LESSON PLAN

Name: Kristen Wahl
Date: April 7, 2001
Content Area: Science
Unit Topic: Electricity
Today’s Lesson: The Bag-o-Stuff: Exploring Conductors and Insulators
Grade Level: 4th
Duration: 12:30-1:15 p.m.

LESSON RATIONALE

N.Y.S. Mathematics, Science, and Technology Standards:

Standard 1: Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

  Key idea 1: The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

  Key idea 3: The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.

N.Y.S. English Language Arts Standards:

Standard 1: Students will read, write, listen, and speak for information and understanding.

  Key idea 2: Speaking and writing to acquire and transmit information requires asking probing and clarifying questions, interpreting information in one’s own words, applying information from one context to another, and presenting the information and interpretation clearly, concisely, and comprehensibly.

Standard 3: Students will read, write, listen, and speak for critical analysis and evaluation.

  Key idea 2: Speaking and writing for critical analysis and evaluation requires presenting opinions and judgements on experiences, ideas, information, and issues clearly, logically, and persuasively with reference to specific criteria on which the opinion or judgement is based.

Instructional Objectives
Students will:
1. Demonstrate whether or not certain materials conduct electricity [Application]
2. Classify in writing each object in the bag as a conductor or an insulator [Analysis]
3. Define in writing conductors and insulators and summarize which sorts of materials are conductors and which are insulators [Evaluation]

Adaptations:
- For student with hearing impairment: Teacher and student(s) will wear voice-enhancement device
- For student with visual impairment: Student will be given large print worksheets and charts, and will have access to a magnifier. Teacher will check for understanding of visual materials frequently.

Materials:
- worksheet on conductors and insulators (copies for the students and one copy on overhead paper for the teacher)
- an overhead projector and marker
- a blank piece of overhead paper
- batteries, light bulbs, wires, and clips (one set for each group)
- paper bags containing pennies, nails, cloth, tongue depressors, straws, plastic spoons, paper clips, and rubber bands (one bag for each group)
- lined paper and pencils (for journal entries)

LESSON OPENING

Anticipatory Set:

“Good morning. During your last Science class, you learned about simple circuits, and you had a chance to set up a simple circuit of your own. Can anyone tell me some facts that you remember about simple circuits?” [Call on 2-3 students to give their answers. If no one says so, remind the class that electricity flows through simple circuits, and that the circuits must be closed in order for the electricity to have a complete path.]

“Those are all great answers! You’re right, there needs to be a complete path in order for the light bulb on a simple circuit to light. As you can see, I have a simple circuit set up right here, and it has clips so I can place certain objects inside the flow of electricity. Some objects will cause the light bulb to light, while others won’t. For example, when I place this nail in between the clips, the light bulb goes on. But when I clip in this plastic spoon, the light bulb doesn’t go on.” [modeling]

“In a few minutes, I’m going to be breaking you up into groups. Each group will receive a simple circuit and a bag containing some objects to test. Like the objects I just showed you, some of them will cause the bulb to light, and some won’t. Let’s do our experiment and learn which items are which!”

LESSON BODY

Activities
1. Prepare for the experiment:
   - Divide students into groups of 3-4.
   - Hand out the conductors and insulators worksheet. Have the students put their names on it and look it over.
   - Have the students write “lights the bulb” over the conductor column of the chart and “doesn’t light the bulb” over the insulator column. Illustrate this on the overhead.
   - Give each group their “bag-o-stuff,” a brown paper bag containing the items to be tested. Allow them to look over the various items in the bag as a group.
   - As a class, have the students figure out what each item is and record its name in the “material” column of the chart. Illustrate this on the overhead.
   - Instruct the students to discuss the materials with their group members and to make predictions about which items will cause the light bulb to light and which will not. **[interpersonal]**
   - Call on one spokesperson from each group to list and explain the group’s predictions. Record the predictions on the chalkboard. **[verbal-linguistic]**
   - Ask the students: How do you think you’ll be testing the materials? What will make some different from others? (Have the students record their answers in question #4 on the worksheet.) **[verbal-linguistic]**

2. Conduct the experiment:
   - Demonstrate for the students how to test each of the materials in their bag-o-stuff by clipping it between the clips and observing whether or not the light bulb turns on. Emphasize that the item must be placed firmly between both clips in order for the experiment to work correctly.
   - Using the overhead projector, demonstrate to the class how to record their findings on the worksheet. **[modeling]**
   - Have the students test each item and mark it in the appropriate category on their charts, depending on whether or not the light bulb goes on. **[bodily-kinesthetic]**

   (Since this is a complicated task, the teacher should circulate and make sure the students are filling out their charts correctly.) **[guided practice]**

   - Ask the students: What does it mean if your bulb doesn’t light when a material is in the clip? Which column would you place that material under? **[check for understanding]**

3. Discuss insulators and conductors:
   - Revisit the students’ earlier predictions about which items would cause the light bulb to turn on and which would not, discussing
their accuracy. Have the students brainstorm some possible differences between the various materials.

- Ask the students: Now that you’ve had a chance to work with your circuits, why do you think some materials caused the light bulb to light up while others did not? *(Call on students to give suggestions.)*
- Tell the students: The materials that caused the light bulb to turn on are *conductors*, while those that did not are *insulators*.
- On the blank sheet of overhead paper, write some facts about conductors and insulators:
  1. Electricity travels better through some materials than others.
  2. When electricity travels easily through a material, that material is said to conduct electricity.
  3. Materials that *do* conduct electricity are called *conductors*.
  4. Materials that *do not* conduct electricity are called *insulators*.
- Demonstrate one conductor and one insulator for the class using the simple circuit.
- Ask the students: Which material that I just demonstrated is the insulator? Which is the conductor? *[check for understanding]*

4. Summarize the findings:
   - In the space provided on their worksheets, have the students define conductors and insulators. Then have them summarize which sorts of materials are conductors and which are insulators. *[logical-mathematical]*

   *(For example, metals are conductors, while rubber, wood, and cloth are insulators.)*

   - If they need extra guidance, ask the students: What are some things that the conductors have in common? The insulators?
   - Discuss the results as a class, recording the students’ findings on the chalkboard.

Closure:

“You all did a great job on your experiments today! To finish up, I want each of you to come up with one new thing you learned about conductors and insulators and share it with the class.” *[Call on the students one by one, having each student say his or her fact aloud to the class.]*

“Those are all great ideas! It’s obvious you all learned a lot about conductors and insulators. Now, I want each of you to make sure you have your name on your worksheet. When I say to, the Collector will come around and pick them up. Ready? Go.”
LESSON FOLLOW-UP

Independent practice:
Write a journal entry about why insulators are important on electrical wires.

Evaluation:
What did I want the children to learn?
• Demonstrate whether or not certain materials conduct electricity
• Classify in writing each object in the bag as a conductor or an insulator
• Define in writing conductors and insulators and summarize which sorts of materials are conductors and which are insulators

How will I know they learned it?
• Correctness of classifications of conductors and insulators on worksheet.
• Quality of written answers on worksheet.
• Quality of group work.
• Quality of verbal responses, especially explanations offered to support responses.

LESSON RESOURCES

References for student use:
• Conductors and Insulators worksheet - http://www.galaxy.net/~k12/electric/conduct.shtml

References for teacher use:
• N.Y.S. ELA Standards
• N.Y.S. Mathematics, Science, and Technology Standards
• Handouts explaining Bloom’s taxonomy, Multiple Intelligences, and Adaptations
• Conductors and Insulators worksheet - http://www.galaxy.net/~k12/electric/conduct.shtml