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

**Module 4: Ecological Aquatic Science**

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Activity: Plankton

1. Why did you choose to do this activity?

During many of my students’ group presentations, larval stages of marine invertebrates were mentioned, so I want to give my students the chance to see how these larvae fit into the marine food web as plankton. Due to lack of time, we will not study the different types of plankton in detail, but it should be an enjoyable activity where the students can also reflect on their TSI learning processes.

2. What are your classroom learning goals?

By the end of 9th grade, I would like my students to be able to demonstrate in a classroom activity that they can practice inquiry with little or no instruction. They should still be exercising curiosity but also be able to implement the TSI phases and other modes when appropriate. I hope that they will be able to carry this on to their future science classes as well.

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

This activity is a good exercise for the students at the end of the year to practice what they have learned in terms of doing a hands on inquiry-based activity, but also to reflect metacognitively on the processes they are using.

4. What date do you plan to start this activity? May 14, 2013

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

* **SC.MS.1.2** Design and safely implement an experiment, including the appropriate use of tools and techniques to organize, analyze, and validate data
* **SC.MS.1.5** Communicate the components of a scientific investigation, using appropriate techniques

6. Describe how this activity relates to at least one of the TSIA PD Themes.

Themes: Community, Metacognition, Science as a Human Endeavor, Observations and Inference, Modeling Science, Scientific Language, Connections

The PD Themes that the plankton activity will relate to are Observations and Inference, as the students observe plankton through a microscope and describe and draw them. They will also be using Metacognition when they reflect on what TSI Phases and Modes they use thoroughout.

**Ocean**

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

This activity connects nicely to the ocean because the students will become aware of the fact that plankton are present everywhere in the ocean, that they are in fact swimming among plankton all the time when they go to the beach. They will also be able to further see the diversity of life that exists in the ocean and how they are connected to other larger organisms through the food chain.

8. 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

X 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**

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

I will not explicitly prepare my students as they have been hearing about plankton here and there throughout the semester. We will be watching Planet Earth videos (Deep Ocean and Shallow Seas) during extra time in class while the students are doing their Invertebrate Phyla presentations, and plankton are mentioned in some segments.

10. 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.)

The names of plankton are quite difficult to pronounce, so it may be difficult for students to remember them without a lot of practice, however I do not see this as a major part of the activity.

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

What types of questioning or approaches to discussion will you take to support student engagement and learning? See questioning handout for suggestions (Mod 3 Binder under “TSI Pedagogy and online in Mod 3 PD section)

I think I will mostly be using Clarifying and Lifting questions while the students are looking at the plankton, to help them better focus their observations and to help them make connections to what we have learned in class before about plankton and other marine organisms, for example how fish form relates to function, which students should realize should be true for plankton as well.

12. What ***TSI practices of inquiry teaching strategies*** will you focus on implementing to help your students meet your learning goals?

See TSI Practices of Inquiry teaching strategies handout for suggestions (Mod 4 Binder under “TSI Pedagogy” and online in Mod 4 PD section)

Although I will be acting as Research Director as usual in this activity, I think more of my focus will be on Metacognition and Instructional Strategies, giving my students multiple ways to investigate plankton. We will be looking at them under a microscope, watching a short video about a fish larva, and inventing our own plankton based on what we learned.

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| Use the following table to plan your lesson using TSI.  For each phase:   * **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 |

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| **INTERPRETATION** | | **INITIATION** | |
| Teacher | * Part 6: Emphasize that plankton play an important role in the ocean and ask Ss to think about this. | Teacher | * Part 1: Tell students (Ss) the day before that I will be going to the beach to collect plankton. |
| Student | * Part 6: Ss share their plankton. * Class discussion | Student | * Part 1: Try to imagine how teach will collect plankton. |
| Assess | * Part 6: Check that students are making connections between form and function and how they are affected by plankton in the big picture. | Assess | * Part: Check that Ss recognize that plankton are microscopic organisms and assess their prior knowledge from the comments that come up. |
| **INSTRUCTION** | | | |
| Teacher | * Part 2: Ask Ss to review the basic steps for use of microscopes. * Part 3: Tell Ss that they will need to observe as many different plankton as possible and draw them in their science notebooks. | | |
| Student | * Part 2: Ss volunteer to state the steps to using a microscope properly. * Part 4: Ss discuss and share the plankton that they are viewing | | |
| Assess | * Part 2: Check that Ss know how to properly use microscopes. | | |
| **INVESTIGATION** | | **INVENTION** | |
| Teacher | * Part 4: Monitor students using microscopes. * Ask Ss what the different types of plankton might mean for how they move and feed. | Teacher | * Part 3: Guide Ss through a review of microscopy. * Part 5: Ask questions while students are designing their plankton to help them be more specific. |
| Student | * Part 4: Use microscopes to view plankton in sample of seawater. * Draw at least three different plankton and take notes on their structures that may be adaptations. | Student | * Part 3: Ss review microscopy technique. * Part 5: Ss invent their own plankton individually with explanations for three ”adaptations” to their bodies and their functions. |
| Assess | * Part 4: Check that Ss are taking good observations. | Assess | * Part 3: Make sure that Ss are comfortable with proper use of microscopes. |

11. Briefly describe how you will guide your students through the TSI Phases of Inquiry. (You are the research director of your classroom, and thus guide or facilitate the learning in your classroom, even if an activity is very student-directed).

The students will be **initiated** to the topic through my talking about going to gather plankton on the day before the activity. There will be only a little bit of **invention**, as the students review the steps of microscopy techniques and on their own figure out a strategy to viewing, drawing, and discussing the plankton they see with their classmates. **Instruction** will occur throughout the activity, beginning with my instructions, and continuing as the students and I ask questions, and discuss the procedures and their observations, as well as share with the class. The students will primarily be **Investigating** with the other members of their group, looking at the plankton and recording observations. I will be encouraging students to return to **Invention** by having them design an original plankton, and describing it in terms of what it eats, how it moves, and so on to share with their classmates. In the **Interpretation** phase, I hope to help my students see plankton in the bigger picture, in terms of how they contribute to the marine and other food webs as well as relate their adaptations to their functions.

12. What *overarching* TSI mode(s) will you focus on for this activity? Why?

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

In this activity, Description will be the overarching TSI mode because the students will simply be looking at plankton through microscopes and noticing their features (shapes, appendages, colors) in order to design their own plankton on the second day. Some Technology is involved in that they are not able to view the plankton with microscopes and they will also be able to see the limits of using microscopes even at high power.

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 that I am teaching this activity so I will be partially playing it by ear. I hope that I will be able to get enough plankton for my students to see a wide variety of types and be able to observe them well.