

Lesson Plan Three: Natural Selection

Kelly Lamey
Anna Wetherholt

Learning Objectives	Assessment Criteria
Students will identify features of organisms for their adaptive, competitive and survival potential	Student answers will include (but are not limited to) appendages, reproductive rates, camouflage and defensive structures
Students will be able to summarize in their own words the phenomenon of natural selection.	Students will summarize the concept of natural selection to be (or some variation of the following) that nature does the selecting either for or against a certain trait.

Benchmark/Standard/Big Idea:

Compare and assess features of organisms for their adaptive, competitive and survival potential (e.g., appendages, reproductive rates, camouflage, and defensive structures). - Illinois State Board of Education Standards; 12.B.3b

Prior Knowledge:

Prior to the lesson, students will not be familiar with the concept of natural selection within the context of our classroom. Students may have outside knowledge unrelated to the classroom and the activity we have planned.

Instructional Strategies:

For this lesson, the students will first engage in a DRA (Directed Reading activity) with a short 3 paragraph reading about Darwin and natural selection where we will identify the main purpose of the reading before they begin as well as certain vocabulary terms which are important to the reading and ask comprehension questions individually while students read silently. Then we will have a hands-on activity where students will act as animals in the wild and we will define their adaptations as time goes on to represent the concept of natural selection.

Instructional resources used:

"Introduction to Natural Selection." - *Science NetLinks*. AAAS. Web. 22 Apr. 2012.
<<http://sciencenetlinks.com/lessons/introduction-to-natural-selection/>>.

Scoville, Heather. "Natural Selection Hands On Lesson Plan." *About.com Evolution*. Web. 22 Apr. 2012.
<<http://evolution.about.com/od/teaching/a/Natural-Selection-Hands-On-Lesson-Plan.htm>>.

Materials and set-up needed:

- Darwin Natural Selection Reading
- A variety of at least five different kinds of dried beans of various sizes and colors
- Masking tape or a box to define the environment

- Plastic knives, forks, spoons, and cups
- Stopwatch or clock with a second hand

Time required:

1 Class Period

Cautions:

Students should exercise caution when performing the second part of the daily activity where they will be using plastic silverware to pick up beans. Before beginning this activity it is imperative to establish ground rules regarding safety while using such utensils. Students should not stab or touch other students with the utensils. Students should not put the utensils in their mouths. Students should exercise caution so as not to hurt other students while trying to pick up the beans with their utensils.

Instructional Sequence:

1. Introducing the lesson

Students will enter the classroom and as they have been conditioned by our cooperating teacher some of them will read what he has posted on the SMARTboard which will most likely include instructions to have a seat quietly and get out their bell ringer worksheets. Next our cooperating teacher will make announcements and have the students perform a bell ringer related to what the students have been focusing on for the past few days about food chains. Next, we will give an overview to the students of what we plan to cover for that day. The overview will go roughly as follows: Today we will be moving away from food chains and getting into something related, but new. We are going to start off today by doing a short reading and we will define some words together and we will define natural selection. After we do the reading we will do a hands-on activity that will show you how natural selection works and demonstrate what you learned in the reading.

2. Body of the Lesson

Part 1-Directed Reading Activity:

With the text provided, we will go through the following procedures with the students:

First we discuss several vocabulary words with the students. The vocabulary words to be discussed prior to reading include: organism, variation, adapted. The students are asked what they think that word will mean in the context of the unit that they currently are in. They are encouraged to use any prior knowledge that they have. The lesson begins with a think, pair, share activity in which students will first think about what the vocabulary word means, share their ideas with their partner, and then select groups share with the whole class. The students should obtain working definitions of these three vocabulary words. The definitions should be similar to as followed: organism: a living thing that contributes to the ecosystem; variation: something a little different from others of the same type; adapted: something that is changed so that it better fits with its environment.

Next we elicit prior knowledge related to the text by asking the question: "What do you already know about Charles Darwin? What do you already know about natural selection?" We then give the students a purpose setting question: "What is natural selection?" and tell students that they are reading this in order to discover the answer to that question.

Students then begin to read individually, and we will circulate around the classroom asking a number of student specific comprehension questions. Examples of these comprehension questions include: "Why does a population change over time? You can go back and read that part if you want, but after

that, I want you to explain it to me.” “Why did the elephants want longer trunks? What is this an example of?” “From the reading or from your own ideas, what is an example of a successful trait?” For students that are really struggling with the text, these students have the option of working with a partner to increase understanding of the text.

We then re-gather students and re-ask the purpose setting question: “What is natural selection?” We encourage a discussion that engages students by asking questions such as “what would an example be of natural selection?”

After this, tell students: “we are going to be doing an activity today that shows us the variations between animals. You will get to experience yourself how variations can help or hurt an animal and how well it can survive.”

Part 2-Natural Selection Hands-on activity:

We will then collect the student readings and pass out the materials for the second part of class. Each group will get a kit which will include enough plastic cups for each student, several plastic eating utensils (2 knife, 1 spoon, and 2 forks) and 50 dried beans. Next we will explain what each of the different materials represents. We will tell the students that they are predators and their prey is the beans. Each student will get either a knife, spoon or fork and their utensil represent different variations among the population of predators. The cup will act as the stomach of the predator. The goal will be defined to students to be to get the most beans into their cup before time is up. We will also tell students that they are NOT allowed to use their other hand, it must be behind their back while they catch their prey. When we say GO! The predators will catch their prey. The rules include that they MUST use their utensil to pick up the bean and put it into their cup. They may only pick up one prey at a time, do not scoop the prey up in large numbers. We will tell the students we will give the students 45 seconds to perform this task. Now we will tell these students that they can choose their utensil put their beans into the “environment” (the environment will be defined to the students as a square of masking tape on their tables) and when we say GO they can begin “catching their prey.” After 45 seconds we will say STOP! Now we will tell the students to count their beans in their cups. We will ask students to raise their hands if they have less than 20 seeds. Many of the students who have knives will raise their hands. We will tell them that they have starved and died. Next we will ask for students who have anywhere from 20 to 40 beans to raise their hands, we will then tell these students that they have survived! Next we will ask anyone who got more than 40 beans to raise their hands. We will tell these students that not ONLY did they survive, but they get to reproduce. This means that the people in the group that died will switch out their knife for a spoon or a fork depending on what kind of utensil the person who reproduced had. They will repeat this 1 or 2 more times depending on time constraints.

3. Wrap up lesson

We will ask the students to put away their materials and we will start discussing what we saw. “Which variation or which type of predator (spoon, knife, and fork) was there most of by the end of the 2nd or 3rd round? Why?” Students will answer that there were the most spoons left by the end of the rounds because it was easiest to pick up the beans with the spoon rather than the fork or knife. “Which type of predator or predators starved to death? Why?” Students will answer that the knife predators were gone because it was too hard to move the beans with a knife. Finally we will ask the students “How does this

activity show how natural selection works?” Student answer will include variations of the following: the predators changed overtime so that we could collect the most beans so we could stay alive; or our ability to catch prey decided whether or not we could live or have babies with the same variations that we have.

4. Evaluating Learning

We will assess students’ prior knowledge during the first portion of the DRA as we use scaffolding techniques to define three important words to the text. As the students use what they know about the words “organism,” “variation,” and “adaptation,” we will use this information to gauge how much the students already know about natural selection. This will help us determine how long we should spend discussing the reading when we return back to re-ask the purpose setting question after the students read the passage.

Student assessment also takes place formatively at two times during the activity, once during the DRA portion of the activity and once during the discussion of the hands-on activity. During DRA we will be going around the classroom asking comprehension questions about the reading such as: “Why does a population change over time? You can go back and read that part if you want, but after that, I want you to explain it to me.” “Why did the elephants want longer trunks? What is this an example of?” “What is an example of a successful trait?” Students will be encouraged to answer these questions without looking back at their text; however they will be allowed to go back to the text to reread the passage to give an explanation. After the hands on activity, the discussion that takes place will also serve as formative assessment where we will ask students to apply what they learned from the reading about natural selection to the activity we just finished with the following questions: “Which type of predator or predators starved to death? Why?” “How does this activity show how natural selection works?” “Which variation or which type of predator (spoon, knife, and fork) was there most of by the end of the 2nd or 3rd round? Why?”

The purpose of these formative assessments is to avoid student misconceptions of natural selections such as the misconceptions that many students believe that environmental conditions are responsible for changes in traits, or that organisms develop new traits because they need them to survive, or that they overuse or under-use certain bodily organs or abilities.

Design Rationale

This lesson falls during a unit on ecology. Students do not have much prior knowledge with elements of this unit, particularly natural selection. We decided to develop a literacy activity for the students to first complete which provides them with a basic idea of natural selection, variations in species, and adaptations among species. The specific strategy known as Directed Reading Activity is used because the text should be mostly readable. Various students in our class have literacy problems, but using DRA provides a way to scaffold the reading activity. Using think-pair-share to introduce key vocabulary words allows students to first elicit prior knowledge, consult with a partner, and then as an entire class, develop a working meaning of those vocabulary words. We also elicit student prior knowledge for the general topic as well as asking the purpose setting question to have students actually read the text with a specific purpose. Students will be able to find more about natural selection in a way that is scaffolded. Additionally, students with greater difficulty reading have the option of working with

a partner if they are having great difficulties in reading the initial text. The whole group discussion that ties back to the purpose setting question allows the class to gain a general understanding of natural selection as was defined in the text as well as more readily understand what the text was trying to communicate.

From there, we want our students to see specifically what natural selection can actually look like in a real world situation. By designing a simulation in which students can see for themselves the implications of variations, we enable our students to see how natural selection works in real life. We decided to do a hands-on activity because we find that our students, while harder to manage, retain learning more when they are doing hands-on activities. Students should be actively engaged during this activity and should have a clear picture of how natural selection works in a real world scenario.