Biological Relationships – Coral Reef Memory Game and Chain Game

Tonya Van Leuvan
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❑ Synopsis:

- This lesson plan is designed to introduce students to the interconnectedness of species within an ecosystem, and to use this knowledge to evaluate how the removal or decimation of one species can have far reaching effects. Inquiry-based questions are provided to be used in conjunction with this lesson.
- This lesson is designed to compliment the textbook units that teaches 6th, 7th or 8th graders about ecosystems; the biological relationships within them, and threats to them. It uses Coral Reefs to illustrate concepts (coral reefs can be used as a thread to tie each chapter of the units together).

❑ Background for the students:

- Vocabulary:
  - Predator – an animal that feeds on other living animals.
  - Prey – the animals that predators eat.
  - Symbiosis - comes from the words " sym " which means together and " biosis " which means life. Symbiosis occurs when two organisms create a union in which at least one is benefited by the other.
  - Parasitism – when one organism in a symbiotic relationships benefits while the other is harmed.
  - Mutualism – a symbiotic relationship that benefits all organisms involved.
  - Commensalism – a symbiotic relationship in which one organism benefits and the other is neither benefited or harmed.
- Students should be familiar with the vocabulary before starting this game, however, if more time is allotted, this game could instead serve as a means for students to learn this vocabulary.

❑ Objective(s):

- Students will be able to correctly identify the types of biotic relationships organisms share:
  - predator/prey
  - symbiotic:
    - mutualistic
    - commensalite
    - parasitic.
- Students will be able to evaluate some environmental and human induced consequences to the coral reef ecosystem.
- Students will be able to apply the above concepts to all ecosystems.

❑ National Science Standards:

- **5-8th grade:**
  - **Populations and ecosystems**. A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.

- **Populations and ecosystems**. For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.

❑ **Arizona Science Standards:**

- **6th grade:**
  - **Strand 1: Concept 3: PO 2.** Form a logical argument about a correlation between variables or sequence of events (e.g., construct a cause-and-effect chain that explains a sequence of events).
  - **Strand 1: Concept 3: PO 6.** Formulate new questions based on the results of a completed investigation.
  - **Strand 2: Concept 2: PO 3.** Apply the following scientific processes to other problem solving or decision making situations: predicting, inferring, identifying, variables, questioning, communicating, classifying.
  - **Strand 3: Concept 1: PO 1.** Evaluate the effects of the following natural hazards: hurricane.
  - **Strand 4: Concept 3: PO 1.** Explain that sunlight is the major source of energy for most ecosystems.
- **7th grade:**
  - **Strand 3: Concept 1: PO 1.** Analyze environmental risks (e.g., pollution, destruction of habitat) caused by human interaction with biological or geological systems.
  - **Strand4: Concept 3: PO1.** PO 1. Compare food chains in a specified ecosystem and their corresponding food web.

❑ **Materials:**

- Print a set of attached "relationship" cards for each set of 2-6 students. There are cards provided, with easier language for ESL students.
- Print attached set of labels.
- Print attached handout of questions.
- Print attached set of "arrows" or use toothpicks.
- Print answer key to Memory Game.

❑ **Time:**

- 10 minutes to become familiar with the cards.
- 30 minutes for the Memory game and discussion afterwards.
- 30 minutes for Chain game and questions. Questions must be done in class.

❑ **Grade Level:**

- 6-8

Procedure:

- If the instructor has time, it would be beneficial to add photos to each memory card.
- Pass out sets of "memory" cards to each group of 2-6 students.

- The students should be given several minutes to become familiar with these cards.
- Instruct students to lay the cards face down in a 5X4 grid.
- Instruct students to take turns flipping over two cards at a time. They should not expect to find matching cards, but instead are looking for two cards whose organisms share a relationship – for example one of the coral cards says "gets its energy from zooxanthellae, which reside in the coral polyps" and the zooxanthellae card says "lives in coral polyps and turns sunlight to energy which it shares with its coral host. In order to keep the cards however, the student must correctly identify the type of relationship shared between the two organisms from the following choices: predator/prey, mutualistic, parasitic, commensalite. In the above example, mutualistic would be the correct answer. Print out the answer key.
- After all cards have been successfully paired up, the student with the most may, at the teachers discretion, receive some reward.
- After all cards have been successfully paired up, instruct the students to lay the cards face up on the table and create a relationship web from these cards.
    - The students should begin with zooxanthellae and its associated coral card. They should line up all coral cards side by side and build from there. Arrows should be used to join each "relationship" and a label placed next to the arrow. For example, zooxanthellae and coral are paired in a mutualistic relationship. Coral is featured again in a commensal relationship with sponges.
- After the teacher has reviewed the branching cards, instruct the students to work on the questions alone or in a group.
- A discussion should follow.

❑ **Evaluation:**

- Students are evaluated based on their group work and on their answers to the attached questions.
- Attached questions can be modified for different point values. I consider questions 5 and 6 to be easiest, requiring the least thinking, and so I assign questions 1-4 point values worth double that of 5 and 6.