Snow Sculptures

Culturally Relevant STEM Lesson Plan

Sarah Miner
SCED 546

Grade: First	**Time:** 30min period + 60 min period
NGSS Standards: K-2-ETS1-2 Develop a simple sketch, drawing or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. **CCSS.Math.Practice. MP5** Use appropriate tools strategically **NCAS Anchor Standard 2 Organize and develop artistic ideas and work** • **VA:CR2.1.1a** Explore uses of materials and tools to create works for art or design • **VA:CR2.2.1a** Demonstrate safe and proper procedures for using materials, tools, and equipment while making art	**Objectives:** Students will • Use the Engineering Design Process to create a sculpture out of snow. • Collaborate with their teammates to design a model of their sculpture. • Collaborate with their teammates to build a sculpture. • Build a snow sculpture using provided materials. • Understand artists sometimes act as engineers.
Materials:	
30 Min Period • Artist interview video https://www.youtube.com/watch?v=rwaihqZsE_c • IPads • Photoshop Sketch App • Engineering Design Process poster • Structural Engineer video https://youtu.be/od_MpNUzeCE	60 Min Period • Plastic spoons, forks, knives • Snow • Trays • Team sketches • Gloves • Engineering Design Process poster • Ruler • Timer

Background Information: The school I am at has a stable population. Many of the students who attend here had siblings, parents, and grandparents attend this school. My first grade class consists of 24 students. About half of them are boys, and the other half are girls. The majority of the students in my class come from two-parent households. They are a part of the white middle class, with highly educated parents. These students have one parent who works, and the other who stays at home with the kids. I have about five students who identify as Alaskan Native, specifically Inupiaq, Athabaskan, and Gwich'in, one student who is Native Hawaiian, one student who is Puerto Rican, and one student who is White and African-American. About six students receive free and reduced breakfast and lunch. Two of them live in extreme poverty. Two students receive Speech and Language services, and one student receives Special Education services. Nine of my students looped from Kindergarten to First Grade with me, and as a result, took on a leadership role in the classroom. They help the other students navigate the hidden rules of my classroom culture.

Multicultural Components: One of the cultural components is my lesson is the tie-in to a community event. All students have prior knowledge of ice sculptures, and have experienced the difficulty of manipulating ice and snow. This draws on their experiences with the world, and allows the students to connect what they know directly to what they are learning.

Another cultural component in this lesson is the use of discussions. Frequently students are pulled back to whole group to check for understanding. The discussions also allow the

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students who are verbal processors to have a chance to talk through their thought process. It also allows an opportunity for me to reinforce the language of engineers.

A third component is the use of teams. Students are paired by learning style, as a way to complement each other. The teams have been kept small, about 2-3 students. Each team will assign tasks to each other, i.e. who draws the design and who edits it. The teams must rely on their shared knowledge to successfully design and build a snow sculpture.

A fourth component is in the use of a rubric for assessment. The use of a rubric helps students navigate the hidden rules of school. The rubric explains specifically what is needed to be successful in this lesson. By sharing the rubric with my students before the assessment, it allows them time to process the criteria for success, and gives them an opportunity to ask for clarification on things they do not understand. The rubric also provides a clear justification for why a student received a certain grade. This helps the parents understand the grading criteria as well, and takes the ambiguity out of the grading.

Technology Component: There are several technology components incorporated into this lesson. One component is the use of videos as visual aids by the teacher. The videos help prepare students by providing a concrete model for students to begin the process of preparing for the lesson. Another component is the use of IPads during the design process. Students are able to use the Photo Sketch App to design, and quickly edit, their ideas. The IPads are also used at the end of the lesson to photograph the students' snow sculptures.

Justification: Each winter in Fairbanks, Alaska, artists from around the world come to compete in the Ice Alaska World Ice Art Championship. It is a tradition for students to visit the ice park with their families. There they will see artists turning blocks of ice into beautiful sculptures, play on the ice slides, and get lost in the ice maze.

Hook: The class will have returned from a field trip to the Ice Park. There the students had the opportunity to observe artists creating sculptures, learn about the process and tools needed to complete a successful ice sculpture, and see examples of successful/unsuccessful designs. Give students this scenario: *You are an artist competing in the 2018 World Ice Art Championship. You and your team will need to design and build a sculpture for the competition. You sculpture must have a strong base, be at least 6 inches tall, and stand on its own.*

Procedure

30 Min Period	60 Min Period
Engage: Discuss with the class highlights from the fieldtrip. Show students the EDP poster. Briefly explain the steps. Show the artist interview video. Discuss the artists' process for creating a sculpture. Explain to students that they will be designing a snow sculpture, give scenario, and break students into teams of 2 or 3. Questions: - What were some memorable	**Engage:** Whole group discussion: Remind students they will be sculptors/engineers today. Have students get into their teams, and pass out their sketches. Explain we will test out our designs using the available tools. Students will have 15 minutes to build their sculpture. Show tools to students. Show EDP and ask students to which steps they have completed. Explain the

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designs we saw at the Ice Park? - What sculptures fell apart? What sculptures were standing? Why do you think that is? - Are the artists acting as engineers? How do you know?	students are now on the “Create” step of the EDP.
Explore: Students work with teammates to think of a sculpture design. Then create a sketch of their design using the Photoshop Sketch App.	**Explore:** Distribute tools to teams, and allow students to begin building. After 15 minutes, call teams back to the group. Discuss how building their sculptures is going. Questions: - What techniques have been successful when using the material and tools? What techniques were not?
Explain: Whole group discussion on what designs each team has decided on. Share sketches. Have teams briefly share reasons for choosing their design. Point out how students are acting as artists/engineers, and show which steps of the EDP students have used.	**Explain:** Explain that structural engineers often face challenges when designing. Brainstorm ideas for overcoming the challenges students have by building with snow. Questions: - What challenges did you discover when testing your design? - How can you work around these? - Can you describe a strategy that will keep your structure standing as snow melts?
Elaborate: Discussion on the similarities of sculptors and structural engineers. Show “What is Structural Engineering?” video to students. Show varies pictures of buildings, bridges, and sculptures. Discuss similarities in why these structures are standing. Questions: - Describe a similarity between a sculptor and a structural engineer. - Why do you think these structures are able to stand? - What challenges do structural engineers and sculptors face?	**Elaborate:** Explain artists/engineers make improvements on their designs, sometimes by creating a completely new design. Have teams work together to improve their sketch to overcome some of the challenges they discovered during their first build. Give teams time to use their improvements to build their snow sculpture. When teams are finished, have the class do a Gallery Walk to view everyone’s sculptures. Discuss the sculptures. Questions: - Were there any tall sculptures?

Snow Sculptures
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SCED 546

	Why do you think they were able to stay standing? - Were there any sculptures that fell? What do you think caused that? Could we change something to fix it?

Evaluate

Students will answer the following prompt in their journal: Describe how artists and engineers are similar. How do they use the Engineering Design Process to build a successful structure?

The following rubric will assess the lesson objectives:

	3	**2**	**1**
Understanding of the EDP and How Artists Act as Engineers	Explains how artists and engineers are similar with 2-3 examples.	Explains how artists and engineers are similar with 1 example.	Does not explain how artists and engineers are similar.
Snow Sculpture Design	Makes improvements to design and builds a successful sculpture. Uses tools strategically.	Makes improvements to design and attempts to build a sculpture. Uses some of the tools.	Does not make improvements to design and does not build a sculpture. Limited use of tools.
Collaborate with teammates	Works with teammates. Shares tools with teammates. Teacher intervenes once or not at all.	Works with teammates. Teacher has to intervene a few times.	Does not work with teammates.