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

**Module 2: Chemical Aquatic Science**

Name: ***Dan VanRavenswaay*** Activity: ***Conductivity***

1. Why did you choose to do this activity?

 ***It’s one of the two options for my third Mod 2 required activity.***

2. What are your classroom learning goals?

 ***My students are still learning to retain and follow oral directions, and to***

 ***stay on task until they complete an assignment.***

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

 ***This is a marine science course currently using 1st Semester themes in physical and chemical oceanography to teach content knowledge and inquiry skills. This sort of activity gives the students an opportunity to do the hands-on activities they enjoy while learning new knowledge, and to operate at a high school level.***

4. What date do you plan to start this activity? ***Tuesday, December 11, 2012.***

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

**Ocean**

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

***1) Conductivity can be used as a way of determining salinity.***

***2) Ocean water conducts electrical currents, and some marine animals have***

 ***adaptations to take advantage of this property (e.g. senses, defense).***

***3) Non-polar liquids (e.g. mineral oil) can be used as insulators and in pressure housings to exclude seawater.***

7. 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**

8. How will you prepare your students for this activity? (For example, review of prior knowledge.)

***We have been learning about properties of water and a bit of chemistry over the last few weeks. The last few days included a lesson on solutions with a discussion (re)introducing the concept of polar and non-polar molecules.***

9. 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.)

***No large struggles expected. Students are still learning the chemistry vocabulary: polar, non-polar, terms associated with solutions, etc.***

**Questioning and Assessment Strategies**

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

 ***My questions will be primarily to keep them focused and writing predictions***

 ***before they conduct their investigation. I’ll be asking them to demonstrate a***

 ***bit of understanding of the concept and definition of “inference.”***

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

 ***1) Adequate completion of the data table. 2) I am with these small classes in***

 ***the midst of the students, so I am constantly asking them to explain their***

 ***observations and investigative procedures.***

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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) | Technology | Mode(s) | Technology |
| Teacher | 1) Pose questions to students to explain what they are doing, and what they are observing. 2) Lead a follow-up discussion about polar vs non-polar liquids and their properties as conductors.  | Teacher | Have supplies ready and available for making a simple conductivity meter. Give instruction for meter assembly.  |
| Student | Explain the relationship between the LED light and conductivity of the liquids being tested. | Student | Assemble conductivity meter.  |
| Assess (look for) | An understanding of the direct relationship between LED brightness and conductivity.  | Assess (look for) | Correct assembly of conductivity meter. Encourage curiosity and time-on-task.  |
| **INSTRUCTION** |
| Mode(s) | Authoritative knowledge. |
| Teacher | Instruct students on how to conduct their investigation of conductivity. I’ll need to include a brief introduction to electrical circuits and safety.  |
| Student | Listen.  |
| Assess (look for) | Understanding of directions. I plan to use “teach it back” questions to asses this.  |
| **INVESTIGATION** | **INVENTION** |
| Mode(s) | Technology | Mode(s) | Curiosity |
| Teacher |  | Teacher | Be ready with a variety of liquids and student-safe potential solutes for when I get the inevitable question, “Can we try \_\_\_\_\_\_\_\_\_.”Watch for safe use of supplies & equip. |
| Student | Conduct investigations with a variety of liquids.  | Student | Conduct additional investigations with conductivity meter.  |
| Assess (look for) | Use of data table for making predictions, observations, and inferences.  | Assess (look for) | Safety, recording of observations.  |

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

 ***The flow is pretty natural. The students will receive directions from me about the construction and safe use of their conductivity meters. They will conduct***

 ***complete a provided data table while doing conductivity tests on up to ten***

 ***liquids/solutions. We will discuss what we observed, return our unit theme of***

 ***the properties of water and seawater, and use some real world examples (see***

 ***lesson plan question #6) to tie this activity in with past and future topics, e.g.***

 ***adaptations and deep-sea exploration.***

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

 ***Technology – the students will be using their simple conductivity meter to infer conductivity and to compare the conductivity of polar and non-polar***

 ***liquids.***

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.