bright *Girls*

Broadening Research Interest in Geoscience, Habitat, and Technology (BRIGHT)

Investigation 5: STOP MOTION ANIMATION

Grades 9-12

Time requirement: 2 hours

Next Generation Science Standards (NGSS)

Science and Engineering Practices
Developing and Using Models • Develop a model based on evidence to illustrate the relationships between systems or between components of a system.

Disciplinary Core Ideas

Earth and Space Science
• ESS2: Earth's Systems
  ○ ESS2.A: Earth Materials and Systems
    ▪ Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes.

Crosscutting Concepts
Stability and Change • Much of science deals with constructing explanations of how things change and how they remain stable. • Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible.

OVERVIEW

Students solidify their understanding of a field area of interest by creating stop-motion animations about it.

LEARNING OBJECTIVES

Students will be able to:

- produce a stop-motion animation about a field area of interest.
- communicate about their animations.

INSTRUCTIONAL APPROACH

This investigation can take place in the field, incorporating natural materials, or in the classroom. Engage students by asking them to share their own experiences with the area of interest and with animation (particularly stop motion). Providing students opportunities to make choices based on individual preferences fosters their creative agency. The instructor should facilitate student exploration and idea development through questions and prompts that encourage experimentation with materials and techniques for communicating visually. The instructor should accept all student responses as value-neutral.

SCIENCE BACKGROUND

Illustrations, visualizations, time-lapse photography, and animations are tools that scientists use to understand and share their work. Stop motion animation involves taking a series of photographs in which objects are moved slightly between each shot so that, when the pictures are viewed in rapid succession, the objects appear to move on their own. Specialty software programs facilitate the production of stop motion animations as one form of visual communication.

MATERIALS

- Blank index cards, 5x8", 1 per group of 2-3 students, plus extras
- Multi-colored construction paper, 10-color pack with 240 sheets
- Multicolor felt tipped markers, 1 pack per group
- Manila envelopes, 1 per group
- Glue sticks, 1 per student
- Scissors, 1 per student
- Pencils, 1 per student
- Scrap paper (newspaper or copy paper, for protecting tables from glue)
- Masking tape, 1 roll
- iPads or other devices with camera and Stop Motion Studio App (free for iOS or Android), 1 per group
- iPad stands or tripods (optional)
- Projector

ACTIVITY

Setup

1. Install Stop Motion Studio, or desired animation application, on iPads or other devices. Decide and set up where animation files will be stored, e.g., Google Drive.

2. Charge all devices.

3. Cover work surface with scrap paper, securing edges with masking tape.

Investigation
2 hours

Introduction
15 minutes

1. Ask students:

   - *Do you like animated movies? If so, what is one you have enjoyed recently?*

   - *What different types of animation have you seen?*

   - *What is stop motion animation? What is an example of a stop motion animated movie?*

2. Let students know that they will be designing a stop motion animation to communicate about their field area/habitat and/or species of interest (e.g., tidewater glaciers and fjords as seal habitat in Juneau, Alaska). It is important to let students select a topic that they like in order to facilitate ownership and learner control over the task.

3. Divide students into groups of two or three (two will facilitate greater engagement in the animation process). Ask students to decide on a topic to animate (they do not have to decide on their storyline yet, just their focus). Ask each pair to share their choice with the rest of the group.

4. Ask students to consider how a scientist who studies their field area/species might communicate their findings to other people. Collect student ideas.

5. Show an example of stop motion animation to give students an idea of the outcome (ideally about a different topic, so as not to influence new creations): http://www.colorsofnature.org/kit-3-resources/

6. With the time remaining, have the groups brainstorm a scenario to animate.

Animation design and production
55 minutes minimum, but allow up to 1.5 hours if possible

1. Divide students into their working groups (they will already have chosen a topic and brainstormed a scenario to animate).

2. Show students an example of a simple storyboard: http://www.colorsofnature.org/wp-content/uploads/2017/03/example_storyboard.pdf.

    Discuss:

    *   *How would you describe this storyboard? What elements does it have?*

    *   *Is it very detailed? Is it in color?*

    *   *How long do you think it took to make?*

3. Distribute index cards and instruct each group to make a storyboard for their animation. A storyboard is a visual outline of key moments in the animation. Have students divide the index card into a grid of 10 squares and sketch the action that will occur in each scene, like a cartoon. These do not need to be elaborate drawings, just reference points to guide the production. The final animation will be around 10 seconds long, so it's best to keep the story simple!

4. Circulate among groups and discuss storyboards. Encourage students to avoid very detailed scenes or numerous characters, in the interest of time.

5. Once students complete their storyboards and discuss them with the instructor(s), have them use construction paper, scissors, and glue to create backgrounds for their scenes and the characters that will appear in the story. Students should use their storyboard as a guide to the components and characters that will be needed for each scene. Instruct them to label a manila folder with their names in which to store their characters and scenes.

6. Demonstrate using the iPad and the Stop Motion Studio app to take pictures of scenes and characters. To animate the scene, have students move the characters across the background, taking a picture each time. Emphasize very small movements, similar to gradual changes over geologic time. Recommend taking 10 pictures of each of the 10 scenes in the series, for a total of about 100 pictures/a 10 second animation (at a rate of 10 frames per second). Share tips (students will also discover these as they go; sharing them initially can help raise the animations' production value and avoid reshooting):

    *   Try to keep the camera as flat and steady as possible.

    *   Consider lighting, e.g., face a window; try not to cast shadows on the scene.

- Press the question mark button to see labels and the in-app manual.

- The "onion skin" slider on the left side of the screen lets one toggle between what the camera sees and the most recent picture taken, showing a transparent "ghost" of the previous image, which helps with alignment and continuity.

- Check lighting and field of view before taking the first picture; consider filling background with large pieces of construction paper.

- Make small movements between each picture.

- To make an element show up for longer, e.g., a title page, take multiple pictures or pause a picture multiple times.

7. Students use the iPads and the Stop Motion Studio app to capture each image and create the animation. (While students are often able to complete this task easily, further step-by-step instructions are available at https://www.cateater.com/support/en/stopmotion/stopmotion-main.html).

   Students can experiment with the number of scenes and number and duration (frame rate) of pictures. They may wish to create a title page with the name of the movie, animators' first names, and a short sentence describing what the animation illustrates. Students may also wish to include a credits page.

8. Help students export their animations as movies and save them in a designated Google Drive folder, as well as to each iPad's camera roll as a backup (students will need to keep track of which iPad they used).

Instructors' note:
If cameras and animation software are unavailable, students can still explore designing a graphic representation of landscape evolution by using their storyboard as the basis for creating a finished comic strip.

Film festival
Allow 5 minutes per group, if possible

Have students share their animations and tell the class about their creative choices in representing their field area and/or species. One possibility would be to upload all animations onto the teacher's computer (e.g., in a designated Google Drive folder) and have students present as they are shown on a projector. If a projector is not available, another option would be to divide the class in half and have one half of the class circulate to view presentations on the iPads. The class would switch roles after the first group is finished.

Have students describe their animations and answer:

- *How did you depict your chosen topic?*

- *What changed from your storyboard to your animation?*

- *What new questions do you have as a result of making your animation?*

Ask the class to give value-neutral feedback to the animators, considering:

- *In what ways does the animation communicate the group's chosen topic?*

- *What could be changed about this animation to communicate the topic more effectively?*

Extension

Stop motion animation is ideal for integration with other content areas; there are numerous possible technique variations. To extend this investigation, have students create their animations at a field site, using rocks and other natural materials. They could also document their animation process, e.g., with time-lapse photography, if additional cameras are available. If time and equipment allow, students could add audio to their animations, e.g., using iMovie.

Other variations include, but are not limited to:

- Using everyday objects or small figurines

- Claymation: using play dough or modeling clay

- Pixilation: photographing people moving frame by frame (may lead to confidentiality issues if students are identifiable in photos)

- Moving sand or cornmeal on a flat surface

- Moving paint (mixed with glycerin to prevent drying) on a glass surface

- Adding hinged limbs to paper cut-outs, e.g., with brass fasteners

- Drawing on whiteboards and adding to or erasing the drawings in each frame

- Drawing on multiple pieces of paper, e.g., using a light table, then photographing each

- Flipbooks: flipping back and forth between two or more drawings

- Replacement animation: swapping two or more of the same element in different positions in each photograph

Source

http://www.colorsofnature.org/wp-content/uploads/2018/12/K-3-All.pdf

OTHER RESOURCES

Stop Motion Studio for iOS manual:
https://www.cateater.com/inapphelp/wp/en/stopmotion/

Stop Motion Studio app tutorial:
https://www.youtube.com/watch?v=X_M468S86H

Introduction to animation:
http://onf-nfb.gc.ca/medias/download/documents/pdf/Prod_Stopmo_L2_ANG_ib_07.pdf

Overview of technology and principles of animation:
http://onf-nfb.gc.ca/medias/download/documents/pdf/Prod_Stopmo_L3_ANG_ib_06.pdf