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

**Module 4: Ecological Aquatic Science**

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Activity: Ecological Sampling/Sampling Design

1. Why did you choose to do this activity? I thought it was a good introduction to Sampling for Abundance which was a target activity. I also think it's a good way to introduce the concept of sampling in general.

2. What are your classroom learning goals? To familiarize students with the reasons for sampling, replication of sampling, and different sampling methods.

3. How does this activity tie into your classroom learning goals? This activity demonstrates how to carry out sampling, replication of sampling, and different sampling methods.

4. What date do you plan to start this activity? April 23, 2013.

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

Design and safely implement an experiment, including the appropriate use of tools and techniques to organize, analyze, and validate data. Defend and support conclusions, explanations, and arguments based on logic, scientific knowledge, and evidence from data.

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

Science as human endeavor: a simple sampling technique can go a long way to help students realize that careful methodology is required for reliable data collection.

**Ocean**

7. Describe how you will connect this activity to the ocean: The ocean is largely unexplored. When I showed the slides from the workshop presentation I related it to a marine intertidal zone.

8. 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.

□ 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

X 7. The ocean is largely unexplored

**Preparation**

9. How will you prepare your students for this activity? (For example, review of prior knowledge.) I didn't. I felt that the activity itself was adequate preparation.

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 only problem I can imagine is that some students may be resistant to the basic mathematics involved. Also, students seem resistant to the idea of replication.

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)

Clarifying: take time before-hand to define terms that students may have some misconceptions about.

Lifting: move them from the examples to a bigger picture/real world scenario.

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)

Allow students to design and refine models, and build an understanding of a model's strengths and weaknesses.

Allow modifications of and hypotheses based on new information.

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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 | Attempt to get them to create a mental image of applying techniques to a real world situation. | Teacher | Workshop slides, discussion of need to sample. |
| Student | Questions from worksheet and responses to my attempts to get them to mentally apply to other applications. | Student | Impossibility of creating a census of the world's oceans. |
| Assess  | How they respond. | Assess  | Observe. |
| **INSTRUCTION** |
| Teacher | Explain the activity. |
| Student | Listen. |
| Assess  | How well they complete the data tables. |
| **INVESTIGATION** | **INVENTION** |
| Teacher | Watching and recording data on whiteboard. | Teacher | Defining terms. Lecture. |
| Student | Sampling. | Student | Notes, answering questions. |
| Assess | Monitor. | Assess | Watch for participation and interaction. |

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).

Begin the class by describing sampling and situations that require careful sampling methods. Then introduce the activity and get them started by providing materials. Monitor the clock to get them on pace to complete data collection and analysis and direct a discussion on interpretation.

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

Curiosity: students think of themselves and experts in candy.

Deduction: students get to test what they think they know about M&M's and actual evidence. A valuable lesson!

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.