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

**Module 4: Ecological Aquatic Science**

Name: *Dan VanRavenswaay*

Activity: *Sampling Design (M&M survey)*

1. Why did you choose to do this activity?

 *This is a target activity. It looks like a good way to introduce sampling. I hope to*

 *do field studies with a different group of students within the next few months, and*

 *if this activity goes well I my use it to introduce them to sampling & survey design.*

2. What are your classroom learning goals?

 *There is more content out there than could be learned in ten times as much time*

 *as our students have with us. But you have to learn something in order to think*

 *critically…you can’t think critically about NOTHING.*

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

 *For this activity - to give them an opportunity to learn that surveys involve*

 *planning and are more than just recording what you see. I’ve shared stories*

 *about doing fish surveys with previous students and for the DLNR. I’d like to*

 *think some of them will think critically about how we do these surveys.*

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

 We started talking about and looking at online content on marine exploration a few days ago. Tomorrow (5.7.13) we’ll use the paper pizza to introduce sampling.

 In the next class (5.9.13) we’ll do the M&M sampling activity.

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

*Modeling Science – we will be looking at the protocols of good sampling.*

*Metacognition & Science as a Human Endeavor – we are the ones who decide how*

 *sampling and analysis is to be done, decide if it should be done, and what might*

 *be done with knowledge gained.*

**Ocean**

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

 *This a marine science course where we’ve been talking about, reading about,*

 *and watching documentaries about field science that includes sampling. As I*

 *mentioned before, the students know that sampling and surveys are things*

 *I’ve done with students and with NOAA and the HI-DLNR.*

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.

X 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.)

 *See my responses to questions 3, 5, and 7.*

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.)

 *None anticipated. With the small class size, and the way we have been doing this*

 *sort of activity (where you have to keep the pace moving along in order to finish)*

 *I’ll be able to help with questions that students have about the analysis questions*

 *or whatever.*

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)

 *Guiding questions – to keep things moving.*

 *Extending questions – asking student to think about how what we’re learning*

 *about sampling might be applied in a field situation (though they have*

 *little or now experience with this. We’ll see what happens.*

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)

 *Teacher as Research Director*

 *Communication*

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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 | Real world applications.  | Teacher | Reminder of the pizza-sampling activity and discussion. Intro to the topic of M&M’s  |
| Student | Student generated examples.  | Student | Listening and possibly asking questions.  |
| Assess  | Recall of applications previously discussed in class, and hopefully some examples beyond this.  | Assess  | Student interest?  |
| **INSTRUCTION** |
| Teacher | Directions for the students do design a protocol for sampling a bag of M&M’s, and guidance through the analysis of the data collected. Help with the questions that accompany the activity.  |
| Student | Ask questions as needed. Compare results with other students.  |
| Assess  | Completion of activity.  |
| **INVESTIGATION** | **INVENTION** |
| Teacher | Counting M&M’s | Teacher | Guide students to cover at least the minimum of what must be decided before beginning the actual sampling.  |
| Student | Students count M&M’s, record data, and analyze the data.  | Student | Students collaboratively decide on a protocol for the sampling itself.  |
| Assess | Completion of activity.  | Assess | The protocol follows what they should know about good sampling.  |

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).

*Initiation of interest.*

 *Instruction of what they need to do prior to the investigation.*

 *Guide any critique and remind students of the demeanors that allow us*

 *to work collaboratively.*

 *Interpretation of data and discussion of other application of*

 *the methods they’re learning.*

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 – What’s actually in the M&M bag?*

*Deduction – Did the data support their hypotheses?*

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.