Lesson Title	Ecology: Symbiosis
Length of Lesson	One (50 minute) class period
Created By	Bo Cherry
Subject	General Science
Grade Level	8th grade
State Standards	8th: 1 d (Inquiry); 3 a (Life Science)
DOK Level	DOK 3
DOK Application	Draw Conclusions, Develop Logical Argument, Compare
National Standards	5-8: A (Inquiry); C (Life Science)
Graduate Research Element	When considering water chemistry, it is important to keep ecology in mind. Several species call the natural streams and rivers their home, and it is our responsibility to ensure that the waters are clean and safe.

Student Learning Goal:
MS 8th Grade:
(Inquiry)1 (d) Analyze evidence that is used to form explanations and draw conclusions; (Life Science) 3 (a) Analyze how adaptations to a particular environment can increase an organism's survival and reproduction and relate organisms and their ecological niches to evolutionary change and extinction.

National Science Education Standards of Content 5-8:
(Inquiry - A) Think critically and logically to make the relationships between evidence and explanations; Develop descriptions, explanations, predictions, and models using evidence; Recognize and analyze alternative explanations and predictions; (Life Science - C) Diversity and adaptations of organisms.

Materials Needed (supplies, hand-outs, resources):
PowerPoint file (INSPIRE_Cherry_02.15.11_PP); Computer; Projector; Index Cards; Permanent Marker; Notes for Class Activity (INSPIRE_Cherry_02_15_11_Notes)

Lesson Performance Task/Assessment:
This lesson is designed to show students the intricacies of symbiotic relationship found in several different biomes. After a short capture activity, students will take notes from a PowerPoint presentation (INSPIRE_Cherry_02.15.11_PP). These notes include definitions of symbiosis and the various types of symbiotic relationships. It is important to discuss each definition as a class in order to make sure the students understand each definition. To do this, the instructor asks a volunteer to put the given definition in his/her own words. Students will also be expected to note examples of each type of relationship. It is important for the instructor to discuss several different examples of the various

relationships, so that the students will be able to draw conclusions in the class activity which follows the lecture. In this activity, the instructor will begin by passing out index cards which have an organism written on them. The instructor will then show one organism on the board (using the given PowerPoint). Students will be expected to raise their hand if their organism could form some sort of symbiotic relationship with the organism on the board. The student must explain what kind of relationship is formed and why (i.e. which organism benefits, is harmed, etc.).

Lesson Relevance to Performance Task and Students:
This lesson will introduce students to various ecosystems and the relationships that form within them. Students will be able to draw their own conclusions based on previous examples. This will be done throughout the lesson, because the instructor will ask the students questions during the lecture, and the class activity at the end of the lesson will be done more or less without the assistance of the instructor.

Anticipatory Set/Capture Interest:
In order to capture the interest of the students, the instructor will begin the class with three short videos. The URL for each video is shown below in the section "Teacher Notes." Each video shows a different kind of symbiotic relationship (Commensalism, mutualism, and parasitism). These videos will not only capture the interest of the students, but they will also be used throughout the lecture, and students will be expected to explain the various relationships.

Guided Practice:
The first part of the PowerPoint presentation will be guided. The instructor will mention various examples of each type of symbiotic relationship and call on students to explain why they are considered that type of relationship. Three examples of each type of relationship will be discussed in detail to ensure that the students understand.

Independent Practice:
The class activity at the end of the class (this should take about 25 minutes) will be independent practice. Students will be given hints if it is needed, but for the most part, the students will be expected to draw their own conclusions and defend their reasoning. Not every students will have an opportunity to be directly involved (because they may not get a card that matches an organism on the board), so it is important to involve everyone in the explanation process.

Remediation and/or Enrichment:
Remediation- Individual IEP; the PowerPoint will be made available to resource teacher;
Enrichment - Have students research various symbiotic relationships and explain them to the class the next day they meet. This will serve as a review as well.

Check(s) for Understanding:
The instructor should observe students during the first guided section of the lesson to check for understanding. The instructor may also observe the students' notes to check for completion before the class is dismissed.

Closure:
Question 1: What are the three types of symbiotic relationships?

Question 2: What kind of relationship forms between a dog and their owner?

Possible Alternate Subject Integrations:
Ecology, Life Science

Teacher Notes:
Videos for the Capture Activity:
Mutualism:
http://video.nationalgeographic.com/video/player/kids/animals-pets-kids/bugs-kids/ant-acacia-kids.html.
Commensalism:
http://video.nationalgeographic.com/video/player/animals/invertebrates-animals/other-invertebrates/clownfish_amonganemones.html.
Parasitism:
http://video.nationalgeographic.com/video/player/animals/invertebrates-animals/other-invertebrates/clownfish_amonganemones.html.