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

**Module 3: Biological Aquatic Science**

Name: Joanna Lee Activity: Modeling Microevolution

1. Why did you choose to do this activity?

This activity is in line with my curriculum life science goals. In third quarter, students study genetics and natural selection.

2. What are your classroom learning goals?

 Students should able to work in small groups to solve problems through discussion and hands on activities. They should think and act like scientists to discover their answers through interaction with each other either by asking and answering questions from each other or the teacher.

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

This lesson helps students understand genetics and natural selection as part of the seventh grade science curriculum. By modeling bacteria as an organism in the environment, students can model how its population can be affected by exposure to a factor such as an antibiotic. Students will be able to see how microevolution results in diversity within a population.

4. What date do you plan to start this activity? March 13, 2013.

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

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| **Benchmark** [**SC.7.1.1**](http://165.248.30.40/hcpsv3/imr/report_by_code.jsp?code=SC.7.1.1) | Design and safely conduct a scientific investigation to answer a question or test a hypothesis |
| **Benchmark** [**SC.7.1.3**](http://165.248.30.40/hcpsv3/imr/report_by_code.jsp?code=SC.7.1.3) | Explain the need to revise conclusions and explanations based on new scientific evidence |

Benchmark SC. 7.5.5 Explain how fossils provide evidence that life and environmental conditions have changed over time.

Benchmark SC 7.5.6 Explain why variation(s) in a species’ gene pool contributes to its survival in a constantly changing environment

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

Examples of organisms (bacteria, archae, and diversity of fish form and function lesson can be used to tie in evolution through natural selection and adaptations.

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.

□ 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.)

Students will review the fish form and function lesson and recall the video showing deep ocean zone creature adaptations that occurred over time. Students will discuss how these fish adapted and survived the harsh elements in the deep ocean water. (bioluminescence, large eyes, teeth, etc.)

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.)

Instructional struggles include time constraints, new students recently enrolled in class with no background of previous lessons and varying academic and motivational levels.

**Questioning and Assessment Strategies**

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

Clarifying: What is meant by microevolution? What is meant by natural selection?

Extend: What are more examples of organisms that adapted to environmental changes?

Focus: Why does the deep ocean zone environment require more adaptations for some fish species?

Summarizing: How did this activity model microevolution?

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

The assessment will be completion of their worksheets, data collection and participation in the modeling microevolution 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) | Deduction, Authoritative Knowledge, | Mode(s) | Authoritative Knowledge, Curiosity, Induction, Description |
| Teacher | Lead discussion with students to reflect upon each groups’ results of their bacteria’s survivalDiscuss with class how the activity modeled microevolutionAllow students to conclude about microevolution and ocean organisms | Teacher |  Encourage students to recall concepts of fish adaptations in the ocean Ask students what types of factors would impact a population of ocean organisms such as bacteriaLead students to discuss how dice and paper clips can be used to model bacteria  |
| Student | Discuss with other students and teacher about the results of their bacteria’s survivalFurther discuss about microevolution and ocean organisms | Student | Discuss and review fish diversity and adaptation of organisms in the oceanListen and discuss how bacteria can affect organisms living in the ocean |
| Assess (look for) | Listen for discussion, verbal answers, questions and data sheet | Assess (look for) | Listen for concepts and information relating to adaptation and microevolution |
| **INSTRUCTION** |
| Mode(s) | Curiosity, Authoritative Knowledge, Description |
| Teacher | Show a few pictures of fish variation and adaptations and connect it to ocean diversity of organisms.Introduce the term microevolution and how it can be explained using a pair of dice and paper clips |
| Student |  Discuss with peers and teacher about variations or adaptations in ocean organism from previous knowledge from the fish form and function lesson and video on deep ocean creaturesDiscuss ideas about microevolution and what are some things that would affect an organism’s population |
| Assess (look for) | Listen to class discussion about microevolution and how an organism’s population is affected |
| **INVESTIGATION** | **INVENTION** |
| Mode(s) | Replication, Authoritative Knowledge, Experimentation | Mode(s) | Curiosity, Induction, Repetition |
| Teacher | Facilitate activity and monitor students using dice and paper clips properly for the lesson requirements | Teacher | Clarify and instruct students about the microevolution activity and how to complete the data table  |
| Student | Hands on manipulation of two types of paper clips to represent typical and mutated bacteria and filling out of data table | Student | Students discuss the instructions on how to fill out data table correctly |
| Assess (look for) | Proper use of dice and paper clips by students for activity, discussion of the effects of mutated and typical bacteria | Assess (look for) | Discussion of procedures to model microevolution |

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

The students will view the phases of inquiry chart as the teacher reviews the lesson at the beginning and end of the lesson.

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

 The focus mode of this lesson is repetition because the dices rolled represents the different generations.

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.