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

**Module 2: Chemical Aquatic Science**

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Activity: Phases of Inquiry

1. Why did you choose to do this activity?

 I chose to do this activity because it was the last of the required lessons for Module 2. Honestly, I was a bit apprehensive of this lesson heading into the activity, but it turned out to be one of my favorites based on the level of student engagement in critical thought.

2. What are your classroom learning goals?

 Currently, we are working on a unit on the composition of the galaxy. The learning goals for the week of this lesson were:

I will be able to:

* Describe the steps of a life cycle of a star.
* Relate the life cycle of a star to the formation of a black hole and to the lifespan of our star, the Sun.

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

 This activity does not tie into the current learning goals of the classroom. I say this even though the phases of inquiry tie into anything because it is not an activity I planned to incorporate into the lessons on these learning goals. With better planning, this lesson could have fit with the star life cycle learning goals.

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

 Tuesday, January 15th

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

 Not applicable

**Ocean**

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

 In the optional introduction activity for the lesson, I plan to have students record steps for a hypothetical situation in which they receive a fish tank for the classroom. Other than water and fish are both found in a fish tank and in the ocean, I did not make much further connection.

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.

□ 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.)

 The activity will rely on the previous completion of the water properties lab. I will make sure that all students have participated in that activity. I will also make sure that activity is fresh in student minds with a review of it and pictures embedded in the PowerPoint of students participating in the water properties lab.

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 predict that students will struggle when it comes to categorizing the steps they record into a particular phrase. To help facilitate this process, I am both relating each phase to a similar step of the scientific method and relating each phase to generic student thoughts and actions (for instance, listening to the teacher, trying different ways to figure something out, asking why, etc.).

**Questioning and Assessment Strategies**

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

Checks for understanding will be placed at the end of a description or demonstration to make sure students are following my thought process.

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

I will have students hand in phase diagrams for the logic puzzle activity. Before this final assessment of their understanding, I will check in with them throughout class through questioning techniques and observations to make sure they are comprehending the process.

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| **INTERPRETATION** | **INITIATION** |
| Mode(s) | Description | Mode(s) | Description |
| Teacher | Teacher circulates making sure students are participating/able to participate in the categorization and mapping of their steps. | Teacher | Teacher asks students to talk about the scientific method and how they use it. The teacher asks students to tell some reasons they think it might not be the best way to model how science works. |
| Student | Think about how to classify each step in one of the phases of inquiry before mapping their process in the phase diagram. | Student | Students list the steps of the scientific method and talk about reasons the method is not a perfect way to describe science. |
| Assess (look for) | Teacher should look for students at work – making sure that all students are able to categorize and map. Then, the teacher should look closer to ensure that each student is doing this “correctly” | Assess (look for) | Teacher should look for student engagement. Students should be active participants in the conversation and contribute verbally. |
| **INSTRUCTION** |
| Mode(s) | Authoritative Knowledge  |
| Teacher | Teacher provides verbal direction or explanation or models a process. |
| Student | Students silently listen, raising hands if they have questions. |
| Assess (look for) | Teacher should look for student understanding in both the answers to the questions he asks at the conclusion of the explanation/demonstration (checks for understanding) and during the activity that follows. |
| **INVESTIGATION** | **INVENTION** |
| Mode(s) | Experimentation | Mode(s) | Description, Experimentation |
| Teacher | Teacher is circulating room watching students attempt to figure out the field goal activity. | Teacher | Teacher circulates room as students fill tables with the steps they will take for the fish tank scenario. Teacher circulates room as students come up with ideas for solving the logic puzzle.   |
| Student | Students are actively engaged in an investigation with their group to figure out the logic puzzle. | Student | Students are working independently to fill in the steps they would take to assemble a fish tank. Students are working in a group to generate ideas for solving the logic puzzle. |
| Assess (look for) | The teacher should look to make sure all students are involved in the problem solving process.  | Assess (look for) | Teacher looks to make sure every student is participating in both of these activities. |

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

**Initiation**

The lesson will begin with a discussion about the scientific method (something students are familiar with) and why it is not the best way to represents what is actually happening when someone “practices science”.

**Instruction**

I give instructions for students to make and fill out the table recording steps and whether they are thoughts/communications/actions for the fish tank scenario.

**Invention**

Students fill in their table with steps and decide how to classify each.

**Instruction**

I show students the phases of inquiry diagram and explain each of the phases in student-friendly terms. I then show them how to map the steps onto the diagram.

**Interpretation**

Students fit each of their steps into one of the phases and create a phases of inquiry map.

**Instruction**

I explain to students that we are going to map the steps we took to complete the water properties lab using the same procedure that we just practiced.

**Interpretation**

Students write out steps, categorize them, and map them using the phases of inquiry diagram.

**Instruction**

I explain the “match stick field goal” activity to students and give them the instructions that they are to record each step (whether communication, thought, or action) that they take when completing the activity. I show students how to set up the activity.

**Investigation**

Students trying numerous ways to solve the puzzle.

**Invention**

Students generating ideas that might work to solve the puzzle.

**Interpretation**

Students categorize and map each of their steps into the phases of inquiry diagram, completing a phase map for the activity.

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

I would categorize the overarching mode of the activity as authoritative knowledge. This is the case because I believe the easiest way to learn how to use the phases of inquiry to describe your scientific processes is to watch someone model the process. Students spend the largest portion of this activity listening and watching me as I explain and model the process for them.