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

**Module 4: Ecological Aquatic Science**

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Activity: Sampling for Abundance

1. Why did you choose to do this activity?

I chose this activity because it is a target activity. I chose to do it second, after Sampling Design. It is required and it follows after Sampling Design nicely by taking the previous knowledge learned to a higher level of practice. I want my students to use ‘real’ tools for science and to practice being scientists in order to create a desire to do more science and to love science.

2. What are your classroom learning goals?

I want to expose my students to new information and career possibilities. I want them to enjoy science and see it as a human endeavor. I want them to know how to do scientific work. Hands on activities, fun and creating a joy of learning science are always my classroom learning goals.

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

This activity will follow Sampling Design nicely and give the students a positive and active lab activity at the end of the year. This activity will show students how a task is done in the ‘real’ field of science. I am hopeful that they will enjoy it and learn something new.

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

May 8, 13

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

7.1.1 Design and safely conduct a scientific investigation to answer a question or test a hypothesis

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

This activity relates to the TSIA PD theme of Science as a Human Endeavor by making science hands on and how to participate in a real life application of science. It’s also relating to Modeling Science through doing science in a practiced way that can transfer seamlessly to real field work. It will touch on Scientific Language through use of new terms and those terms are used in science. I try to always include the Metacognition component by doing self reflection and self assessment at the end of the activity.

**Ocean**

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

I will connect this activity to the ocean by relating the ‘organisms’ and the ‘substrate’ as ocean themed. I will have the students (as I saw another teacher do) name the provided ‘organisms’ with real life names of sea life. The manufactured ‘substrate’ will also be named with real life terms (rock, sand, tidepool, coral, rip rap….). Since the students all live near and use the ocean this will also help make the connection to the ocean easier for them. I struggled in the workshop by not knowing what to relate the ‘made up’ sample area to so think it will help to give the ‘made up’ items real names.

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

□ 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 will review what was previously learned in the Sampling Design activity and lead a whole group then small group discussion of how much of the ocean is unexplored and why techniques like sampling are helpful in understanding the ocean more clearly. Discuss as small groups why we even need to know about what’s in the ocean (limiting human impact, finding new resources, identifying previously unknown species..).

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 foresee struggles with inattentiveness due to new technology (transect lines) so will have them try these out on Day 1, before the actual sampling occurs. I am sure that my students will not realize or have any idea that there are multiple ways to sample so exposure to the transect and quadrat methods will be helpful to show there is more than one way to sample will be important. I will continue the discussion and practice of random sampling vs systematic vs haphazard sampling. They struggled a bit with the difference between random and haphazard and differentiating between the two. I am hoping that this activity will solidify the difference to some degree.

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 will focus on the TSI questioning strategy of clarifying to get the students to better understand the new terms associated with sampling. I will have them revisit the terms at the end of the activity in an assessment format to define and give examples of the terms in their own words. Summarizing strategy will be helpful at the end when the students share out their sampling data and results to the class and we get a more broad picture of the sampling site and the limitations involved with sampling.

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 want to focus on the practice of inquiry strategy of Science as a Discipline to model again the demeanors of scientists, purposeful use of scientific language and seeing science as a human endeavor. I also want to continue practicing utilizing myself as the research director of my student team to give them more self directed learning opportunities so that they can ‘own’ their learning and see how it can transfer into other parts of their lives. We will be communicating out our research to each other and to continue working on open, non judgmental discussions will help the students for science and for life in general. Metacognition will come in during the activity when they need to re-think and re-try how they do things and then again at the end when they will need to reflect on their learning from the activity.

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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 | Lead discussion of different physical parameters of sampling. Have students compare different types of sampling techniques and when one might be better than another and why.  Assist with data collection as needed and facilitate group discussion of results and graphs. | Teacher | Ecosystem set up to spark interest and start questions of what we will be doing. Connect to ocean. Set up ‘field team’ groups. |
| Student | Collating data from own samples. Completed data tables and group graph. Assessment questions answered in lab notebooks. Participation and listening skills shown. | Student | Curiosity evidenced. Prepare to get to work quickly and efficiently. |
| Assess | Active participation in sampling. Active listening and participation in discussions. Assessment of answering activity questions in lab notebook. Self reflective write up. | Assess | Joining team without complaining (too much). Gather materials needed to begin. |
| **INSTRUCTION** | | | |
| Teacher | Introduce and define new vocabulary. Lead discussion on class procedures for gathering data from the ‘field’. Discuss experiences that pertain to activity and result during the activity. Help with refining methodologies as needed. Suggestions for improvement if needed. Lead comparison of results after data collection. | | |
| Student | Giving examples of new vocabulary. Writing definitions/examples of new terms into lab notebook. Handle and experiment with transects and quadrats. Working as a team to collect and record data. Giving constructive, positive feedback. Refining methods and suggesting changes effectively. | | |
| Assess | Students working well as a team. Data tables completed and ‘accurate’, with little ‘error’. Questions post activity answered and turned in. | | |
| **INVESTIGATION** | | **INVENTION** | |
| Teacher | Facilitate sampling and help as needed. Re-direct as needed. Offer suggestion or use questioning strategies to help teams move forward. Check that data is being recorded. | Teacher | Introduce new tools (transect, quadrat) and explain use and how to. Discuss features of each tool and it’s limitations. Review new vocabulary. Help students make predictions and hypotheses. |
| Student | Survey the scene (“habitat”). Strategize as a team and whole group best methodology. Sample using transect and quadrat. Complete data collection table and group graphs. Prepare to share out. | Student | Try out new tools, understand their uses. Give examples of the new vocabulary. Make predictions and hypothesis. |
| Assess | Sample area analyzed. Data collected from sampling techniques. Methods revised as necessary. Completed data table and team graph. Share out to group. Lab notebook has reflection and activity questions answered. | Assess | Students are actively engaged. Experimenting with new equipment. Participating in discussion/listening. Prediction and hypothesis done. |

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).

My focus will be to hold back on too much lecture style instruction when introducing new vocabulary and tools. My tendency is to let a lot of discussion and personal experience tales come into play and then we get off track and spend too much time. I will work on maintaining focus and getting to the point with some precision and a plan of time management. The setting should get the students curious to find out what’s going on. They have responded very well to collecting and recording data on tables so I think they actually like that now after the Sampling Design activity. Most of the activity time will be spent surveying the ecosystem and collecting the data. I will make sure to give the time needed to interpret the results and reflect on the process and what was learned. Time management and maintaining focus will be my focus this time in order to progress through the activity effectively.

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

My focus modes for this activity will again be the same that were used on us in the workshop. The reason I do this is for building my confidence and to be as effective as possible. It also allows me the freedom from guessing or the trap of trying to fit in too many modes which is my normal default. My main focus mode will be Description because the students will be using transects and quadrats to define and discuss a specific area/ecosystem. I will also focus on (a little less) Authoritative Knowledge because I will be explaining how to use the different tools available. I will also be the role of research director and will be a resource as needed for tool use and basic questions regarding methodology.

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.