Schulich SCHOOL OF EDUCATION | NIPISSING UNIVERSITY

Lesson Plan

1. Lesson Plan Information	
Subject/Course: Science	**Name:** Mr. Bartlett
Grade Level: 7	**Date:** 05/12/10 **Time:** 1:50
Topic: Heating and Cooling Investigation	**Length of Period:** 80 mins

2. Expectation(s)

Expectation(s) (*Directly from The Ontario Curriculum):*
- investigate ways in which heat changes substances, and describe how heat is transferred;

Learning Skills *(Where applicable):*
- Investigation

3. Content

What do I want the learners to know and/or be able to do?

By the end of the unit, students should be able to explain the difference between temperature and heat, record the changing state of temperatures, identify factors that effect the rate of temperature change, observe the state of solids/liquids/gases when heated, describe and experiment with conduction, convection and radiation, classify sources of renewable energy, and as a final culminating activity, demonstrate how heat loss/transfer can be controlled in one of a number of ways.

Today learners will:
Perform 3 small experiments as part of a general observation about heating and cooling. Specifically, students will hypothesize and make observations about what happens when a solid, liquid and gas are heated and cooled.

4. Assessment (collect data) / Evaluation (interpret data)
(Recording Devices (where applicable): anecdotal record, checklist, rating scale, rubric)

Based on the application, how will I know students have learned what I intended?

Checklist notes compiled based on the participation of the students and their written observations from the experiments

5. Learning Context

A. The Learners

(i) *What prior experiences, knowledge and skills do the learners bring with them to this learning experience?*

- Students have prior experience with the scientific method and its steps
- Students have previously participated in activities requiring group work and research skills
- Students are aware of how to self-reflect and evaluate their own findings

(ii) *How will I differentiate the instruction (content, process and/or product) to ensure the inclusion of all learners?* (Must include where applicable accommodations and/or modifications for learners identified as exceptional.)

- Teacher should ensure to provide written as well as oral explanations (will use whiteboard as form of class instruction when possible)
- C's behaviour and ability to stay on task should be monitored closely
- J should be seated close to the teacher during activities, as his ability to distract one another is disruptive

B. Learning Environment

Students will begin class at their assigned desks.

The classroom is equipped with a whiteboard, a document camera, scanner, computer, and data projector. All other necessities will have to be brought to the classroom (see resources). The classroom will remain in this 'normal' structure until we have discussed the scientific method steps as posted, and some aspects of heating and cooling. The class will perform these experiments using their own body heat, thus will be asked to participate at the front of the class. The experiments will be student participatory and hands on, based on the split class structure and importance of hands on work. I will be at the front of the room while giving the instructional part of the lesson, and will ask for class participation and feedback throughout. I will then use proximity in the classroom as students are writing their observations and analysis. I will use this time to provide guidance, and complete a participatory checklist, if it is warranted, and the lesson portion allows for this management strategy.

C. Resources/Materials

I need to bring:

- This Lesson plan
- Hot dogs
- Empty glass bottle
- Bowl
- Container
- Microwave
- Ice
- Quarter
- Thermometer
- Textbook "Scientific Technology 7
- QOD Books

Students need:

- Pencil (Writing Utensil)
- Eraser

6. Teaching/Learning Strategies

INTRODUCTION (7 mins)

***How will I engage the learners?* (e.g., motivational strategy, hook, activation of learners' prior knowledge, activities, procedures, compelling problem)**

Introduce students to the unit's first experiment in area of "Temperature and Heat", and ask them to refer to their "terms page". ASK, "Who can tell me the difference between temperature and heat?". When the answer is given, advise that will be focusing on both heating and cooling today, and the changes of state of liquids, solids and gases.
ASK: "Who has ever seen a hot air balloon? What happens when it is heated? Cooled?"
SAY: "Heat and Cold can change the size, shape and even look of different things. Think about popcorn, or a chocolate bar left in the sun."
SAY "Today, we will learn what happens to different states of matter when they warm up, and cool down"

MIDDLE: (30 mins)

Teaching: *How does the lesson develop?*

How we teach new concepts, processes (e.g., gradual release of responsibility - modeled, shared, and guided instruction)

I will ASK TO TURN TO PAGE 78 and choral read introduction for heating and cooling. I will have students read together and ask them to think about 2 words in their terms list for today; EXPANSION AND CONTRACTION. I will tell the students you will be doing 3 mini experiments today, one for each state of matter; solid, liquid and gas, but not the ones from the text. I will make sure to advise we will be using the scientific method (posted on science board) and handout sheet from text with all necessary steps.

Give the students the question from the text "WHAT HAPPENS TO A LIQUID, SOLID AND GAS, WHEN HEATED OR COOLED?" This leads to the hypothesis (GUESS) about what will happen to each substance. The experiments begin from here:

- Have all students write their hypothesis separately

- Inform them of all the materials that will be used
- Begin the experiments with the liquid, using the following procedure, and explaining verbally as you go – **SAY OUT LOUD EACH TIME YOU MOVE TO ANOTHER STEP SO STUDENTS CAN RECORD!**
  1) **Fill a beaker with cold tap water. Record temperature of thermometer and place in water for 30 seconds. Ask a student to note the temperature after 30 seconds (What happened to the liquid inside the thermometer?)**
  2) **Have student place thermometer in hand and hold for 30 seconds (What happened to the liquid level this time?)**
  3) **Take cold hot dog and place in opening of 2L pop bottle**
  4) **Take another hot dog, heat for 45 seconds in microwave, and then re-attempt to place into same pop bottle (What is the difference between the hot dogs?)**
  5) **Fill bowl with ice water and place in glass bottle with quarter on top. Leave for 45 seconds.**
  6) **Have student remove bottle from water, carefully, to not disturb quarter, and wrap hands around bottle (What happens to the coin? Why does this happen?)**

Consolidation and/or Recapitulation Process*: How will I bring all the important ideas from the learning experiences together for/with the students? How will I check for understanding?* **(20 mins)**

After each experiment, the students will be asked to write what they observed about the liquid/solid/gas using the leading questions above. They will write the answers to these questions in their "observation" area. They may use the back of the sheet if necessary.

Application: What ***will learners do to demonstrate their learning?*** **(Moving from guided, scaffolded practice, and gradual release of responsibility.) (15 mins)**

Have the students perform the analysis of the overall experiment by providing an answer to this question on the back of the page:

USING YOUR TERMS, EXPLAIN WHAT HAPPENED IN THE EXPERIMENTS WHEN THE SOLID, LIQUID AND GAS WERE HEATED? WHEN THEY WERE COOLED?

Share answers by asking students individually, if time permits

CONCLUSION: ***How will I conclude the lesson?*** **(5 mins)**

Have students re-organize desks, stack chairs and pick up any garbage on floor as tickets out the door

7. My Reflections on the Lesson
What do I need to do to become more effective as a teacher in supporting student learning? **As one of the first experiment classes I have taught, I believe there was initial success in this lesson. Specifically, I attempted to re-activate their knowledge of the "Scientific Method" previously learned by asking the students the order of events necessary and posting their answers on the board. As I followed this up with a reminder sheet they could use for the class, I believe this minimized confusion as the experiment was carried out. As well, because I spoke clearly and slowly throughout the experiment, as mentioned in the lesson plan, of the steps I was taking, when the students asked, "what are you doing?", or "what just happened", I would not give them the answer, but simply repeat what I was doing and place the owness on them to record the process. The observation aspect, or the "SO WHAT" factor revealed they had little motivation to perform inquiry without a real reason. I attempted to explain it easy for us to SEE WHAT HAPPENS, but the most important thing to understanding is to realize WHY. My only desire for the next lesson is to have the students participate more in the actual process of the experiment, and make more efficient use of what limited respources we have. I need to possess more trust in the students to take a hands on approach as this lesson develops in order for them to develop a clear understanding of the topic of heat.**