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# LIGHT & SOUND EXPEDITION

*A Guide from the Creativity Lab*

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# About This Project

This is an overview of a semester-long learning expedition designed for first graders. Each of the projects in the expedition is interdisciplinary and involves making. The expedition centers on the questions: How do light and sound travel, and how are they used for communication?

In each of the projects involved in this expedition, students investigate science concepts through making. Each project has its own set of inquiries to launch discovery:

**Instruments**
How is sound made? Through their senses of touch and hearing, students discover that sound involves vibration.

**Light Play**
What is light? How does it work? By playing with light and watching it interact with different materials, students explore light.

**Shadow Puppets**
How are light and sound used for communication? Students design and perform a shadow puppet play using light boxes and instruments. Expedition Product.

# Our Story

Two first grade teachers, Virginia and Rebecca, teamed up with the Creativity Lab to design making projects that would drive student learning about light and sound. Based on the work of Seymour Papert, we believe deeper learning occurs when we create things with our hands.

In the Light and Sound Expedition, students investigate how light and sound travel and how they are used for communication. Throughout the unit, students return to the same essential questions as they develop their understanding.

Our expedition is aligned with the waves focus of the Next Generation Science Standards, In particular, our inquiry-based model is focused on the NGSS practices.

# Projects in this Expedition

Instruments

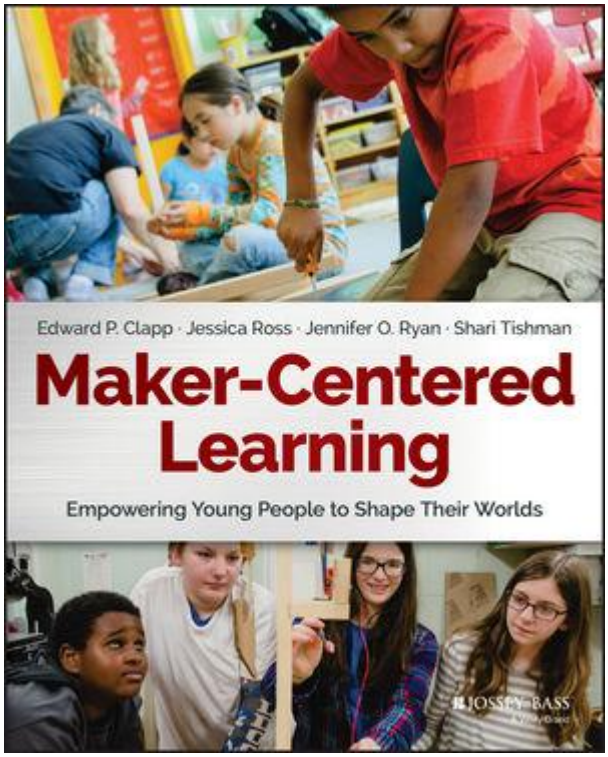
Light Play & Shadow Puppets

# Context: Before we make...

At the Creativity Lab, we support standards-based content learning through making. The learning targets in this expedition are focused on science and literacy.

The Creativity Lab has an ongoing collaboration with Agency By Design, a research initiative of Project Zero at Harvard University. Supported by the Abundance Foundation, teachers and researchers have gathered stories and best practices of maker learning, captured in Maker-Centered Learning published in 2017.

(http://www.agencybydesign.org).




# Expedition Description

Over the course of three months, our first grade students engaged in the expedition twice per week, for about 45 minutes per session. Making projects were integrated into the study, rather than during a separate time period. In our first case study, students explored sound by feeling vibrations of various instruments. By looking at a guitar string under a magnifying glass, we saw that sound travels in waves. Then, we built our own instruments, each vibrating — and making sound — in a different way. Next, students explore light. Light waves move too fast to see or feel, but we can learn about their properties through experimentation. In our second case study, students explored different materials in light boxes and noticed how they interacted with light, making discoveries about shadows and reflection. Finally, students use their our key understandings about sound and light to create a final project: a shadow puppet play based on the Elephant and Piggie books, texts students had been reading throughout the year.

# Guiding Questions

- What are light and sound? How can we use light and sound to communicate?
- How do we hear and make sounds?
- How do we see things?
- How can we use light and sound to tell stories?

# Essential Understandings

- Light and sound are both waves that travel to our bodies so we can see and hear.
- Sounds are made when something vibrates.
- We see objects when light bounces off them and into our eyes.
- We see shadows when light is blocked by an object.
- We can create patterns of sound and light in order to communicate.

# Standards Assessed in The Expedition

**Next Generations Science Standards (NGSS)**

| Performance Expectations | Long-term Learning Targets |
|---|---|
| (1-PS4-1) Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. | (1-PS4-1) I can make sound by making matter vibrate. |
| (1-PS4-2) Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. | (1-PS4-2) I can make objects seen by illuminating them. |
| (1- PS4-3) Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light. | (1- PS4-3) I can reflect light with a mirror.<br>(1- PS4-3) I can make shadows. |
| (1- PS4-4) Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. | (1- PS4-4) I can make and use devices to communicate over long distances. |

**Common Core Reading Standards**

| Standard | Long-Term Learning Target |
|---|---|
| RI 1.1 | I can ask and answer questions about key details (non-fiction) |
| RI 1.2 | I can talk about the main idea and details. |
| RI 1.5 | I can use features of non-fiction text. |
| RI 1.6 | I understand how picture information is different from text information. |
| RL 1.5 | I know the difference between fiction & nonfiction. |
| RF 1.3 | I can use strategies to read words. |