**How does Natural Selection Work?**

**Purpose**: To illustrate how natural selection takes place using a model.

**Standards:**

648.04. Understand the theory that evolution is a process that relates to the gradual changes in the universe and of equilibrium as a physical state.

648.05. Understand concepts of form and function.

652.01. Understand the theory of biological evolution

**Objectives**: SWBAT:

1. Collect data related to change in population size due to Natural Selection.
2. Graph the population make-up of M&M’s as they change over time using Microsoft Excel.

**Time**: Two class periods (80-90 minutes)

**Materials**:

* Mini M&M’s separated into colors, at least 150 of each color.
* 7 Paper cups
* 4-5 different patterned fabrics, minimum of 1 yard of each
* Lab handouts

**Safety Precautions**: Students are not to eat the M&M’s.

**Procedure**:

1. **Day 1**: Have students answer journal question on the board: “ What are the 4 points that lead to Natural Selection?”(5 min)
2. Discuss the answer: 1. *there is variation within populations 2.Some variations are favorable 3. Not all offspring of a generation survive 4. those individuals that survive have the more favorable variations. (2*min)
3. Handout lab directions and read over them with the students. Review the format for lab write-ups. Check for understanding by asking random student questions about the lab procedures. Also ask questions about what the various parts of the lab are modeling. *What is representing the population? What is the variation? Which variation do you think will be favorable on each fabric?*  (8-10 min)
4. Students begin lab. Monotor their progress and be sure they are collecting data correctly and collecting the correct number of offspring. When finished collecting data, they are to clean up and then may eat their captured m&m’s . (30-35 minutes)
5. As a class, discuss the preliminary results of the lab. *Whose populations behaved as expected? Were there any unexpected results? Any extinctions? What if we “migrated” one population to a different habitat? What if a mutation developed where they became flat? Etc, etc.*
6. **Day 2**: After journal question, go to computer lab and follow directions for graphing the data collected in the lab.
7. When finished with the graph, students are to write a conclusion to their lab according to their directions.

**Assessment:**

Laboratory will be graded according to the Laboratory rubric given to the students on the first day of class. It will be worth 25pts

**LIMSST Project Literacy Lesson Reflection Form**

**Name: \_\_101\_\_\_\_\_\_ Date lesson was taught: \_\_\_\_\_\_\_\_\_\_**

Natural Selection Lab

**Lesson Title/Topic Areas:**

**Literacy Strategies Used:**

(Please discuss what literacy strategies you embedded in this lesson. What were your goals in using these strategies?)

I used the science notebook strategy to teach/reinforce the idea of natural selection and how it works in nature. The lab we did was a model system of this process that helped the students visualize mechanism for evolution. The notebooking portion of this (or lab write-up, as I call it) helps to ensure the students think through what they did in the lab and apply it to what we have learned in class. It also is a tool for me to see how well they understood the concepts that I wanted them to learn because it requires them to write down their interpretation of the lab.

**Student Response to the Lesson:**

(Was the strategy effective? Were students able to read/write as needed in this lesson? What attitudes were displayed? How did specific

 students and/or the class do? How did the literacy strategy aid in developing student understanding of the topic? Cite specific evidence from the samples of student work)

The strategy was very effective in demonstrating and reinforcing the mechanism of natural selection. The lab itself was clear and simple and the students were able to follow what was going on easily. Their attitudes were quite positive towards this lab, especially in the light of what the attitudes had been throughout the unit. The reading and writing portion of the lab was straightforward and simple enough that no one appeared to have much difficulty with the mechanics of it. They have been doing lab write-ups all year so are used to the format by now and don’t complain or seem to have much difficulty writing down the appropriate material. The data was easy to interpret and also straightforward and most students were able to see a trend of one color surviving better than others because of their camouflage. The lab-write-up was essential in getting the students to interpret which color of M&M survived the best. Without requiring the conclusion of the lab, many students would have just done the work of the lab and not interpreted their data or even looked at their numbers.

**Lesson Reflection:**

(What worked well with this lesson? What challenges did you encounter in this lesson? Would you change certain aspects of the lesson or the questions that you asked? How does this influence future lesson planning?)

I always like teaching this lesson because it has consistently been an effective way to demonstrate natural selection. It is a simple model of the process that uses numbers and data to show a natural process. The only change I made this year was the portion where the students used Excel to graph their results. This change proved to be somewhat of a challenge, as I expected it would be, but I will continue to conclude the lab with this in the future. Once we got past all the technological difficulties and inability to follow written instructions, all students were able to successfully create a graph of their data. I believe this was a very valuable part of the lesson because it allowed the students to actually see which M&M survived the best and picture it in their head as opposed to just looking at a number on a paper. I also think that many of my students are lacking in the department of interpreting charts and graphs, which is an invaluable skill they should have. I would like to integrate the use of Excel in future labs, especially now that the students have a grasp on the mechanics of how to use the program so they could then focus more on the data they are interpreting.

**Relationship to Previous Instruction:**

(Have you taught this lesson/topic prior to the LIMSST project? If so, how did your teaching of this lesson differ from what you taught before? How did students’ reactions to this lesson differ?)

See above