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

**Module 2: Chemical Aquatic Science**

Name: Paul Crowe

Activity: Properties of Water

1. Why did you choose to do this activity?

 In order for students to investigate and understand various properties of water including cohesion, adhesion and surface tension.

1. What are your classroom learning goals?

To understand how the chemical structure of water affects its properties .

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

This activity will allow students to investigate in groups some of the most important properties of water.

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

12/8/12

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

**Standard 3: Oceanography —Understand the physical features of the ocean and its influences on weather and climate.**

**Ocean**

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

As a class we will discuss that the many unique properties of water make it possible for organisms to live in an around the ocean.

We will also discuss that the ocean is made up of primarily water which has unique and incredible properties.

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

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

□ 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.

X 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

X 7. The ocean is largely unexplored

**Preparation**

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

Students will have already completed the electrolysis lab. They will have basic understanding of the formation of water molecules and that water is a polar covalent molecule

1. 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 foresee some difficulty in understanding that adhesive and cohesive properties of water are mainly due to hydrogen bonding. Hydrogen bonds can be difficult to picture because they are not true bonds and they require an understanding of the geometry of the water molecule and the fact that it has partial positive and negative charges.

**Questioning and Assessment Strategies**

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

Students will have guided questions embedded in the lab. There will also be pre and post lab questions in addition to a warm-up question and an exit card.

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

 Students will be assessed based on their performance during the lab, the quality of their lab report and responses to post lab questions. I will also frequently check for understanding and do an exit card to make sure students understood the important aspects of the lab.

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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) | Induction, Deduction | Mode(s) | Authoritative Knowledge |
| Teacher | Helping students interpret their results. | Teacher | Leads a discussion on the unique properties of water. |
| Student | Thinking about the meaning of their results and what conclusions they can make. | Student | Think about, discuss and ask questions about the properties of water that they are familiar with. |
| Assess (look for) | Critical and intelligent responses to post lab questions. | Assess (look for) | Participation in discussion. Relevant questions being asked and statements being made. |
| **INSTRUCTION** |
| Mode(s) | Description |
| Teacher | Maintains class order and safety |
| Student | Investigate using the attached procedure |
| Assess (look for) | Student engagement and understanding. |
| **INVESTIGATION** | **INVENTION** |
| Mode(s) | Experimentation, Curiosity | Mode(s) | Product Evaluation. |
| Teacher | Circle around and help keep students engaged in the investigation process | Teacher | Guide and help students get the correct materials |
| Student | Performs the appropriate experiments based on the procedure and answers embedded questions. | Student | Decide how to best set up their apparatus for investigation. |
| Assess (look for) | Are students working well together. Are they understanding the embedded questions. | Assess (look for) | If the students are following the procedure and investigating appropriately. |

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

At the beginning of class there will be a brief discussion of the unique properties of water that we are already familiar with. Students will do a warm up and answer the pre-lab questions.

Students will then investigate using the TSI activity procedure.

Class results will be compared and discussed using a powerpoint.

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

The overarching modes of this activity are induction and deduction. Because the water molecule is so small, we have to rely on our experiments to describe the link between the chemical structure of water and its unique properties.

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.