**Teaching Science as Inquiry (TSI) Lesson Plan #3**

**Module 2: Chemical Aquatic Science**

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Activity: Phases and Modes of Scientific Practice

1. Why did you choose to do this activity?

We are halfway through the school year and I felt it was a good time for the students to think about why we do and learn things the way we do in class, by inquiry, because this is a type of instruction and learning that they actually practice in many of their classes here at our school.

2. What are your classroom learning goals?

I would like my students to be responsible for the own learning and to be aware of their learning strengths and areas they need to work on more. As these students progress through high school, they will be held increasingly more responsible for

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

By learning about the Phases of Inquiry and Modes of Inquiry, we will be able to discuss the activities we do in class using a common language. The students will be more aware of what my intentions are for specific activities and be able to focus their efforts better as well. For example, if the overarching modes for an activity are product evaluation and technology rather than description and curiosity, they will approach the activity with a different mindset and know what they will be assessed on most and be able to address the activity objectives more effectively.

4. What date do you plan to start this activity? January 7, 2013

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

* **Benchmark SC.MS.1.3** Defend and support conclusions, explanations, and arguments based on logic, scientific knowledge, and evidence from data
* **Benchmark SC.MS.1.7** Revise, as needed, conclusions and explanations based on new evidence

**Ocean**

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

There is not direct connection to the ocean except that students may bring up ideas from the lesson on properties of water that we are reflecting on while learning about the TSI Phases and Modes.

7. 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.

□ 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.

□ 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.)

This will be the first activity back after our Winter Break, so I will be using the start of the semester as well as a new Module (Chemistry) as the reason for beginning to think about our practice of science. We will start by looking back at the activity we did last semester on Properties of Water.

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.)

Students may struggle with the concept of metacognition or find it uncomfortable to analyze their own thinking because it is something they have not previously done in school before. I will try to make the classroom environment very comfortable by sharing my

**Questioning and Assessment Strategies**

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

* Ask students to give personal examples to support their ideas and practice metacognition

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

* Formative assessment
  + Worksheet tables and figures
    - Table 1.1 Steps of Your Scientific Practice
    - Figure 1.2 TSI Phase Diagram
  + Activity questions #1-13
  + Scijournal Topic (Activity Question #14)
  + Class discussion

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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) | Description | Mode(s) | Curiosity, Description, Authoritative knowledge |
| Teacher | * Facilitate discussion about activity * Use questioning strategies as needed to guide the discussion | Teacher | * Introduce “metacognition” * Day 1: Give examples of steps and ask students to determine if they are actions, communications, or thoughts * Day 2: Same as above for phases * Day 3: Same as above for modes |
| Student | * Answer Activity Questions * Share answers in class * Write one-page reflection on Scijournal topic for Activity Question #14 (Google Doc) | Student | * Recall what steps they took in “Properties of Water” activity |
| Assess (look for) | * Students are practicing using the correct new vocabulary terms for steps, phases, and modes | Assess (look for) | * Students are trying out the new vocabulary words. |
| **INSTRUCTION** | | | |
| Mode(s) | Authoritative knowledge, Replication | | |
| Teacher | * Guide students through the activity steps with examples. | | |
| Student | * Listen to instructions and budget time. * Determine classification of steps, phases, and modes with classmates.   + Day 1: Determine if steps are actions, communications, or thoughts   + Day 2: Same as above for phases   + Day 3: Same as above for modes * Share during class discussion. | | |
| Assess (look for) | * Students are communicating with each other about their metacognition. | | |

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| **INVESTIGATION** | | **INVENTION** | |
| Mode(s) | Description, Authoritative knowledge | Mode(s) | Description, Authoritative knowledge |
| Teacher | * Ask students why they are choosing particular labels for phases and modes * Give suggestions as needed | Teacher | * Give students examples to help them “visualize” the labels for each step * Ask students to give examples to check for understanding before moving on to independent/group work |
| Student | * Look at SNB (lab notebook) and review what they did in the activity * List steps in Table 1.1 * Day 1: Categorize steps as actions, communications, or thoughts * Day 2: Assign phase(s) to each step * Day 3: Assign mode(s) to each step | Student | * Think of examples of actions, communications, and thoughts * Use definitions in Figures and Tables to label steps * Create mental pictures of the Phases and Modes of Inquiry to use to categorize their steps of scientific practice |
| Assess  (look for) | * Students are working together to analyze what they were thinking during each step of the activity | Assess (look for) | * Students are using a consistent way (individually) to determine how to label each step |

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

* Initiation: Introduce students to the idea of metacognition, actions/thoughts/communication, phases, and modes
* Instruction: Introduce the TSI phases and modes with examples and ask the students for examples.
* Invention: Encourage students to think of examples for each type of phase and mode to use to help them label the steps.
* Investigation: Allow students to grapple with assigning labels to their steps for each of the three parts, help as needed.
* Interpretation: Have students answer Activity Questions; share their answers in a class discussion; and reflect on initiation in a Scijournal.

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

The overarching modes of this activity will be Authoritative Knowledge and Description, as the students use given terms to categorize their steps in a previous class activity. They will need to learn the terms and apply them in a consistent manner to the steps of their activity, which will require them to use description to explain their choices.

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.

This is the first time I will be teaching this activity and I am planning to give the students a lot of time to digest the new information and do each part of the activity because we will be using these terms throughout the rest of the semester.