KEEP THOSE HANDS WARM! *(MODIFIED FOR ADEED)*

INSTRUCTIONS

Science Teacher Education Program

Science Concept:

Different materials act as insulators.

Objectives:

The student will:

- explain how materials insulate;
- make a generalization; and
- write sentences.

GLEs Addressed:

Science

[3] SB2.1 The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by classifying materials as insulators or conductors (i.e., fur, metal, wood, plastic) and identifying their applications.

[3] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

Writing

[1] W1.2.2 The student writes for a variety of purposes and audiences by writing a variety of responses to text (e.g., response logs, journals).

Vocabulary:

insulate - protect (something) by interposing material that prevents the loss of heat or the intrusion of sound

Materials:

- Ice cubes (six to eight, in a bowl)
- Gloves (three types: cotton, knit, fiberfill)
- Plastic transparent cups filled to within 1/2 inch of top with water and frozen (three per group)
- Variety of materials (fur, fiberfill, fabric: cotton, wool, fleece, denim, knit)
- Rubber bands
- Science journals (one for each student)
- STUDENT WORKSHEET: "Materials Observation"

Activity Preparation:

1. Fill cups to within ½ inch of top with water and keep frozen until the Explore activity.
2. Cut the fabric material into 6x6 inch pieces.

Activity Procedure:

Please refer to the assessment task and scoring rubric located at the end of these instructions. Discuss the assessment descriptors with the class before teaching this lesson.

Gear Up

Process Skills: observing, describing and communicating

1. Show students the ice cubes in the bowl and ask them how they could keep them from melting. Record all student responses on the board.

2. Show students the gloves and ask which one would keep their hands the warmest if they were outside in the winter. Record responses on the board and discuss.
3. Discuss why things need to be kept cold or warm.
4. Ask students if they know what the word insulate means and discuss student responses. Discuss that insulating something keeps it the temperature you want it to stay (ice stays frozen, hands stay warm). Write the group's definition of insulate on the board to refer to later if needed.

Explore
Process Skills: observing, predicting, collecting data and communicating

5. Tell students they will be doing an investigation about which materials will keep an ice cup insulated (will melt the least).
6. Divide the class into small groups. Discuss the STUDENT WORKSHEET: "Materials Observation." Have groups choose the three materials they will be using. Do the investigation. Each student in the group should complete a worksheet. The teacher should indicate when the students should draw their observation (15, 20, 45, 60 minute intervals).

Generalize
Process Skills: describing, communicating and making generalizations

7. Bring the students together after the investigation and have them bring their worksheets. Ask the following questions:
   a. What happened to the ice cups?
   b. Why did that happen?
   c. Which material was the best at keeping the ice cup insulated?
   d. What material was the worst at keeping the ice cup insulated?
   e. What would happen if there was more ice in the cup?
   f. What would happen to the ice if we observed it for a longer time?
   g. What material should be used to keep something warm?

Apply
Process Skills: describing and communicating

8. Ask students to pretend that they have a cup of hot chocolate they want to keep warm. In their science journal they should draw a picture and label it to describe what material or materials could be used to keep it warm.

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RUBRIC

Assessment Task:

Tell students to imagine that they are going on a walk outside and it is cold. In their science journal they must explain what kind of gloves they would wear to insulate and keep their hands warm. They will write at least three complete sentences that include at least one kind of material that the glove could be made of. They should also include at least one generalization about insulation.

Rubric:

Objective	GLE	Below Proficient	Proficient	Above Proficient
The student explains how materials insulate.	[3] SB3.1	Does not write an explanation.	Explains which kind of glove would insulate their hands and lists one material.	Explains which kind of glove would insulate their hands and lists two or more materials.
The student makes a generalization.	[3] SA1.1	Does not write a generalization.	Writes one generalization.	The student writes two or more generalizations.
The student writes sentences.	[1] W1.2.2	Writes two or fewer complete sentences.	Writes three complete sentences.	Writes four or more complete sentences.

NAME: _____

MATERIALS OBSERVATION

Directions:

- Choose three materials to investigate.
- Predict which material will be the best at inslating the ice.
- Wrap each ice cup completely in a different material. Use the rubber bands to secure them.
- Observe (using your eyes) to see how the materials help to insulate an ice cube.
- Fill in the chart on the following page during your investigation.
- Answer the following questions.

Which material was the best at insulating the ice cup?

_____

Which material was the worst at insulating the ice cup?

_____

NAME: _____

MATERIALS OBSERVATION

Material Draw a picture of each material below. Write the name of the material.	**15 minutes** Draw what the ice looks like now.	**30 minutes** Draw what the ice looks like now.	**45 minutes** Draw what the ice looks like now.	**60 minutes** Draw what the ice looks like now.