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

**Module 2: Chemical Aquatic Science**

Name: *Anne McKnight*

Activity: *Properties of Water*

1. Why did you choose to do this activity?

*I’ve decided to do this lesson first because it is a required TSI activity and because it fits in well as an intro to the water cycle unit I am starting now. I will do the stills activity next! This will also tie in well to sedimentary rocks and erosion when we get to the rock cycle.*

2. What are your classroom learning goals?

*This activity will ask students to use inquiry methods (practices of scientists) to build their understanding of the concepts of adhesion and cohesion and what these properties look like in the real world as natural phenomena.*

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

*It is hands-on inquiry, with guided observation and reflection along the way it also asks my students to develop multiple hypotheses by applying 2 basic definitions to ongoing observations which is practice they need.*

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

*Monday, November 19, 2012.*

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

*8.8.7 I can describe the physical characteristics of oceans*

*8.6.6 I can describe and compare the physical and chemical properties of different substances*

**Ocean**

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

*Adhesion and cohesion of water have impact on the water cycle, weather & the climate. These in turn also affect the rock cycle especially erosion, deposition and sedimentation.*

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.

X 2. The ocean and life in the ocean shape the features of the Earth.

X 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

□ 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 simple atomic model and introducing adhesion and cohesion as vocabulary.*

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.)

*This lab requires a large amount of reading: procedures, question prompts etc and a lot of writing as well. Both are weaknesses for my ELL students, so I will increase the use of labeled diagramming in students answers. During class, I will circulate to help students with constructing answers that include the targeted language elements. I will also pre-teach the key vocabulary and include definitions on the lab worksheet.*

**Questioning and Assessment Strategies**

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

*I will constantly move between groups asking them what is the best way to draw a phenomena theythen describe what they’re doing and what they are observing. We will wrap up each of the sections of this lesson with group reflection/discussion. I’ll use extensive questioning to ask students to probe areas they may be overlooking and to connect the current activities to previous learning.*

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

*I will use Bellwork over the next lessons to check student understanding.*

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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) | Deduction, induction, & transitive knowledge.  , . | Mode(s) | Curiosity & Authoritative Knowledge |
| Teacher | I will ask students to share what they observed, and how this relates to adhesion, cohesion and previous knowledge such as other places they’ve observed cohesion, adhesion, and surface tension occurring. | Teacher | Have room set up as a stations lab with supplies ready to use because students tend to think stations labs are more experiential & interesting Using the document camera, show 1) water sprayed on a plastic sheet beading up & 2) water clinging to my finger before dropping. |
| Student | Students share & discuss observations with the class by sharing diagrams, hypotheses and answers on the document camera. | Student | Students will observe the demos |
| Assess (look for) | Involvement in the discussion and a growing understanding of the concepts in the lesson through appropriate use of key vocabulary and transitive connections to outside examples. | Assess (look for) | I will look for misconceptions/correct interpretations of the 2 demos using similar vocabulary that leads up to the definitions of cohesion, adhesion, surface tension, meniscus etc. |
| **INSTRUCTION** | | | |
| Mode(s) | Description, Authoritative knowledge | | |
| Teacher | Using the document camera, show water clinging to my finger before dropping and water sprayed on a plastic sheet beading up. Introduce the terms adhesion and cohesion and discuss where and why each is happening in the demos. Give notes on these terms.  Give instructions for the station activities. .During the lab, stop students and question them as they go through the procedures at each station to inform/remind them to focus on important steps. Use questioning strategies to spark discussions and allow students to peer teach ideas they are starting to master. | | |
| Student | Observe and discuss the demos &  Takes notes on adhesion and cohesion.  Peer teach ideas they are starting to master to partners or other nearby classmates. | | |
| Assess (look for) | Student diagrams and written answers that show them making headway with terms and concepts. Students peer teaching partners who are asking for clarification, etc. | | |
| **INVESTIGATION** | | **INVENTION** | |
| Mode(s) | Curiosity. Experimentation, Replication, Induction | Mode(s) | Transitive knowledge, Induction, Authoritative knowledge |
| Teacher | I will monitor and guide the students through the different procedures, making suggestions, asking and answering procedural and interpretation questions while they investigate | Teacher | I will require students to invent hypotheses for each procedure and share their hypotheses with the partners for advice on format and clarity. I will also ask students to invent and advise each other on penny loading and prodding, ruler sticking and paperclip floating strategies. |
| Student | Students will have to read the procedures and follow the steps written on the activity worksheet. Students will have to make predictions, observations and record their results. They will have to revise their strategies where they get results they are unsatisfied with (ex 24drops on their penny while partner got 45 etc) | Student | Student will have to use their prior knowledge and observations made during the procedures to make hypothesis about the properties of water. They will also have to advise each other on penny loading and prodding, ruler sticking and paperclip floating strategies. |
| Assess (look for) | Safety.  Understanding procedures and following them.  Replication.  Adapting strategies, advising others on how to achieve the observable properties. | Assess (look for) | I will use their hypotheses, diagrams and responses to the activity worksheet as a form of assessment. I will look to see if the hypotheses are written in correct format and if they are reasonable. |

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

*Initiations, Instruction (directions), Investigation, Interpretation*

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

*Experimentation and deduction will be the overarching modes. The students are making the observations themselves, and being asked to relate/connect them to newly learned concepts (cohesion and adhesion of water molecules.)*

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.

*I have very small classes. I also have many students who, because of vocabulary issues and slow processing speed, must be given instructions multiple times and then again one on one to check understanding. I’ll be spreading this activity out to make it more manageable. I expect it to take 3 full days if I push my students to work as quickly as possible.*