Let's make a game!	Grade 4: Light and Sound

Lesson Plan

Coding Tool	Scratch
Cross-curricular	Language Arts

Big Ideas
- Light and sounds are forms of energy with specific properties
- Light is required to see
- Technological innovations involving light and sound have an impact on the the environment

Learning Goals
- Identify sources of light in and around the school
- Classify sources of light into two categories: natural and artificial
- Create a "rule" for defining the difference between natural and artificial light

Specific Expectations

1.2 assess the impacts on society and the environment of light and/or sound energy produced by different technologies, taking different perspectives into account

2.6 use appropriate science and technology vocabulary, including *natural*, *artificial*, *beam of light*, *pitch*, *loudness*, and *vibration*, in oral and written communication

2.4 use technological problem-solving skills (see page 16) to design, build, and test a device that makes use of the properties of light

2.6 use appropriate science and technology vocabulary, including *natural*, *artificial*, *beam of light*, *pitch*, *loudness*, and *vibration*, in oral and written communication

2.7 use a variety of forms *(e.g., oral, written, graphic, multimedia)* to communicate with different audiences and for a variety of purposes

3.1 identify a variety of natural light sources *(e.g., the sun, a firefly)* and artificial light sources *(e.g., a candle, fireworks, a light bulb)*

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Description

This is lesson two of two where students will explore the differences between light sources we see all around us. Each lesson can be done independently or in sequence. The purpose of this lesson is to provide students with the opportunity to show their understanding of the differences between natural and artificial sources of light by creating a sorting game using Scratch.

Materials

- Types of Light pt.2 Handout
- Computer with internet
- Projector (Optional)

Computational Thinking Skills

- Block based coding
- Scratch specific knowledge (what is a sprite/how to create a sprite, how to hide a sprite, how different sprites communicate with each other)
- Decomposition (breaking down a problem into smaller, solvable problems)
- Algorithm design (creating a sequence of instructions to accomplish a task)

Introduction

Review:

- Students begin with *Types of Light pt.2 Handout* facedown on their desks
- Teacher asks the class to come up with a definition for natural light and artificial light
- Students can discuss definitions in partners and then share their ideas with the class
- Ask: Can we find sources of artificial light in the classroom? Outside the classroom? How about sources of natural light?
- Once a few suggestions have been offered, ask students to turn over their worksheets and complete the table

Action

Introduction to Scratch

- **Set up:** Students are in front of a computer, and the PowerPoint is projected onto a screen for everyone to see.
- The first half of the slideshow will focus on becoming familiar with Scratch. Students should be following along on their computers (e.g., when the slide has an image of the coding blocks, students practice navigating through the different coding blocks)
- As you are guiding students through the presentation, ask them to think about one thing that is important to remember when using Scratch. When they hear something they want to remember, they are to write it down on the first page of their handoutt in the appropriate section. (E.g., how to copy and paste an image into Scratch)

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Introduction to coding

- Follow the link in the PowerPoint to access a completed sorting game on Scratch.
- When you open the link, it will take you to the project page. Invite a student to read the game instructions and to play the game.
- To see the inside of the game, click on the blue "see inside" button on the upper right side of the window
- Invite a student to come up and explore "inside the game".
- Ask: What do you notice about the codes? The Sprites?
- Return to the PowerPoint to examine the code further
- Students follow the instructions on the PowerPoint to create code on Scratch.
- On the worksheet, students draw the code for a Light Source sprite, and for a Sorting Box sprite. This will help them when they go to create their own sorting games.

Game Makers

- Students add to their sorting games. Set the challenge for them to include 3 sources of natural and 3 sources of artificial light in their game.
- When a student is finished, they must find someone else to play their game. The person who plays their game completes the peer-evaluation checklist and signs it. Once it has been signed, the student can try and add more detail to their game. (E.g., sound effects score counter, celebration page upon game completion, etc).

Consolidation/Extension

Reflection

- Students put computers away and return to their desks.
- Ask: "How did this activity help you learn about light?". Students discuss their answer with a partner, and then are invited to share their thoughts with the class (i.e. Think, Pair, Share)
- Ask: "What problem were we trying to solve with coding?", Think, Pair, Share.
- Highlight that this is what we would call the "big problem". Students write down the big problem on their worksheet (e.g., "The big problem was how to sort sources of light.").
- Highlight that to solve this big problem, we had to break it down into smaller problems. We call this "decomposition". We know that there was decomposition because instead of one giant script, each sprite had it's own script.
- Ask: "What was a small problem that we found in the big problem?" Think, Pair, Share.

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- Write some student examples on the board while students answer the corresponding question on the worksheet.
- Lastly, to finish the lesson, students complete a t-chart for natural and artificial light. They are asked to describe one advantage and one disadvantage of each source of light.

Assessment

- Class discussion
- Looking at student games
- Worksheet

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