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

**Module 4: Ecological Aquatic Science**

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Activity: Sampling Design

1. Why did you choose to do this activity?

Sampling Design seems like a fun and engaging way to introduce the topic of sampling to my students.

2. What are your classroom learning goals?

Classroom learning goals are to learn what sampling is, who uses it and for what, and the importance of standardization and replication of the sampling process.

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

This activity allows students to experiment with the process of creating and using their own sampling designs

4. What date do you plan to start this activity? 4/19/13

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

**Standard 1: Scientific Investigation—Discover, invent, and investigate using the skills necessary to engage in the scientific process**

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

Sampling Design relates to the TSIA theme of Modeling Science. The class will be charged with developing a plan for sampling “populations” with M&M’s. They will be told that even though they come from varying disciplines of science they will need to work together to arrive at a consensus on the design of their research. Surely they will run into trial and error, and hopefully improve their design. It is an opportunity to model what a true to life situation in science could be like.

**Ocean**

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

Our class will begin by discussing a marine related sampling hypothetical situation. The plan is to ask about estimating an Opihi population within a tide pool region. How would we make an estimate? What are other ways marine biologists need to sample populations?

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.

□ 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.)

During our bellwork time, students will be asked to identify how they commonly define the term “sample”, and also how as scientist might use the term “sample” in their work.

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.)

I am not certain how students will define the term “sample” during bellwork, but they may be the area with the most misconceptions. I will address misconceptions with sharing the scientific use and provide some examples.

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 plan to be asking clarifying questions to emphasize the importance of being specific with design creation. I also plan on using lifting questions to try and extract some reasons why one color may be used more than another and what possible motivations there may be.

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)

I plan to focus on the “Teacher as Research Director” and “Communication” teaching strategies for this lesson. I believe that my students will need some guidance to assist with plan development, and also need some modeling to communicate plan design ideas. Additionally, I will need to model how to collect data and then analyze it once we are ready.

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| **INTERPRETATION** | **INITIATION** |
| Teacher | Facilitates class-wide data collection, review of calculations for results, and analysis of data.  | Teacher | I will use the alternate activity opener using the pizza slices to demonstrate the idea of taking samples and collecting data from those samples. |
| Student | Works with class to compare and analyze data, results, answer activity questions.  | Student | Will share data from pizza slices, compile data and then analyze. |
| Assess  | Class contribution of data, activity questions  | Assess  | Student sharing data, asking questions |
| **INSTRUCTION** |
| Teacher | Shares Sampling Design activity with class, asks students to make and record predictions with shoulder partners |
| Student | Shares definition, discusses with any questions, comments, Makes predictions, and compares predictions with classmates.  |
| Assess  | Records predications and helps to analyze with class, discussion with support for predictions |
| **INVESTIGATION** | **INVENTION** |
| Teacher | Facilitates the dissemination of materials, ensures integrity of data collection (no eating the samples) | Teacher | Shares activity with students, guides the class through choosing a sampling design.  |
| Student | Collects data, shares data, comes up with alternative design for sampling | Student | Works in small teams (2 or 3 to come up with a design sample to share with class. Students share and then come to a consensus on a design. |
| Assess | Students data collection sheet accurately completed, calculated | Assess | Students creating designs, sharing ideas |

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).

Students discuss bellwork question (instruction), and then initiation through the pizza sampling activity. There will be further instruction on setting up their own sampling design with M&M’s, and then investigation as they put their design into practice. Students will then interpret first design results. The will invent, investigate and interpret once again as they are asked to set up another sampling design.

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

The overarching modes of inquiry will be replication and curiosity. I believe my students will have a high degree of curiosity related to both the pizza activity and the M&M’s since it may be something that they have entertained in their youth but never had the opportunity to before. Replication will be emphasized as all groups must follow the same design to ensure integrity of sampling.

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.