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

**Module 4: Ecological Aquatic Science**

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Activity: Slowly Sinking Plankton

1. Why did you choose to do this activity?

Student learned about plankton last year and we are expecting marine biologists from Japan on May 20. This activity will help prepare students to interact with our guests marine biologists.

2. What are your classroom learning goals?

Students will:

* review prior knowledge about plankton and the food chain
* create a model of a plankton
* collaborate in a small group

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

Students will share their prior knowledge about plankton with the class. They will work cooperatively to create a model of a plankton.

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

May 13-14, 2013

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

**HCCPS - Standard 1: The Scientific Process: SCIENTIFIC INVESTIGATION: Discover, invent, and investigate using the skills necessary to engage in the scientific process**

Common Core Mathematics – 1.MD.4

Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

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, Communication,

I shall expect students to exhibit the demeanors of scientists. Students will be required to formulate a plan to create a model with provided materials. They will be required to collaborate in small groups. Students should also recognize that science is a human endeavor by solving a problem which can be applied to real life.

**Ocean**

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

Students will be reintroduced to plankton and its habitat. Also students will be required to connect the making of the model to the process of natural selection for plankton to survive in the ocean.

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.

x 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

□ 7. The ocean is largely unexplored

**Preparation**

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

I shall review of prior knowledge of plankton and natural selection.

I shall also reteach the importance of models and how scientists use models in real life.

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.)

Students tend to start building before they plan. I shall go through instructions thoroughly including checking for understanding. Materials will not be passed out until we have gone through the directions.

I shall also time students – planning, investigating, and testing.

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)

I shall use the following questioning strategies:

* Clarifying while giving directions and initiation
* Focusing – while students are investigating
* Summarizing – during instructions
* Verbal rewards – during investigation
* Identifying a problem
* Formulating a hypothesis
* Analyzing results

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)

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Science as a Discipline:

* Recognize and teach science as a multi-directional process, with multiple pathways to knowledge generation
* Model and require students to exhibit the demeanors of scientists
* Recognize and teach science as a human endeavor

Teacher as Research Director

* Have students develop their own hypotheses based on evidence
* Direct students to assess the quality of procedures, results, and conclusions.

Metacognition

* Be clear about expectations and performance criteria so that students are able to become aware of their own thinking processes and self-assess.

Communication

* Create a classroom community where all students are comfortable contributing to civil discourse about the scientific process, including communicating and defending evidence and conclusions.
* Facilitate collaboration in large groups, small groups, and pairs.

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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 | Asking questions on what can they did if they repeat the activity | Teacher | Listening to students research of plankton |
| Student | Answering questions to replicate | Student | Researching online planktonSharing information discovered |
| Assess  | Student responses | Assess  | Students research about plankton |
| **INSTRUCTION** |
| Teacher | Introducing new knowledge students may have not discovered during initiationGiving directions to procedures, expectations, and performance criteria |
| Student | Students listening and writing notes. |
| Assess  | Check for understanding – students at random will be picked to give directions. |
| **INVESTIGATION** | **INVENTION** |
| Teacher | Observing; prompting; encouraging | Teacher | Observing; prompting; encouraging |
| Student | Creating model; working as a team | Student | Creating model, working as a team; sharing ideas |
| Assess | Student performance | Assess | Student performance |

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:

Students will look up plankton information online. I will be walking around to ensure everyone is participating and collaborating.

Instruction:

I will lecture and check for understanding after by asking different students (at least one from each team to repeat the instructions.

Invention:

During planning, I shall walk around to ensure all students’ participation and collaboration.

Investigation:

I will be walking around to encourage and prompt students.

Interpretation:

I shall each team to share their experiences and what they can do next time.

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

Overarching modes will be: experimentation, transitive knowledge and authoritative knowledge. Instead of me reteaching/reviewing prior knowledge about plankton and natural selection, I shall expect students to look up online information about plankton. With this authoritative knowledge and any transitive knowledge they can apply from other classes, students will be mostly involved in the experimentation mode.

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.

Do not give students the materials until you have provided the expectations and performance criteria. Also, provide time to plan without holding on to the materials. Use a timer for every part of the activity. Finally, allow time and opportunity for replication using other materials.