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

**Module 2: Chemical Aquatic Science**

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Activity: Electrolysis of Water

1. Why did you choose to do this activity?

I chose this activity because I have done electricity in the past and felt confident with that part of the activity (conductivity, currents, power source, etc). I chose this one also because it seemed like it would be fun and a challenge to figure out how to do the ‘instruction’ phase with my new and limited understanding of atomic bonds and even just bonds. I liked that the activity was very small steps focused and to get to see the breakdown of the atoms you had to follow the steps and show attention to detail to set up your system.

1. What are your classroom learning goals?

 My learning goals for this activity are to understand that water can be broken down into its separate elements of hydrogen and oxygen. I want my students to see the value of listening and then implementing the steps necessary to set up a successful system. I would also hope for some exercising of their observational skills, practice of it. I hope that the students learn about a current and how to create better conductivity and mostly I hope that they have fun so that they will want to keep doing science.

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

 My science classrooms overarching learning goal this year is to get students excited about science, to see things in new ways and begin to see that everything is connected on this planet (through the ocean I’m realizing).

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

12/3/12

1. *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

7.1.2 Explain the importance of replicable trials

7.1.3 Explain the need to revise conclusions and explanations based on new scientific evidence

Common Core Standards this lesson will address:

[CCSS.ELA-Literacy.RST.6-8.3](http://www.corestandards.org/ELA-Literacy/RST/6-8/3/) Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

[CCSS.ELA-Literacy.WHST.6-8.2d](http://www.corestandards.org/ELA-Literacy/WHST/6-8/2/d/) Use precise language and domain-specific vocabulary to inform about or explain the topic.

**Ocean**

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

 I referred back to the activity on cohesion and adhesion and how we know those things exist due to our experiences in the water/the ocean. I talked about the faint link to creating hydrogen as a fuel source and why that might help the planet and more so the ocean. I had a hard time connecting this activity directly and seamlessly to the ocean.

7. 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.

X 4. The ocean makes earth habitable

 5. The ocean supports a great diversity of life and ecosystems.

X 6. The ocean and humans are inextricably interconnected

 7. The ocean is largely unexplored

**Preparation**

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

 I will start by reviewing the knowledge gained from the cohesion/adhesion activity to reinforce the understanding they gained of hydrogen bonds (not bombs like I kept saying during the activity. I will have them do a quick review of the demeanors of scientists notes in their lab notebooks as partners. I will quickly refer to the safety protocols for this activity and the importance of following the steps. We will do a quick review of working as partner groups and equal access time for both partners.

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.)

 I am a little nervous about being the ‘instructional’ component of this activity, again due to my low level understanding of chemistry. I did seek help from two teachers in my science department who have experience and they said that I knew more than they did so that gave me a last minute boost. I don’t think it’s true I just think they were blown out that I was going to try and teach this and have kids do this level of an activity in my class. It made me start out feeling stronger than I was before the conversations with them. I want to make sure that I don’t talk too much to the students so that they tune out or that I get myself into a place I can’t get out of knowledge wise. I worry about my students ability (willingness) to follow a strict protocol of set up in order to have a successful experiment. Timing could be an issue for me because it always is, I take too long.

**Questioning and Assessment Strategies**

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

 \*predicting

 \*inferencing

 \*small group discussion

 \*individual discussion with me

 \*whole group questioning

 \*reflection time to put into their own words what happened during the activity and what they learned

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

Students will take notes in their lab notebooks on new vocabulary and notes from during the activity and then do an end of activity assessment in their partner groups. I will use the questions at the end of the activity as an assessment tool. I will give the students the end of the module assessment and see how they did on that. I am worried because there will be a winter break in between the activities from this module and the end of module test. I can’t figure out how to fit in in time wise before the break. I will check for understanding continually throughout the activity.

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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) | Replication, Induction | Mode(s) | Curiosity |
| Teacher | Encouraging small group discussionsand comparison of results. Prompting students to compare their systems to other groups. | Teacher | Initiating discussion within small groups and whole group about how can we break atomic bonds (not atomic bombs – but that did get their attention). And how would we know we did |
| Student | Finding similarities, discussing connections, sharing and comparing results with other groups. | Student | Small group discussion participation |
| Assess (look for) | Consistency and transfer of knowledge from activity to why/how water has its unique properties | Assess (look for) | All participating positively and respectfully |
| **INSTRUCTION** |
| Mode(s) | Curiosity |
| Teacher | Whole group procedures role modeled, circulate to check for understanding and keep students on task |
| Student | Sharing ideas with partner and whole class,note taking, setting up technology appropriately, experimenting, looking for replication across groups, |
| Assess (look for) | Following procedural steps to set up their system, “success” in getting their system running, sharing of data and information and results, asking questions. |
| **INVESTIGATION** | **INVENTION** |
| Mode(s) | Induction, Replication | Mode(s) | Replication |
| Teacher | Circulating to check that all students are on task and that their systems are running. Answer and ask questions of students. | Teacher | Lead discussion of hypothesis and making them in their small groups. Making my own system as role model. Lead through the steps. |
| Student | Predicting, recording, manipulating, observing, comparing with other groups | Student | Following directions, setting up their systems correctly  |
| Assess (look for) | All students engaged, appropriate use of lab equipment, asking appropriate questions. | Assess (look for) | System set up and running |

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

My plan is to take them to initiation, instruction, invention, instruction, investigation, instruction, interpretation and instruction. My pattern for this activity seems that it will turn out to go in a clockwise movement with very little back and forth. Maybe some back and forths to initiation.

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

 Experimentation, Replication and Induction

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.