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

**Module 2: Chemical Aquatic Science**

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Activity: Properties of Water

1. Why did you choose to do this activity?

After the success of the Module 1 lesson plans in our classroom, I chose this activity because my ‘budding scientists’ are ready, willing, and able to conduct this experiment. I expect them to have a great time and to learn a great deal about water molecule properties.

2. What are your classroom learning goals?

Students will observe and describe both adhesion and cohesion of water and make inferences of how the water molecule behaves. They will take this information to a discussion how these properties are demonstrated in the ocean and how we are ultimately affected by these ocean properties.

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

This activity ties in to my classroom learning goals of comprehending the Scientific Process through experimentation.

4. What date do you plan to start this activity? 11/29/12 – 12/3/12

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

SC 5.1.2 The Scientific Process: Scientific Investigation

**Ocean**

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

After conducting the experiments in this lesson we will discuss how seawater has unique properties and draw on the students’ prior knowledge about the ocean. We will review how seawater has a higher density than fresh water and cover where the salt in seawater comes from.

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.

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.

x 4. The ocean makes earth habitable

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

□ 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.)

I will begin this lesson with a pre-lesson about atomic and molecular structures, particularly the water molecule. My students have very little prior knowledge of atoms and molecules (I asked them what they already knew) and will benefit from the upfront information this lesson will provide. Then during the Properties of Water lesson, they will understand the terms we are using in this lesson a bit better. I will also briefly explain what adhesion and cohesion mean, so they can draw their own conclusions from their observations.

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.)

As fifth graders, the chemistry in this lesson may be a bit above them. I think some of them will have a difficult time with terminology and concepts. But I also expect their observations will help them to grasp most of the lesson content.

**Questioning and Assessment Strategies**

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

I will ask them to describe what they observe during each experiment, whether they are observing adhesion or cohesion, and what they think the water molecules are doing in each experiment.

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

As the facilitator, I will be assessing their conversations during each phase of the lesson and assessing understanding. I will also have their worksheets and be able to check them for accuracy. The final classroom discussion will provide an overall assessment of class comprehension.

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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 | Mode(s) | Curiosity |
| Teacher | Facilitates groups sharing dataCompiles classroom data Facilitates discussion of observed water properties to build on comprehension | Teacher | Will demonstrate use of pipette to draw water and dispense drops |
| Student | Shares data and compares resultsApplies observation information to understanding properties of water and the ocean | Student | Will make predictions about number of drops until water spills off penny |
| Assess (look for) | Data is recordedStudents are demonstrating increased comprehension during classroom discourse | Assess (look for) | Observe students and ask them to describe their predictions/hypotheses |
| **INSTRUCTION** |
| Mode(s) | Authoritative Knowledge |
| Teacher | Provide pre-lesson on atoms and molecules Explain experiment procedure(s) |
| Student | Record information from lesson in Science notebook and request additional information increase comprehension |
| Assess (look for) | Students are following directions of lesson proceduresStudents are sharing information |
| **INVESTIGATION** | **INVENTION** |
| Mode(s) | Experimentation | Mode(s) | Replication |
| Teacher | Will facilitate as needed during students’ experiments | Teacher | Teacher will ask for prior knowledge and provide lab materials |
| Student | Will follow procedures and record data | Student | Make connections to prior and new knowledgeCheck for accuracy of ideas/predictionsFollow procedures |
| Assess (look for) | Students understand what to do and record data accurately | Assess (look for) | Students are successfully following the testing methods |

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

I will briefly provide the information needed to fill the gaps in student prior knowledge since they are 5th graders. Students will be guided through each experiment and encouraged to develop ideas/predictions/hypotheses. Students will conduct experiments, observe manipulate, replicate, and record data. Classroom sharing and discourse will allow for evaluations and conclusions. Connections will be made to the properties of seawater.

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

Replication and induction. Replication as the students each take turns conducting the experiments and recording data. They will be repeating the work of other classmates.

The induction mode will also be used as students make generalizations about the water molecule and the behaviors of water through their observations during each experiment.

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 still am wondering as I write this just how the Phases of Inquiry will take place. I have listed my own predictions of how I think my facilitating will follow the Phases during the lesson, but I recognize that I cannot plan for the unexpected. I do not consider this a problem; it just makes my answer to number 12 a suggestion on how I plan to direct my class through the Phases of Inquiry.