**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? It was a target activity and I also like that it

crosses over into the math curriculum for 7th grade. I could teach it in my class

and reinforce some concepts that were covered in their math classes.

2. What are your classroom learning goals? To have students explore how to analyze

data and the results of replicating data then process their data as an individual,

small group and whole class.

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

goal in my Life Science class is to expose the students to science in a fun,

hands on type of format in order to encourage a desire to do science in the

future.

4. What date do you plan to start this activity? April 18, 2013 and April 19, 2013

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

SC. 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

I believe I will mostly relate it to the theme of Modeling Science and Scientific

Language. The students will be practicing how to collect data, why it’s

important to minimize error and why data collection is done. Those all

lend themselves to modeling how science is done. They will also be hearing

and using the language of science while doing the activity. I did a review of

vocabulary that they would need to know before starting and also reviewed

the demeanors of scientists before starting

**Ocean**

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

I will facilitate a discussion about how data is collected and for what kinds of reasons it’s collected from tidepool ecosystems. I feel that this would be

the easiest way to connect it directly to the ocean since all of them have been

to a tidepool area. Also discuss how much of the ocean is unknown to us and

how it would be explored through data collection. This activity is a warm up for

collecting data in the field (the tidepools).

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 always review the demeanors of scientists now before an activity in an attempt to get the students in a focused mindset. I will review some already learned terms and introduce some new ones. The vocabulary I will choose for them

to focus on for this activity are: hypothesis, sample, error, population, random sampling, sample size, census, prediction, abundance, data table, inference, fraction, percentage, average and scientific error. I leave these terms up for the entire lesson, they write them and a definition in their own words into their lab notebooks and then we review it throughout the week.

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 the main difficulty being keeping them from eating the M&M’s before it’s ‘time’. I’m not sure how much information/previous knowledge that they will have with any of the terms focused on sampling so will do discussions on that on the first day before we start. I foresee some grumbling about having to do math in science class which I actually look forward to because for me the crossing over between content areas is an absolute positive. I will pre-determine their seating which always causes some arguing but I think with the curiosity element this activity will bring out this will not last long.

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 strategies of clarifying when discussing the vocabulary and dealing with the data. I will use lifting to attempt to get the students to take the information being learned to a higher level and to other situations. I will end with summarizing by having a final wrap up discussion and written reflection on the questions.

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 say that I will focus on all of the inquiry strategies because they all seem equally important but will try to focus on just a couple to stay more focused which has been my struggle all along. I try to fit all of it in and then get rushed at the end and have ‘lost’ the students by trying to cover too much. I will focus specifically for this activity on the teacher being the research director and on metacognition. I want the students to be engaged in real science and practice what that’s like and then on creating a positive learning environment where they can self assess their processes.

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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 on how data collection applies to the real world (tidepools specifically here). Discuss types of error that can occur and the importance of accuracy and replication, I will keep a data table going on the overhead during the data collection. | Teacher | Discuss why scientists and others do sampling. Discuss and elicit from students when and where sampling would be used. |
| Student | Participating in discussion with partner and whole class. Keeping accurate data table that will be used as a graded assignment | Student | Participation in discussion with partner and whole group. |
| Assess | The data table completed and turned in. Participation. Error avoidance. Vocabulary done in lab notebook. | Assess | Listening and discussing |
| **INSTRUCTION** | | | |
| Teacher | Discuss experiences of personal sampling situations (bottom grabs, plankton tows, transets and quadrats). Checking for accuracy on data collection. Answering questions. Providing steps in the order of the activity plan from TSI. Encouraging discussion and questions. Lead discussion of results and what they mean. | | |
| Student | Share personal experiences of sampling. Collecting data and recording data accurately. Participating in discussion and asking questions of partner and/or me. Following directions. Sharing out results and able to make connections to others results. | | |
| Assess | Vocabulary complete. Data tables (predictions, individual sample, class sample, raw data) completed and accurate. Sharing results out to the group. | | |
| **INVESTIGATION** | | **INVENTION** | |
| Teacher | Discuss how to do sampling from the bag. Discuss how to describe samples across the whole group. Help to relay the data if needed. | Teacher | Discussing and explaining the new sampling vocabulary. Explaining procedures and protocols. Helping as necessary. |
| Student | Taking samples correctly without ‘error’. Sorting and counting and recording data. Helping partner if needed and sharing out results for class data table. | Student | Writing and discussing new vocabulary. Making a prediction and hypothesis. Following procedures to collect data. |
| Assess | Data tables are complete and accurate. Participation with partner and whole group. | Assess | Vocabulary defined in writing. Prediction and hypothesis recorded. Procedures done correctly and in order. |

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).

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

I will focus on the same modes that were done with us in the workshop in order to understand them better myself and to stay focused on just a couple as opposed to trying to cover all of them again….. Curiosity because they will want to know what colors and how many there are in the bags and eventually be able to eat the candy. Deduction through making their hypothesis and then collecting data to test it.

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.