

The Floristic Relay: A Game to Teach Succession

Elena Ortiz-Barney
NSF GK-12 Fellow
Arizona State University

Description:

This lesson is designed to introduce students to the concept of succession or plant community dynamics. It takes advantage of students' enthusiasm and interest in playing games. This lesson uses a board game in which students represent imaginary plant species. Students explore plant community dynamics by playing the game. Each time the game is played, the students are conducting a type of experiment. Students report on the results at different points in the game. Then they discuss with the class, what they have learned. To apply their new knowledge, students predict changes in the community and attempt to make the community change in specific ways. It can be used for students in grades 5 –12 and college.

Goals:

Students will learn:

- 1) That different plants respond differently to changes in their environment.
- 2) That plants respond to each other.
- 3) Both these influencing factors can shape the way a plant community changes over time.

Objectives:

Students will be able to

- 1) Diagram the changes in the imaginary plant community as a function of time, in the presence of environmental disturbances.
- 2) Predict the most likely outcome of plant succession in the imaginary plant community, in the absence of environmental disturbances.
- 3) Predict the outcome of land management strategies that increase or decrease the frequency of disturbances.

National Science Education Standards:

Teaching Standards

STANDARD A. Teachers of science plan an inquiry-based science program for their students.

STANDARD B. Teachers of science guide and facilitate learning. In doing this, teachers focus and support inquiries while interacting with students.

Orchestrate discourse among students about scientific ideas.

Content Standards (Grades 5-8 and 9-12)

STANDARD C. As a result of their activities in grades 5-8, all students should develop understanding of

Populations and ecosystems

Diversity and adaptations of organisms

STANDARD C: As a result of their activities in grades 9-12, all students should develop understanding of interdependence of organisms

Arizona Department of Education

State Academic Standards:

STANDARD 1: Science as Inquiry

Essentials (Grades 4-8)

1SC-E2. Create a model (e.g., a computer simulation, a stream table) to predict change

1SC-E3. Organize and present data gathered from their own experiences, using appropriate mathematical analyses and graphical representations

1SC-E4. Identify and refine questions from previous investigations

Proficiency (Grades 9-12)

1SC-P1. Propose solutions to practical and theoretical problems by synthesizing and evaluating information gained from scientific investigations

1SC-P6. Identify and refine a researchable question, conduct the experiment, collect and analyze data, share and discuss findings

STANDARD 3: Personal and social perspectives in science and technology

Proficiency (Grades 9-12)

3SC-P4. Identify and describe the basic processes of the natural ecosystems and how these processes affect, and are affected by, humans

STANDARD 4: Life Science

Essentials (Grades 4-8)

4SC-E7. Explain and model the interaction and interdependence of living and non-living components within ecosystems, including the adaptation of plants and animals to their environment

Proficiency (Grades 9-12)

4SC-P6. Describe and explain how the environment can affect the number of species and the diversity of species in an environment.

Materials:

- Game Board (2 parts)
- Game Cards
- Game pieces: assorted nuts, bolts and buttons
- 1 coin for each group
- Handouts for students: Rules, Community diagrams, Discussion questions

Procedure:

Time Frame: This lesson can take place over the course of one or more 45 minute periods, depending on the level of the students, and the extension work.

1. For each group of 4-6 students, make a copy of the Game Board on card stock and tape the two sides together. Make copies of the game cards on card stock, use a different color for each of the 3 types of card: Event cards, Interaction cards and Character cards. Make multiple copies (5-7) of the Event and Interaction cards for each group. Make one copy of Character cards per group.

2. Assign students into groups of 4-6. Provide each group with one Game Board, a deck of Event cards, a deck of Interaction cards, and a set of 6 Character cards. Each group also needs 6 game pieces (nuts, bolts and buttons), and a coin for coin tosses.

3. Provide each group with the Rules and the handout “How did the plant community change?”
4. Read the rules with the class, and walk them through the first round of the game.
5. As the class plays more rounds of the game, remind them to record the position of the players after all players have left the Start box. There is a place to record this data on the handout “How did the plant community change?”
6. At the end of the game, have students record the position of the players on their handout. Discuss the sample diagram and have students diagram what their plant community looked like at the start and end of the game. If any players are at the Start box at the end of the game, their species has zero plants in the diagram.
7. Hand out the Discussion questions. Have students fill them out within their group and then share with another group. They can compare and contrast their events and results.
8. Discuss as a class their answers to the discussion questions.
9. The last question asks students to make a prediction about the outcome of the game in the absence of disturbance cards. Have students make predictions and try the experiment.

Evaluation:

Have students write a short report on their results of the experiment.

Have students conduct experiments (with the game) and write a report on their results and state an opinion on the following scenario:

Environmentalists of the group Earth Brigade are asking the government to ban all grazing in Lorax National Forest. They believe that if the park manager continues to allow cattle to graze in the forest, that soon there will be no Borogrove grass in the forest. The rancher who owns the cattle that are in the forest has told the government that grazing is good for the forest. Grazing encourages the Grickle grass to grow, and the Grickle grass helps the Borogrove grass. The park manager at Lorax National Forest has been telling his boss and others in the government, that grazing doesn't hurt the forest, but it isn't good for the forest either. Who is right? What happens if we remove grazing? What if grazing is necessary, how many times should it happen?

The scenario can also be used to have a class debate, students taking sides based on the opinions in their reports, or assigned by the teacher.

Extensions:

One of the questions for discussion asks which plants respond well to the different disturbances. As an extension you and your students could discuss and research what adaptations allow plants to withstand some disturbances. What makes a plant adapted to fire, landslides or grazing.

You could research your local ecosystems, learn what disturbances occur there, and what adaptations the plants in those ecosystems have to those disturbances. A good place to start is the Forest Service, Parks Service or other local conservation agency.

You could create your own game based on the plants and disturbances in your neighborhood.