



Environmental Literacy Model

Title	PIERS Schoolyard Plant – Animal Interaction Unit
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School, District	Garrett and Allegany Counties, Maryland
Audience (grade, course)	GR K or 2 (originally GR 4 prior to adoption of NGSS)

Curriculum Anchor

Defining the Learning Objectives and Curriculum Connection

Curriculum indicators, performance expectations, and/ or student learning objectives.

NGSS

PE K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

SEP. Analyzing and Interpreting Data

DCI LS1.C. Organization for Matter and Energy Flow in Organisms

CCC. Patterns

PE K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.

SEP. Analyzing and Interpreting Data

DCI ESS2.D. Weather and Climate

CCC. Patterns

PE K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

SEP. Obtaining, Evaluating, and Communicating Information

DCI ESS3.C. Human Impacts on Earth Systems

CCC. Cause and Effect

PE 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

SEP.

- Planning and Carrying out Investigations
- Scientific Knowledge is Based on Empirical Evidence

DCI LS4.D. Biodiversity and Humans

CCC. NA

MD E. Lit. Standards

(1) Environmental Issue Investigation & Action. Environmentally literate students investigate environmental issues in order to develop and implement local actions that protect, sustain or restore the natural environment.

(3) Environmental Impact of Human Activity. Environmentally literate students construct and apply understanding of the environmental impact of human activities on Earth’s systems and resources.

Students will understand that:

- Plants and animals interact in many different ways that help them grow and reproduce.
- Weather and human activities can impact these plant-animal interactions.

Students will know that...

- Plants are called producers because they make their own food using air, sunlight and water.
- Animals are called consumers because they get food by eating plants and other animals. Some plants have bad-tasting toxins, prickly leaves, and other characteristic to keep animals from eating them.

- Plants get animals to transfer their pollen so that they can reproduce; this is called pollination. They have flowers with nectar to attract the animals. Animals are attracted to certain flowers and have body parts that help them get the nectar.
- Plants get animals to transport their seeds; this is called seed dispersal. Some plants have seeds that stick on animal fur; other plants have their seeds in sweet fruit or nuts for animals to eat.
- Animals make nests in plants and from plants so that they have a place to live and reproduce.
- Weather changes with different seasons. In the fall, air temperature decreases, and day length (period of sunlight) is also decreases.
- In fall, many plants die or go dormant, and the animals that rely on them must either migrate or also go dormant—sometimes using the plants as a home.
- Human activities can negatively affect plant-animal interactions by removing organisms from the populations involved in the interaction when building schools, home, stores and other structures.
- Human activities can positively affect plant-animal interaction by increasing populations of organisms involved in the interaction.

Students will be able to...

- Create list of plant-animal interactions found in area such as the schoolyard.
- Identify plants and animals that interact and describe how they interact and what characteristic of these organisms are used in this interaction.
- Measure, graph and compare how environmental conditions change with season (i.e., late summer to late fall); this should include weather (temperature), day length, and plant/animal activity/presence.
- Use evidence and reasoning to explain interactions.
- Describe how weather impacts plant-animal interactions.
- Describe how human activities impact plant-animal interactions and, optionally, propose ways to enhance habitat support plant-animal interactions.

Describing the Local Context

The life-relevant issue that will serve as the context for learning.

Students recognize that they can see different plants and animals interacting in their communities, including their schoolyard, at different times of year. They also recognize that weather and human activity affect the types of plants and animals they see interacting in their schoolyard.

Identifying the Driving Question

A broad, open-ended, life-relevant question that is based on the standards/learning objectives. Guides inquiry for the investigation(s), prompts the development of actionable claims.

Students will explore their schoolyard and note the various interactions between plants and animals in the late summer and late fall as they record the weather and day length weekly. This will lead them to the driving question: How can we support plant-animal interactions in our schoolyard?

Issue Investigation

Asking Questions, Defining Issues and Problems

Students define the issue, problem, or phenomenon to be investigated and develop supporting questions that are relevant for investigation.

Issue Investigation 1	Issue Investigation 2	Issue Investigation 3
(In late summer) Students discuss ways they've seen plants and animals interact with each other and come up with four key types of plant-animal interactions: herbivory, nesting, pollination, and seed dispersal. This discussion leads students to ask the question: What plant-animal interactions are in our schoolyard?	(Sometime between investigation 1 and 3) After completing the previous investigation in their schoolyard, students begin to wonder how exactly do plants and animals interact, and how does the change in season impact those interactions?	(In late fall/early winter) As the days seem to be getting colder and shorter, students begin to wonder how does the change in season affect plant-animal interactions in their schoolyard.

Planning and Conducting Investigations

Students plan and conduct investigations and classroom activities (indoor and outdoor) that actively address students' supporting questions. Students collect data that will be used to inform actionable claims.

Issue Investigation 1	Issue Investigation 2	Issue Investigation 3
<ol style="list-style-type: none">Working in pairs or small groups, students select an area of the schoolyard as their study site. They observe and record all evidence of each of the four forms of plant-animal interactions in their study site.Students begin recording forecasted low temperature and day length weekly until their late fall observation date.	<ol style="list-style-type: none">Students read about and discuss the four types of plant animal interactions such as where they occur (i.e., near or far from human activity), who they help (the plant? the animal? both?), related characteristics (e.g., bee proboscis and flower; hooked seed pods and fur), and impacts of seasons.Students divide into groups and read about one of four virtual fieldtrip sites in the late summer and late fall. They evaluate plant-animal interactions at those sites based on the above questions, and then discuss whether organisms at their virtual fieldtrip site are producers or consumers.	<ol style="list-style-type: none">Students return to the schoolyard to look for and record evidence of herbivory, pollination, seed dispersal, and nesting. They determine and record any changes in each interaction as increased, decreased, stayed the same, or didn't see it.Students graph their forecasted low temperature and day length data.

Issue Investigation ccn't.>

Analyzing and Interpreting Data

Students analyze data through graphs, models, and other methods to reveal patterns and relationships. Students synthesize and apply evidence from their investigations to draw conclusions that address the supporting questions.

Issue Investigation 1	Issue Investigation 2	Issue Investigation 3
<ol style="list-style-type: none"> 1. During this lesson, students come up with definitions of what they consider evidence of “some” interactions and what is “many.” They then go out to their study site and record on their datasheet under the “Late Summer Evidence” column whether they see “none,” “some” or “many” of each interaction. Students may also draw and label the evidence on the back of their worksheet. 2. Back in the classroom, students share what they saw at their various sites and discuss how their locations may have affected the number and types of interactions observed (e.g., students may see a bird nest in a shrub along the edge of the school property, but not in shrubs next to the busy playground). 3. Knowing they’ll be going out again in late fall to record the plant-animal interactions at their study site, students begin to think about how weather and human activity could affect these interactions, and start recording weather data until their late fall schoolyard investigation. 	<p>Students share with each other what they’ve learned from their virtual fieldtrips. They review the evidence of interactions they saw in the schoolyard and discuss characteristics of schoolyard organisms that encourage or discourage those interactions.</p>	<p>Students review changes in their schoolyard plant-animal interactions from the late summer to late fall relative to changes in temperature and day length.</p>

Constructing and Communicating a Claim

Students draw on the conclusions from their investigations to make a claim about the driving question and communicate these evidence-based claims to internal and/or external audiences.

Issue Investigation 1	Issue Investigation 2	Issue Investigation 3
<p>Based on their observations, students typically conclude that they see evidence of all four types of plant-animal interactions in their schoolyard during the late summer. The most-observed interaction visible this time of year – when flowers are still in bloom and leaves are on the trees – is pollination. Students predict the change in weather will affect the plant-animal interactions, primarily due to flowers dying and no longer providing nectar for flying insects.</p>	<p>Students conclude plants and animals have various characteristics that promote and inhibit interactions among them, and these interactions vary with seasons.</p>	<p>Students use their data to reflect on the number, types and locations of plant-animal interactions in their schoolyard. They use this information to determine how they can best support such interactions, discuss their options as a class, and come up with a schoolyard enhancement plan (e.g., plant shrubs on edge of the schoolyard for nesting, plant flowering plants to provide nectar for bees and seeds for birds) to present to their principal or PTA.</p>

Stewardship and Civic Action

Identifying Solutions

Students identify and explore solutions that directly address the problem, challenge, or opportunity reflected in their claim. Students use decision making processes to identify the solution(s) to implement.

As a class, students determine the type and location of a schoolyard enhancement (e.g., plant shrubs on edge of the schoolyard for nesting, plant flowering plants to provide nectar for bees in the summer and seeds for birds in the fall) to increase plant-animal interactions. They may mark this location on a paper map of their schoolyard and discuss the best way to implement this schoolyard enhancement.

Designing a Plan and Taking Informed Action

Students design a plan for implementing solutions through informed action in their classrooms, schools, and/or communities. The plans should include criteria for determining the extent to which the action successfully addresses the problem, challenge, or opportunity reflected in the claim. Students implement their plans.

Students develop a detailed plan for supporting/increasing plant-animal interactions in their schoolyard, which they can present to their principal or school board. With permission, students implement their plan.

Evaluating Action

Students reflect on the action and determine the extent to which it successfully addresses the problem, challenge, or opportunity reflected in the claim. Students communicate their findings and share proposals for sustaining or extending the action.

Students complete the “Reflections” questions at the end of their “student report” (i.e., worksheet) without teacher’s guidance (except to clarify questions as necessary).

For subsequent academic years, students may examine the effectiveness of previously installed plant-animal interaction schoolyard enhancements and either maintain, replace, or expand upon them (e.g., weeding gardens and replacing plants that have died; planting a fruit tree).