System Interactions: The Lorax and the Truffula Tree

Overview:

After reading *The Lorax*, students discuss the interrelationships of the characters in the story and create a causal loop diagram, so as to further understand the nature of systems interactions and their use in problem solving.

Objectives:

The student will:
- create a causal loop diagram;
- discuss the interrelationships within systems;
- offer advice on a problem based on the relationships between objects in a system; and
- modify a causal loop with the addition of new input.

GLEs Addressed:

Science

[5-9] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

[10-11] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, analyzing data, developing models, inferring, and communicating.

[5] SA3.1 The student demonstrates an understanding that interactions with the environment provide an opportunity for understanding scientific concepts by identifying the limiting factors (e.g., weather, human influence, species interactions) that determine which plants and/or animals survive.

Materials:

- OVERHEAD: “Modifying the Loop”
- STUDENT WORKSHEET: “Truffula Tree”
- STUDENT WORKSHEET: “Letter from the Lorax”

Activity Procedure:

1. As a class, read *The Lorax*. Ask students to identify each figure in the story (*bar-ba-loots, Once-ler, Lorax, threeeds, factory, smoke, swomee-swans, people, truffula trees, truffula fruits, humming-fish, pond, gluppity-glupp, schloppity-schlopp*).

2. Explain that a system is a group of objects or units combined to form a whole and to move or work together. The world of the Lorax and the Once-ler described in the story is a system, just as Earth is a system. The human body is also a system, as each organ in the body works together to carry out vital functions.

3. Earth's weather is also a system, which includes the atmosphere, water, solar radiation, and aerosols, etc. Discuss why the study of systems is important to scientists. Point out that the National Ground Water Association (NGWA) stated in their 2006 “Declaration of the Importance of Earth Systems Science Education” that, “Because the Earth represents endless interconnected and dynamic systems exhibiting intricate behaviors on space and time scales relevant to society, a broad understanding of the linkages between Earth systems’ processes is needed.”

4. Read the book again. This time, pause after each creature is sent away and discuss the cause for their leaving.
5. As a class, create a causal loop diagram to illustrate the interrelationships between the figures identified in Step 1. The diagram may look something like this:

![Causal Loop Diagram](image)

6. Distribute the STUDENT WORKSHEET: “Truffula Tree” and ask students to complete the worksheet individually or in pairs.

**Critical Thinking Question: Letter Writing Method.** Distribute the STUDENT WORKSHEET: “Letter from the Lorax.” Ask students to pretend they are the Lorax and are writing a letter to the Once-ler with advice on how he should run his business. The letter should refer to the interrelationships identified in the causal loop diagram and offer a suggestion as an alternative to cutting down all the truffula trees. Ask several students to share their letters with the class and discuss the different solutions suggested. How does the causal loop diagram help students to identify cause and effect in the situation?

7. Explain one value of sketching causal loops is the ability to model the introduction or removal of items from a system. SHOW OVERHEAD: “Modifying the Loop.” Explain that the first loop shows a neighborhood that is suffering. As the number of residents decreases, the number of vacant properties increases and the quality of the neighborhood declines. This is a feedback loop. Ask students to identify the other feedback loop in the system. (As the number of local residents decreases, the local revenue decreases, which leads to less maintained city infrastructure, which leads to a decrease in the quality of the neighborhood.)

8. Make sure students understand the difference between a causal loop and a feedback loop. A causal loop is a diagram that shows the relationships between objects in a system. A feedback loop is a specific type of causal loop in which the system feeds on itself, causing a cycle that repeats.

**Teacher’s Note:** Feedback loops can be negative or positive. Positive feedback amplifies the system. Negative feedback helps to maintain stability in the system.

9. The second loop shows how the introduction of a community garden can alter the loop. Ask students how the system was changed by the introduction of a community garden.

10. Pick two or three letters from the Critical Thinking Question. As a class, modify the causal loop from Activity Procedure Step 5 to include the suggestions within the student letters. Discuss.

**Answers:**

STUDENT WORKSHEET: “Truffula Tree”

There are no right or wrong answers. However, students should use complete sentences.

STUDENT WORKSHEET: “Letter from the Lorax”

Letters will vary. However, students should demonstrate understanding of causal loops.
Project Plan: Part II and III

**Directions:** Answer the following questions. There are no right or wrong answers.

1. Describe the land before the Once-ler came. _______________________________________
   ______________________________________
   ______________________________________
   ______________________________________

2. Why did the Once-ler chop down the first truffula tree? ______________________________
   ______________________________________
   ______________________________________
   ______________________________________
   ______________________________________

3. What happened when the Once-ler sold his first thneed? _____________________________
   ______________________________________
   ______________________________________
   ______________________________________
   ______________________________________

4. What happened to the animals as the Once-ler kept “biggering” and “biggering” his factory? ______
   ______________________________________
   ______________________________________
   ______________________________________
   ______________________________________

5. What do you think the Once-ler could have done differently while still increasing his business?
   ______________________________________
   ______________________________________
   ______________________________________
   ______________________________________
Directions: Pretend you are the Lorax and are writing a letter to the Once-ler. Using the relationships identified in the causal loop diagram created by your class, explain to the Once-ler why he should not cut down all the trees and offer him an alternative means of running his business.

Dear Once-ler

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

Sincerely,
The Lorax