Interdependence of Organisms

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Date/Time Lesson to be taught: November 10, 2011, 9:56 - 10:46 a.m.

Course Description:

Name: Biology

Grade Level: 9th

Honors or Regular: Regular (Inclusion class)

Lesson Source: Ms. John; RISD Scripted Curriculum

Concepts:

Organisms have interactions with both their biotic and abiotic factors. Their actions affect the biogeochemical cycles. They have competition for resources with other organisms. Sometimes they have beneficial relationships with other organisms that leaves one relying on the other. They transfer energy and matter through the ecosystem.

Objectives: Students will be able to:

1. Categorize the type of relationship demonstrated between two organisms.
2. Interpret the effects, positive, negative, or neutral, on each organism in a symbiotic relationship.

Texas Essential Knowledge and Skills:

(12) Science concepts. The student knows that interdependence and interactions occur within an environmental system. The student is expected to:

(A) interpret relationships, including predation, parasitism, commensalism, mutualism, and competition among organisms;

(F) describe how environmental change can impact ecosystem stability.

English Language Proficiency Standards (learning strategies, listening, speaking, reading or writing)

74.4 (c) Cross-curricular second language acquisition essential knowledge and skills.

(1) Cross-curricular second language acquisition/learning strategies. The ELL uses language learning strategies to develop an awareness of his or her own learning processes in all content areas. In order for the ELL to meet grade-level learning expectations across the foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with the student's level of English language proficiency. The student is expected to:

(A) use prior knowledge and experiences to understand meanings in English.

Materials List and Advanced Preparations:

Arrive to class early and set up lab stations. As students leave first period, the teacher will post the translated vocabulary chart where students can see.

ITEM	Quantity	Source
Interactive notebooks and supplies	30	Already in classroom.
PPT - Ecology	1	Provided by Ms. John.
Pre-quiz	30	Tanja will bring to class.
Post-quiz	30	Tanja will bring to class.
Data Sheet	30	Tanja will bring to class.
A-Symbiotic Relationships Gallery Walk sheets	1 set	Tanja will bring to class.
Stop Watch	1	Tanja will bring to class.
Arrow Cards	1 set	Tanja will bring to class.
Station Number Cards	1 set	Tanja will bring to class.
Vocabulary chart	1	Tanja will bring to class.

Safety:

In case of emergency please follow emergency procedures according to RISD emergency guidelines. Mutual respect for others is expected. There are no chemicals or equipment being used besides paper, so there are no further safety issues.

Accommodations for Learners with Special Needs (ELL, Special Ed, 504, GT, etc.):

ELL students will have a reference for key words in their native language, as well as scaffolded definitions in a chart that I will build for them and place at the front of the class. I will also incorporate pictures into the lesson, and have the students up and moving around stations.

English	Spanish	Vietnamese	Short definition
Ecosystem	Ecosistema	Hệ sinh thái	a population of organisms and their environment
Trophic Levels	Los Nieveles Troficós	dinh dưỡng cấp độ	energy levels
Symbiotic Relationships	Las Relaciones Simbioticas	cộng sinh mối quan hệ	things that are together to live
Mutualism	Mutualismo	thuyết hỗ trợ	both organisms benefit
Commensalism	Comensalismo	--	neither organism benefits
Parasitism	Parasitismo	trạng thaí ký sinh	one thing benefits and one is harmed
Predator/Prey	Depredador y la Presa	--	one animal eats another animal

ENGAGEMENT Time: 5 Minutes		
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
The teacher will welcome students to class and introduce herself. The teacher will briefly review students about the material they have covered in the previous class. The teacher will say, "Let's review a few things you may have learned this week. I believe that your teacher has covered the flow of energy and matter, carbon, and nitrogen cycles."	**Is that correct?**	
If students advise that Ms. John has not covered one of the subjects the teacher will advise students by saying, "I am sure that Ms. John will cover that material soon, but let's start with what you do know."		**No, we did not cover one or more of those subjects.**
If students advise that all material is covered, then the teacher will go over trophic (energy) levels with a few questions about that. The teacher will say, "I believe that Ms. John has taught you about the flow of energy and matter."		**Yes, she covered all that.**
	What is the flow of energy and matter?	**Energy comes from the sun into organisms and is eventually recycled by other organisms.**

		It is how energy and matter goes into the food chains and consists of interactions between producers, consumers and decomposers. Solar energy, water, nutrients, and carbon dioxide are taken in by producers, plants, who manufacture glucose through the process of photosynthesis. Glucose becomes energy for the producer and for consumers. Animals are consumers. Plant eaters are herbivores. Animals that eat other animals are called carnivores. Animals that eat plants and other animals are called omnivores. When producers (autotrophs) and consumers (heterotrophs) die, decomposers, like bacteria and fungus, break down these bodies into nutrients that go back into the soil, which then re-enter the food chain and are utilized by producers. Sometimes, detrivores "scavengers" eat the dead things.
	You learned that energy stored by the organisms at each trophic level is about one-tenth the energy stored by the organism in the level below. Why does it seem that some energy or matter is lost? (See slide 13 of PPT for this LP)	**Some energy is lost through heat from and through its utilization for work, like running, breathing or digestion.**

	What is the carbon cycle?	**CO_2 that is dissolved in water or is in the air is used during photosynthesis by plants, algae, and bacteria. CO_2 then returns to the air and water in one of three ways… Cellular Respiration-using oxygen to break down food; Combustion-burning fossil fuels (coal, oil, natural gas); Erosion-limestone from sediment of decayed shells erodes releasing carbon.**
	What is the nitrogen cycle?	**Nitrogen, N_2, makes up 79% of Earth's atmosphere. Most organisms cannot use it in this form (N_2), so we rely on bacteria to break the N_2 bond during nitrogen fixation, which binds nitrogen to hydrogen to form ammonia (NH_3). Nitrogen-fixing bacteria are found in the nodules on the roots of beans, birch and alder trees and some other plants.** 1. **Nitrogen-fixing bacteria convert N_2 to NH_3 (ammonia). 2. NH_3 goes through nitrification by nitrifying bacteria to convert it to NO_3 (nitrate). 3. NO_3 is assimilated (taken up by the roots of plants.) 4. Denitrifying bacteria then convert the NO_3 to N_2 so it can return to the atmosphere during**

The teacher will pass out a pre-quiz and say, "Please take two minute to answer two quick questions. **The teacher will say, "Great! You are all off to a good start."** **The teacher will say, "We will learn more about symbiotic relationships in a few minutes."** **The teacher will say, "Let's move into groups and get busy with our exploration into symbiotic relationships."**	**Students please write your name on the paper, answer the questions and raise your hand when you are finished.**	**denitrification. Ammonification is the production of ammonia by bacteria during the decay of urine. The ammonia produced in this step can also be assimilated by plants or goes through nitrification.** **(Have Ms. Fisk pass out and pick up quiz.)**
Evaluation/Decision Point Assessment	**Assessment**	**Student Outcomes**
The teacher will pass out a pre-quiz sheet and have students answer two multiple choice questions about symbiosis.	**Students' responses to questions will allow the teacher to assess where they are as far as background and any misconceptions can be addressed. If most of the students are comfortable with the review, we will continue.**	**Students will have an idea about what they are about to explore.**

EXPLORATION Time: 25 Minutes		
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
The teacher will say, "I need all everyone's attention, please. We are about into move to groups and move through several stations. I have some cards with information and photos that will match up with the data sheet I am passing out to you. Please move quietly when time is up and start on the next station. You will only have four minutes per station and we only have 20 minutes to do this activity. You will not see all of the stations. You will only have time for five stations. Make the most of it." **The teacher will say, "Take a look at your data sheet. Your station numbers will correspond with your data sheets. The pictures will also help you check to make sure you are writing on the correct line. Please pay attention to these visual cues while you are working through the stations.** **"When I call your name please take your data sheet and your pen and move to the station that matches your assigned group. Let's be quick and quiet so we can get this done efficiently."** **The teacher will then call name and station assignments.** ****When completed, the teacher will set the timer four minutes to**		**Students should be sitting at their desks and paying attention.**

start. The teacher will say, "Time starts now. Go!" The teacher will announce when one minute is left. **When time is complete, the teacher will say, "Stop! Time is up. Follow the arrows and move to the next station."** **Once the students have moved to the next station, the teacher will begin again from **. Repeat until students have completed five rotations.** **Upon completion of final rotation, the teacher will say, "Okay, that was our last station. Everyone move quickly and quietly back to your seats."**	**The teacher will circulate about the lab checking for student understanding by observing their progress through the various stations and asking students about their perceptions.** **What do you see going on in this description?** **Why do you think this is parasitism, etc.** **How do you know?** **Explain to me what you read. Does what you read and what you wrote on the data sheet make sense?**	**Students will be encouraged to ask for help from the teacher or from each other. Students will be encouraged to quietly discuss amongst themselves the information at each station.** **Well, this dog died because of the heartworms.** **They had a negative impact on the dog's life.** **Yes, because it explains what I read.**
Evaluation/Decision Point Assessment	**Assessment**	**Student Outcomes**
The teacher will have monitored the students' progress throughout the gallery walk. Based on student completion of data sheets, if most students have information down on the sheet, then we will move back to the desks and continue with the explanation.	**The teacher will walk around the stations and ask students questions about how they arrived at their answers.** **Has everyone finished their data sheet? Raise your hand high if you are finished.**	**Most students will have their data sheets completed. Students will consider how organisms are interconnected throughout the biome.**

EXPLANATION Time: 10 Minutes		
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
The teacher will say, "Please open your interactive notebooks and let's draw a four-square to organize our thoughts about symbiotic relationships."	**Does anyone know what a symbiotic relationship is?**	**It is a relationship between two different organisms.**
While students are drawing the four square, advance the PPT to slide #34. Instruct students to take notes in their own words to help them remember what these words mean, a working definition. Read through the PPT to help students learn the material. Ask the students to practice saying the vocabulary words as a group. [Note: If these were my students, I would have them come up with their own definitions and spend more time with underlying concepts of flow of energy and matter, but for the sake of time, and to satisfy the requirements of the curriculum, I will stick with the prepared lesson notes that they want in the student notebooks.]	**Can you think of another way to define mutualism?**	**Mutualism is when two organisms are helping each other out.**
	commensalism?	**Commensalism is when two organisms live together and neither one is helped or hurt. They just live together.**
	parasitism?	**Parasitism is when one thing lives off another thing. It could be bad or good for the other organism.**
	predator/prey relationship?	**Predation is when one organism is hunting for food and the other organism IS the food. One of them is going to die.**
The teacher will say, "Please be sure that you put in your notes the symbols that represent the effect of the type of symbiotic relationship has on each organism. This is very important. If you are able to determine who is benefitting from the relationship, then you should also be able to name it, as defined in this four-square activity.	**Have you ever thought about how much we rely on other organisms that sustain us?**	**Only in school. No. Yes, when I go to the store.**
	Do you know that you are a host to a variety of bacteria? Why do we need them?	**Ew! No. Yes, for digestion.**

The teacher will say, "I read an article that stated, 'More than 500 different species of bacteria exist in our bodies, making up more than 100 trillion cells. Because our bodies are made of only some several trillion human cells, we are somewhat outnumbered by the aliens. It follows that most of the genes in our bodies are from bacteria, too.	Note: http://www.wired.com/medtech/health/news/2004/10/65252	
	What do you think about that?	**That's just creepy, but cool. I did not know that.**
Luckily for us, the bacteria are on the whole commensal, sharing our food but doing no real harm. (The word derives from the Latin meaning to share a table for dinner.) In fact, they are often beneficial: Our commensal bacteria protect us from potentially dangerous infections. They do this through close interaction with our immune systems.'"	**If something caused the bacteria in your body to not function efficiently, what will happen to you?**	**I could get sick. I might die. Different bacteria might pick up the slack. I might have to go to the doctor.**
	What about yogurt and all those pro-biotic products at the store? Why would it be a good idea to consume these things?	**Most yogurts contains live cultures of bacteria that will aid in digestion and the probiotic stuff does, too. It could replace the bacteria that are not working correctly.**
The teacher says, "Let's think about our lab and what we found out."	**What did Group 1 find out at your last station (#5 *E.coli* and mammals)?**	**E. Coli gets protection and food from mammals and helps with digestion. Mutualism.**
[Note: There will likely not be enough time to review each station. Keep a close eye on time and make sure there is enough time to do the post quiz. If necessary, the elaboration can be eliminated.]	**What did Group 2 find out at your last station (#6 Heartworms and dogs)?**	**Mosquitos carry heartworm larvae and deposits them when the bite a dog. The heartworms live and reproduce in the dogs heart and eventually the dog dies. Parasitism.**
[Ask Ms. Fisk to pass out the post-quiz when there are seven minutes left in class.]	**What did Group 3 find out at your last station (#7 Termites and protozoa)?**	**The termites eat wood, but only because there is a protozoa that lives inside them that makes an enzyme that help breakdown cellulose. Mutualism.**

	What did Group 4 find out at your last station (#8 Cattle egret and grazers)?	**The egrets eat the insects that the large mammal stirs up. It is also protected by the animal. Commensalism.**
	What did Group 5 find out at your last station (#1 Lion and Zebra)?	**The lion eats the zebra. Predation.**
	What did Group 6 find out at your last station (#2 Green algae and fungus)?	**The lichen collects water and minerals and the algae produces food. They cannot live without each other. Mutualism.**
	What did Group 7 find out at your last station (#3 Shark and remora)?	**The Remora doesn't do anything for the shark. Remora does eat scraps left by the shark or shark feces. Commensalism.**
	What did Group 8 find out at your last station (#4 Mistletoe and tree)?	**Mistletoe takes nutrients away from the tree. If there is a lot of mistletoe, it can cause the tree to not grow or the tree could die. Parasitism.**
Evaluation/Decision Point Assessment	**Assessment**	**Student Outcomes**
Students should hve their four-square completed and most, if not all, of the stations reviewed in discussion.	**Constant checking for understanding by calling on students that are less inclined to participate should help make it clear that most students are able to justify their answers.**	**Students should be able to recognize symbiotic relationships and recall the term that describes it. It will take study time for the vocabulary to be learned.**

ELABORATION **Time: 5 Minutes**		
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
The teacher will say, "How about a video? I actually found one that is kind of funny and will help you remember symbiotic relationships." **The teacher will play the video.** **http://www.youtube.com/watch?v=xNm7dg3BiyU&feature=related**	**What do you think about the song?** **It's a little goofy, but weren't you able to start remembering the different relationships and how they are part of a bigger picture: the connectedness of all organisms?**	**It was weird. It was funny. I hated it. I liked it.** **Yes, I did start singing along and that helps me learn.** **No, I already know this stuff.**
Evaluation/Decision Point Assessment	**Assessment**	**Student Outcomes**

EVALUATION **Time: 5 Minutes**		
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
The teacher will say, "We have one last task for the day, a quick quiz so I can assess how well I am teaching. Please help me out and do your absolute best to answer the four questions quickly. Thank you!"	**Please raise your paper if you have any questions about something on the quiz and I will come to you.**	
The teacher will thank the class for their participation in her learning to teach and have the students ask any questions they might have about UTD, the UTeach program, or college in general. **The teacher will say, "Have a great rest of the day!"**	**Does anyone have any questions about why I am in your classroom?** **Are you interested in pursuing your education through UTD?** **Any questions about college life?**	

Students will be asked throughout the lesson to provide answers and justify their reasoning. During the gallery walk and explanation discussion, students will be asked about how they arrived at their answers to questions about how some organisms relationship with another organism affects each, whether each organism benefits, what would change if one organism were removed from the relationship, what would further consequences to the biome be, etc.

Students will be presorted into groups by Ms. John. This is an inclusion class and I do not know the students well enough to decide which students need to be paired to maximize the learning for all.

In addition to the formative assessments throughout the lesson, there will be Pre- and post-quizzes will be distributed and picked up. From these instruments, I will be better able to assess my success or failure in teaching the lesson.

I have included a progressive vocabulary chart that will be displayed in the classroom to help students understand the new terminology. Also included on data sheet are pictures to help students remember what they are looking at. This gallery walk gets students moving so they should remain actively engaged in the lesson.