**Teaching Science as Inquiry (TSI) Lesson Plan**

**Module 2: Chemical Aquatic Science**

Name: Dan Spitler

Activity: Conductivity

1. Why did you choose to do this activity?

*We are studying physical and chemical properties and changes. The adhesion/cohesion lab we did addressed the physical properties; this one addresses the chemical properties.*

1. What are your classroom learning goals?

*In science, that my students start looking at the world differently – at present, they are very passive and do not really push themselves intellectually or scientifically. I would like to get them to start looking at the world through a different lens, in a more questioning and aggressive manner. I want them to take control of their own learning.*

*That and for all of them to pass the HSAs in reading and math ☺*

1. How does this activity tie into your classroom learning goals?

*It is another inquiry based activity that will get my students thinking about what is really taking place rather than just reading about it or watching a demonstration.*

1. What date do you plan to start this activity?

*January 7, 2013*

1. *If applicable:* HIDOE standards this lesson will address

*Standard 1: The Scientific Process: SCIENTIFIC INVESTIGATION: Discover, invent, and investigate using the skills necessary to engage in the scientific process*

*Benchmark SC.6.1.2 - Use appropriate tools, equipment, and techniques safely to collect, display, and analyze data*

***Standard 6: Physical, Earth, and Space Sciences: NATURE OF MATTER AND ENERGY: Understand the nature of matter and energy, forms of energy (including waves) and energy transformations, and their significance in understanding the structure of the universe***

*Benchmark SC.6.6.6 - Describe and compare the physical and chemical properties of different substances*

**Ocean**

1. Describe how you will connect this activity to the ocean:

In follow up and analysis ask the question, “Would you rather be in a boat on a freshwater lake or in the ocean during a thunderstorm?”

1. Select the Ocean Literacy Principle(s) that you anticipate this activity will address. (check all that apply)

□ 1. The Earth has one big ocean with many features.

x 2. The ocean and life in the ocean shape the features of the Earth.

□ 3. The ocean is a major influence on weather and climate.

□ 4. The ocean makes earth habitable

□ 5. The ocean supports a great diversity of life and ecosystems.

x 6. The ocean and humans are inextricably interconnected

□ 7. The ocean is largely unexplored

**Preparation**

8. How will you prepare your students for this activity? (For example, review of prior knowledge.)

*Vocabulary work and discussion on electricity, conductivity, electrical circuits, and ions. Also, the previous labs and activities have prepared them.*

9. Explain any instructional struggles that you foresee and how you will address these issues. (For example, student misconceptions, classroom discussion, aspects most difficult for students to grasp, etc.)

*I’m not sure how much experience and instruction they’ve had with electricity and associated properties and principles. I’ll assign bellwork and provide opportunities for discussion and question prior to the lab as a formative assessment and opportunity for instruction.*

**Questioning and Assessment Strategies**

10. What *questioning strategies* will you use to help your students meet your learning goals?

*Open ended questioning. Encourage discussion both with me and peers*

11. What *assessment strategies* will you use to help your students meet your learning goals and monitor their progress.

*Lab write-up as a summative*

*Observation and discussion before and during lab as a formative.*

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| Use the following table to plan your lesson using TSI. For each phase:* **Mode(s):** List the Mode(s) of Inquiry you will incorporate
* **Teacher:** Describe what you will be doing
* **Student:** Describe what your students will be doing
* **Assess:** Describe how you will assess your students in this phase so you can monitor their progress through the activity

\*Modes: Curiosity, Description, Authoritative knowledge, Experimentation, Product evaluation, Technology, Replication, Induction, Deduction, Transitive knowledge |

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| **INTERPRETATION** | **INITIATION** |
| Mode(s) | Deduction, description, transitive knowledge | Mode(s) | Curiosity, technology |
| Teacher | Answer questions and assist as students work through the analysis portion of the lab write up. | Teacher | Allow leeway in lab for students to modify in their own wayProvide opportunity to explore and discuss electricity and associated concepts. |
| Student | Make connections between the data collected and observations made and what they have learned about electricity, circuits and the properties of water. | Student | Students develop and explore circuits of their own designParticipate in discussion of electricity and associated concepts |
| Assess (look for) | Assess the analysis and “Things to Think About” portion of the lab writie up | Assess (look for) | Differences in electrical circuits, success or failure to create an actual circuit |
| **INSTRUCTION** |
| Mode(s) | Authoritative knowledge, replication, description |
| Teacher | Provide opportunity to explore and discuss electricity and associated concepts. Clarify and rectify misconceptions. |
| Student | Read lab for understanding, participate in discussion of electricity and associated concepts.Record concepts and new learning |
| Assess (look for) | On task behavior, written definitions and concepts in journals |
| **INVESTIGATION** | **INVENTION** |
| Mode(s) | Experimentation, replication, curiosity, technology | Mode(s) | Curiosity, technology, replication |
| Teacher | Provide materials, answer questions and assist resolving difficulties and misunderstandings as they arise | Teacher | Provide support and correct misunderstandings when evident |
| Student | Read and follow directions, perform experiment, ask questions, discuss findings, repeat procedures to confirm results, compare results with other students. Test and modify circuit designs. | Student | Develop hypotheses and explanations at appropriate places in the lab.Modify circuits to complete required portions of labs |
| Assess (look for) | Connections and understanding demonstrated between activities being performed and concepts being investigated through discussion, observation, and checking written work. | Assess (look for) | Hypotheses shown understandings of cohesion and adhesionAre actual circuits created? |

12. Briefly describe how you will direct your students through the Phases of Inquiry.

*1. Instruction – Define and discuss electricity, conductivity, circuits, ions*

*2. Initiation – Make the instruction portion student and discussion based*

*3. Instruction – Intro Part 1 lab write up and discuss. Check for understanding*

*4. Investigation/Invention – Perform lab and develop hypotheses for each phase of experiment*

*5.Interpretation – tie all the phases of experiment back to the big concepts – adhesion/cohesion.*

13. What will be the *overarching* mode(s) of this activity? Why?

*Curiosity – Just providing materials and allowing the students to develop their own circuits within certain parameters*

*Technology – Students are using materials to create their own circuits and systems*

Please provide any additional comments that will help you prepare to teach this activity or help the TSI facilitators understand how you plan to teach this activity.

I broke lab into two parts because of time constraints. I added the “Test conductivity of solid materials” to provide scaffolding for the conductivity testing of different water types.