

EDUC 315
Korrine Gust
11-16-05

LESSON PLAN by: Meganmarie Pinkerton

Lesson: Keeping Warm? **Length:** 40 minutes

Age or Grade Intended: 5th Grade

Academic Standard(s):

5.3.10 Investigate that some materials conduct heat much better than others, and poor conductors can reduce heat loss.

5.5.1 Make precise and varied measurements and specify the appropriate units.

5.1.7 Give examples of materials not present in nature, such as cloth, plastic, and concrete that have become available because of science and technology.

Performing Objectives: Given cups of water, students will measure the temperature of the water using a thermometer with 90% accuracy.

Students will record the temperatures of water on a chart with 85% accuracy.

Using the temperature data on a chart, students will determine which materials are the best conductors of heat with 85% accuracy.

Advanced Preparation by the Teacher: The teacher needs to have 4 similar sized/shape cups or mugs made out of metal, clay (ceramic), paper, and polystyrene marker; hot plate; cooking pot; water; 4 thermometers; clock; metric measuring cup; transparency of Black Line Master (BLM) *Keeping it warm?*; overhead projector; overhead marker; copies of BLM *Keeping it warm?* for each student. The teacher needs to label the cups A, B, C, D, and heat the water before class.

Procedure:

Introduction/Motivation: Ask students what they do to keep warm in the winter (example: wear layers, put on a coat, use a blanket). Then ask them what they do to keep food or drinks warm (example: use a thermos, use tin foil). Tell them that today they will investigate how different types of containers help to keep liquids warm. Explain what conduction is- the movement of heat through matter. One thing to remember is that poor conductors reduce heat loss. Explain that you will be using four different types of cups to hold hot water and the students will help you to record how the heat of the water changes in each container. You will observe which ones cool down faster etc. to see which containers are better conductors.

Step-by-Step Plan:

1. Show the students examples of each container, talk about what they are made of. Then have the students predict which containers they think will be better conductors of heat (Blooms Synthesis). Instruct students to record the materials of the cups and their predictions on the *Keeping it warm?* worksheet.

2. Set out the four cups and place the thermometer in each one. Pour 200ml hot water into each cup. Why is it important to pour the same amount of water into each cup? (Bloom's Knowledge)
3. Put the transparency of the *Keeping it warm?* worksheet on the overhead projector, record the start time on the sheet and instruct students to fill out their sheets accordingly. Continue to fill out the worksheet as the lesson progresses.
4. Call four volunteers to read the temperatures on the different thermometers. Take this opportunity to review thermometer use. Then help the volunteers fill out their temperatures on the overhead and instruct the other students to record the data on their sheets. (Gardner's mathematical, visual and kinesthetic intelligences)
5. Break the class up into four groups and assign each group to a cup. Tell each group that they are responsible for measuring the temperature of the water in their cup every two minutes for 10 minutes total. Every two minutes instruct students to record their data on their worksheets. (Gardner's mathematical, visual, kinesthetic, and interpersonal intelligences)
6. At the end of 10 minutes instruct a member from each group to record their data on the overhead transparency. Then have all the students record all the data on their worksheets.
7. Instruct students to look at the last row of data and use that information to fill out the remainder of the worksheet. Which cup was the poorest conductor? (Bloom's Comprehension) What material makes up the cup? Does metal or paper conduct heat better? (Bloom's Knowledge) Why do you think this cup kept the water hottest the longest? (Bloom's Evaluation) Have them look at the data again and determine which cup was the best conductor. Of all the cups tested which should restaurants use for hot chocolate? (Bloom's Evaluation) (Gardner's mathematical, intrapersonal, and visual intelligences)

Closure: Instruct a few volunteers to help clean up the cups and thermometers (remind them to be careful if the water is still hot). Instruct students to move back to their seats and pass their worksheets to the front. Tell them to investigate the cups and containers that they use at home and see what kind of materials they use for food and drinks. Then tomorrow they will discuss what materials are often used to keep food warm or cold.

Adaptations/Enrichment: This lesson has a few adaptations already built into it with solo and group work, it also provides multiple opportunities to enforce the data that is being recorded and many helpful follow up questions. Students with emotional disabilities might have trouble working in one of the four larger groups while recording temperature. They might benefit from pair work where they will be forced to participate in recording and measuring. This is also true for students with learning disabilities, MiMH, and ADHD. I think that smaller groups or maybe even pair work to record and measure the temperatures would give each student a chance to measure the temperature and keep them from losing interest during the 2 minutes in between readings. Perhaps more discussion questions could be asked during the wait time or the teacher could be measuring the temperature of other things on the overhead to keep their attention. Students with learning disabilities or MiMH might have trouble with some of the questions on the worksheet or filling it out so they would benefit from discussing and filling out the worksheet

in pairs or having a class discussion about all the questions. Having the overhead to reinforce the data that should be written on the worksheets is an adaptation already written into the lesson to help with these problems.

Self-Reflection: I will know that the lesson is successful if...

- If the students fill out their worksheet correctly.
- If the students can determine which types of cups would be better for drinks.
- If the students understand why some cups are better conductors than others.
- If the students enjoy and are engaged in the activity.

I will assess this lesson by...

- Checking their worksheets for accuracy.
- Observing students participation in measuring and recording data.