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

**Module 4: Ecological Aquatic Science**

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**Activity: Sampling Abundance**

1. **Why did you choose to do this activity?**

I wanted to take the students to the beach to continue this activity to the field.

1. **What are your classroom learning goals?**

Students will practice sampling in a logical and consistent style. They will investigate measurement strategies. Students will also build on the understanding of the importance of standardization and replication gained from the M&M Sampling Design activity.

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

Ties in as a continuation of M&M’s Sampling and Surveys.

**4. What date do you plan to start this activity?** May 6th

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

**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 a Human Endeavor –** Sharing findings with others is essential.

**Ocean**

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

 **The “organisms” are all found in the ocean and we plan to go to the beach and replicate this activity in the field.**

**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

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.)**

This activity is actually prep for the field day at the beach!

**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 don’t see any. I expect an engaged class and excited to have a field day afterward.

**Questioning and Assessment Strategies**

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

* CLARIFYING – while the students are in the invention stage, I will use clarifying questions to help students decide how best to arrange the transect lines
* EXTENDING –to help students apply what they are beginning to understand about transects and quadrats to the environment.
* FOCUSING – continuously.

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)

Science as a Discipline:

* Model and require students to exhibit the demeanors of scientists.
* Recognize and teach science as a human endeavor.

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

Students will be assessed through informal discussions in small groups and as a full class. They will also complete the worksheet activity questions.

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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) | Induction, Deduction, Transitive Knowledge | Mode(s) | Curiosity, Description |
| Teacher | * Ask clarifying questions
* Review data tables
* Lead students to identify patterns in the data.
* Question students about issues that occurred and their effect on the data
* Questions students about issues that would come up when using transects and quadrats
 | Teacher | Ask students to determine what the cards & sticks and covered area are? Come to a class consensus.  |
| Student | * Compute mean for the data then graph the data.
* Answer activity questions and make inferences about the results.
* Create data graphs & charts to compare class, group and re examine actual area
 | Student | * Name the “organisms” and decide what part of the “sea floor” is represented
 |
| Assess (look for) | Are graphs representative? | Assess (look for) | Is there agreement re: “organisims” |
| **INSTRUCTION** |
| Modes | Authoritative knowledge, transitive knowledge |
| Teacher | Ask students to assist each other in considering how to lay the transect lines and quadratsAsk students to review for each other how to estimate and record the percentage that each surface material takes up within the quadrat frame if the material is an irregular solid.  |
| Student | Advise partners on quadrat and transect laying pros & consPeer teach partners |
| Assess (look for) | Are students collecting data at interval points? See chart for info. |
| **INVESTIGATION** | **INVENTION** |
| Mode | Experimentation, Description, Technology | Mode(s) | Curiosity, Product Evaluation, Transitive Knowledge, Experimentation |
| Teacher | Ask questions of individuals and groups as they collect data Monitor class and answer questions.Monitor accuracy of class data table entries & calculations | Teacher | Ask students to suggest strategies for laying the transects and quadrats. Ask students to decide which method to use: transect point, quadrat point or quadrat percent. Ask student to generate a hypothesis. |
| Student | Students set up and begin testing the 3 collection strategies. | Student | Students strategize laying the transects Students experiment with transect point, quadrat point or quadrat percent to learn the strategies and to decide which is the best method. |
| Assess (look for) | Sampling accuracy & completenessData table accuracy & completeness. | Assess (look for) | See data collection table. |

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

**Initiation *–*** *Students create names for the organisms & area to me sampled.*

**Invention –**  *Ask students to generate a hypothesis.*

**Instruction -** *Lay the transect lines and quadrats*

**Investigation** *\*Ask questions of individuals and groups as they collect data*

 *\*Monitor class and answer questions.*

 *\*Monitor accuracy of class data table entries & calculations*

**Interpretation *– What are the findings. Share the groups data and create a bar graph or pie chart to show the findings.***

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

The overarching mode(s) will be curiosity, description, product evaluation and replication. Description will make up a lot of the time spent sampling because at each point, the students will need to describe the materials being sampled. Thinking about technology and product evaluation too. Using the tools to collect the data.

**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.**