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

**Module 3: Biological Aquatic Science**

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Activity: Modeling Microevolutiion

1. Why did you choose to do this activity?

The activity provides student engagement. This is also a good review and reinforcement for what they learned last year about natural selection.

2. What are your classroom learning goals?

Students will:

* model how a bacteria population is affected by exposure to an antibiotic
* explain why/why not their predictions match their observations
* compare final typical and mutant bacteria numbers with the class
* write an explanation about how living organisms adapt or not able to adapt to their environment by natural selection
* answer critical thinking questions

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

This activity will help students fulfill my classroom goals, especially about natural selection.

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

February 1, 2013

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

Grade 8 Standard 5 – Life and Environmental Sciences: Diversity, genetics, and evolution (Understand genetics and biological evolution and their impact on the unity and diversity of organisms)

**Ocean**

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

‘The oceans supports a great diversity of life and ecosystems’ and ‘the oceans and humans are inextricably interconnected’. I shall reteach how we affect life in the oceans.

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

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**

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

I will review natural selection (genotype and phenotype) with the students since they learned this last year. I also need to give a quick lesson about bacteria.

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 anticipate students having difficulty understanding the directions to the activity. I shall provide the directions twice and provide a third time for those who still have difficulty understanding the directions. I will also have students teach each other.

I shall also closely monitor groups to ensure they follow the directions.

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

I shall use the following question types:

* clarigying
* extending
* focusing
* lifting
* summarizing

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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 | Ask students to write results (fill in graph) on transparency to compare with others.  Ask activity questions. | Teacher | Explain how we affect the ocean |
| Student | Students will complete graph on own sheets and 1 transparency per group to compare with others.  Answering activity questions and sharing answers with class. | Student | Listening and taking notes |
| Assess | Answer on activity questions. | Assess | Checking for understanding |
| **INSTRUCTION** | | | |
| Teacher | Reteach phenotype and genotype  Teach bacteria – typical and mutant  Giving instructions for the activity  Call on individual students to read the instructions and activity questions | | |
| Student | Listening  Reading along with the class the activity instructions and activity questions. | | |
| Assess | I shall check for understanding by ‘thumbs up (students understand) and thumbs down (students do not understand)’ | | |
| **INVESTIGATION** | | **INVENTION** | |
| Teacher | Monitoring groups; answering questions for clarity | Teacher | Monitoring groups; prompting students to solve problems/answer questions |
| Student | Performing activity; asking questions; writing down observations; completing chart. | Student | Asking questions while performing the activity; |
| Assess | Students engaged in activity | Assess | Students engagement in activity |

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).

I shall review natural selection (phenotype and genotype) as well as reteach bacteria (typical and mutant).

I shall also remind student to keep in mind what we are doing by reading the activity questions.

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

I will focus on induction, deduction, transitive knowledge, and replication. I would like to spend some time after the actual experimentation to think about, discuss, and share what their outcomes are compared to their own predictions and to their peers’ outcomes.

During all the previous activities, I did not provide an extra class time for students to model induction and deduction. I would like the students to write about what they predicted, what happened, the reasoning for their outcomes, and how they are using knowledge from mathematics and English classes in the science classes. Also, I would like students to reflect how they are thinking as scientists.

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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.