Subject Area(s): earth science, problem solving, reasoning, technology, mathematics

Associated Unit: Living Things

Associated Lesson: Life cycle, ecosystem, predation, supply and demand

Activity Title: Who Eats Who?

Grade Level 2nd (2nd-4th)

Activity Dependency none

Time Required 60 minutes

Group Size 4 students

Expendable Cost per Group US$ 0

Summary
Working in small teams, students will categorize note cards with varying pictures and names of plants and animals into producers, herbivores, omnivores, and carnivores. Students will then use online resources to research animals eating habits to allow them to make any necessary corrections to their categories. Students will then create food chains by linking note cards together with yarn. The students will then gather in a large circle with one food chain each. The teacher will help demonstrate how the food chain is interdependent on other animals and plants in an ecosystem by connecting varying parts of one food chain to another. Then the teacher will remove one string of yarn which will consequently affect every student’s food chain. Following mathematics lessons will include related study of population and cause and effect of animals/plants through word problems and graphs.

Engineering Connection
A food chain is how energy passes from one living thing to another. This lesson helps children understand how elements can be interrelated which is present throughout engineering. This lesson creates a foundation for engineering concepts by reasoning, organizing, and creating a system.
Students will be able to conceptualize cause and effect, energy transformation, and analyzing relationships. Engineers experience cause and effect invariably. Engineers must be conscious of the decisions they make as they will affect a variety of things. Engineers also practice analyzing relationships and creating systems to create more advanced systems and devices through mathematical, scientific, and technological concepts.

This lesson can be incorporated throughout the curriculum. In writing and language arts, students can identify the problem in society and ecosystems with animal and/or plant extinction, design a solution, and write a persuasive essay or prepare a presentation to communicate their ideas. In science, students can study the topic of food chains in more depth by studying food production, energy, specific animals, varying ecosystems and locations, and human nutrition. Students could work in small groups to create a solution to monitor extinction of certain species and build a model design to test their solution. Students could then compare solutions with other class members to incorporate key components of the design process. An activity like this would improve engineering confidence and give students ownership of their project.

**Engineering Category**

1) relates science concept to engineering

**Keywords**

Sun, animals, plants, producer, consumer, herbivore, omnivore, carnivore, energy, food chain, food web, relationship, cause, effect

**Educational Standards**

- State science: 5.1 B1, 5.1 B2, 5.3 C1 5.4 A, 5.4 B, 5.4 C, 5.5 A, 5.5 B
- State math: 4.1 A1, 4.1 B1, 4.1 B4, 4.1 C, 4.3 C1, 4.4 A2

**Pre-Requisite Knowledge**

Students should have prior knowledge that animals must eat to survive. They must also be aware the sun helps plants to grow.

**Learning Objectives**

After this activity, students should be able to:

- Understand how energy is passes from one living thing to another in a food chain
• Know the meaning of producer, consumer, herbivore, omnivore, and carnivore
• Work collaboratively with other students
• Recognize relationships and cause and effect
• Perform addition and subtraction word problems
• Read and construct bar graphs

**Materials List**
Each group needs: note cards with various picture and name of animal or plant, yarn, internet access to approved websites

To share with the entire class:
• Yarn
• Food Chain Mathematics worksheet

**Introduction / Motivation**
The teacher will introduce the terms producer, herbivore, carnivore, and omnivore. The teacher will give small student groups an envelope with 20 note cards (4 categories, 4 producers, 4 herbivores, 4 carnivores, 4 omnivores). The students will work collaboratively to place four plants or animals in their respective categories. The teacher will then check the students categories and ask them to research any incorrect placement of animals and/or plants.

**Vocabulary / Definitions**

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>Energy source for planet</td>
</tr>
<tr>
<td>Producers</td>
<td>Capture energy from the sun to make their own food</td>
</tr>
<tr>
<td>Consumer</td>
<td>Any living thing that eats something else</td>
</tr>
<tr>
<td>Secondary</td>
<td>Any living thing that eats another consumer</td>
</tr>
<tr>
<td>Consumer</td>
<td></td>
</tr>
<tr>
<td>Herbivore</td>
<td>Animal that eats plants</td>
</tr>
<tr>
<td>Carnivore</td>
<td>Animal that eats other animals</td>
</tr>
<tr>
<td>Omnivore</td>
<td>Animal that eats both plants and animals</td>
</tr>
<tr>
<td>Food Chain</td>
<td>How energy passes from one living thing to another- a path showing who eats who</td>
</tr>
<tr>
<td>Food Web</td>
<td>Shows how plants and animals are interconnected by different paths</td>
</tr>
</tbody>
</table>

**Procedure**
• After students have researched their plants and animals and have created correct categories of animals they will be asked to construct a food chain with any four note cards from their categories. Students must decide which animal eats which animal or plant. They must work together using their prior knowledge and reasoning skills.
• The students will then connect their four components of the food chain with yarn. The yarn must be long enough so the students can stand holding one card each in a line. The teacher will provide an example of recommended yarn length between note cards.
• The entire class will stand in a circle. The teacher will begin by asking the students to look at the other food chains and try to find patterns or similarities. The teacher will then choose one note card and recognize a relationship to another note card. The teacher will ask the students holding each note card to also hold a piece of the ball of yarn as connections and relationships are made. The teacher will then encourage students to observe other relationships and continue passing the ball of yarn. For example a deer from one group’s food chain also eats leaves from another group’s food chain. Eventually the entire class will be holding a piece of yarn intertwined like a spider web.
• The teacher will use probing techniques to get students to recognize the interdependence of animals and plants within our ecosystem. The teacher will ask students to imagine what would happen if one of the animals or plants in the food chain were to become extinct. The student holding that plant or animal would be asked to let go of the card and yarn they were holding. It would fall and affect the connecting note card which would consequently affect each member of the food web in one way or another. Eventually the entire food web will fall apart.
• The teacher would then reiterate key components of the activity in a class discussion to get students to synthesize the demonstration.
• The students would then use their knowledge of cause and effect within food webs and the food chain to answer mathematical problems. The math problems are a combination of graphical word problems emphasizing interpreting data and drawing conclusions.

**Background**

A food chain shows how living things get its food. A food chain links producers and consumers within an ecosystem together. A producer makes its own food by using light energy from the sun. A consumer can not make their own food so they eat other plants and/or animals. Animals that only eat plants are called herbivores. Animals that only eat other animals are
called carnivores. Animals that eat both plants and animals care called omnivores.

A typical food chain flows
sun ➔ plants (producer) ➔ herbivore (primary consumer) ➔ carnivore (secondary consumer) ➔ carnivore (tertiary consumer)

A food chain usually only has four or five links because the further along the food chain, the less food available, thus animals at the end of the food chain would not get enough energy to stay alive. Animals can be a part of more than one food chain. Interconnected food chains are called food webs. Food webs illustrate how plants and animals are interconnected within an ecosystem, while food chains illustrate a linear path. Since populations within a food chain are interdependent, a change in one population with ultimately affect other populations.

Before the Activity

• Divide the class into small groups of four students each
• Create an envelope for each group with four title category note cards (herbivore, carnivore, omnivore, producer) and four respective plants or animals that fit under each category. Each note card should contain a picture of the plant or animal and its name. The envelope should contain a total of 4 plants, 12 animals, and 4 category cards.
• Gather other necessary materials (yarn, math worksheets)

Image

Image 2
ADA Description: A sample food web showing the connections between animals and plants within an ecosystem.
Image file name:?

Attachments
• The Circle of Life graph worksheet

Safety Issues
• The teacher should provide pre-approved websites for students to use while researching on the internet.
Investigating Questions

Knowledge
- Make a food chain using your given note cards
- How many consumers are in your food chain?
- What is a producer?
- Find/list/describe/relate/locate/name

Comprehension
- What are the differences between a herbivore, carnivore and an omnivore?
- How do you think that animal got his food?
- Why are there primary, secondary, and sometimes tertiary consumers?
- Predict/discuss/describe

Application
- Could this food chain exist in a desert environment?
- Group the plants and animals by their eating characteristics.
- Try to create a food chain using other animals.
- Show/use/classify/illustrate

Analysis
- Compare your food chain to another groups. What are some similarities? What are some differences? Do you notice any patterns?
- What would happen to this food chain if there was a drought?
- What other animal could eat a rabbit? (or other animal)
- Identify/explain/examine

Synthesis
- Devise your own solution to deal with animal extinction
- Design a way to limit animals eating (example, humans eating meat)
- Predict what would happen if...
- Create/invent/compose

Evaluation
- Is there a better solution to...
- What changes would you have made to this?
- How would you feel if there wasn’t any chicken (or other food) available to eat?
- Select and justify the most important component in a food chain

Assessment

Assessments for this particular lesson can vary greatly due to individual teacher’s philosophy of teaching and teaching style. Assessments should work in conjunction with lesson objectives. Teachers can measure effective learning through during instruction formative or summative assessment. Students can also self-assess through interactive food web demonstration and working collaboratively with other group members.
Objective assessment such as a multiple choice test or short answers about factual information, such as terminology or math problems would be used best for summative assessments briefly after the lesson or at the end of the unit to measure content knowledge.

I would personally assess my students using both formative and summative assessment, but with a strong emphasis on formative assessment. I would emphasize formative assessment during instruction by observing students interactions, participation, and understanding of the material as they worked collaboratively with other group members. Formative assessment allows the teacher to adjust learning and teaching while it is happening. This helps to ensure the students are meeting the objectives. It also allows the teacher to observe progress made, give students descriptive feedback, and make modifications to instructional strategies.

Activity Extensions
This lesson would fit great after a study of food and nutrition. Students would be able to make real-world connections by understanding their individual role in the food chain. To emphasize how energy is passed on through living things within the food chain and how many paths are interrelated in the food web, students could take sample items of food and trace its path. For example, analyze a cheeseburger. The meat comes from a cow who eats grass which is a producer using energy from the sun. The cheese also comes from the cow. The bun comes from grains which are producers as well as the tomatoes and lettuce which all get their nutrients from the sun. These lessons are highly relatable since food is a necessity to life. Many activities applicable across the curriculum could stem from lessons on nutrition and the food chain.

Please also see Engineering Connection for other examples of activity extensions.

Activity Scaling
• Lower grades, such as kindergartners and first graders, could adopt this lesson by putting the note cards into their own categories. For example, some students might organize the plants and animals based on size or where they live. Categorizing animals and familiarizing themselves with various elements of an ecosystem is still beneficial. Students could then create an environment for an animal to encourage creativity and design.
• Upper grades could easily adopt this lesson by using more advanced terminology and studying the food chain, ecosystem, and energy in more depth. For example, producers are called autotrophs while consumers are called heterotrophs. Students could study the in depth processes of photosynthesis to further understand how plants get their energy from
the sun. Students could also design a way to represent a food chain or web under specific constraints.

**Additional Multimedia Support**
- Bill Nye the Science Guy - "It's The Food Web" music video found on youtube.com
- Interactive website on meadow, artic, and pond food webs. [http://www.harcourtschool.com/activity/food/food_menu.html](http://www.harcourtschool.com/activity/food/food_menu.html)

**References**


**Owner** Samantha Carrick, *The College of New Jersey*

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