

6.6 The Secret Lives of Plants in the Arctic

Story Extension for This Lesson:

This lesson is used in "An Introduction to John Rae" section of the junior story. A good place to connect this lesson to the story is this passage:

Fortunately a piece of wood had gotten entangled amongst the willows. This was cut up for a fire, and a cup of tea made us comfortable.

Grade: 6

Strand: Biodiversity

Experts (suggested):

- Dr. Jennifer Baltzer, Email: jbaltzer@wlu.ca
- Dr. Mihai Costea, Email: mcostea@wlu.ca
- Dr. Lada Malek, Email: lads.malek@lakeheadu.ca

Big Ideas:

- Classification of the components within a diverse system is a beginning point for understanding the interrelationships among the components. (Overall expectations 2 and 3)
- Because all living things are connected, maintaining diversity is critical to the health of the planet. (Overall expectations 1 and 3)

Overall Expectations:

1. assess human impacts on biodiversity, and identify ways of preserving biodiversity
2. investigate the characteristics of living things, and classify diverse organisms according to specific characteristics
3. demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans

Specific Expectations:

- 2.3** use scientific inquiry/research skills to compare the characteristics of organisms within the plant or animal kingdoms
- 2.4** use appropriate science and technology vocabulary in oral and written communication
- 2.5** use a variety of forms to communicate with different audiences and for a variety of purposes

Inquiry Skills:

Observing, Searching Gathering Data

Instructions:

The arctic is an interesting place for a plant to live. They have short growing seasons, shallow soil, and a layer of permafrost that keeps things icy cold. How do plants in the arctic live in this harsh environment?

Part 1: The Flowering Plants and Shrubs in the Arctic

This is a quick research project where students discover how flowering plants and shrubs live in the arctic environment. Students are to complete The Flowering Plants of the Arctic before they proceed to the Part 2: The Benefits of Plants in the Arctic.

Part 2: The Benefits of Plants in the Arctic

In this section, students will research how plants in the arctic are used by the Indigenous people of the North. Students are to complete The Benefits of Plants in the Arctic before they proceed to Part 3: The Secret Life of Arctic Plants.

Part 3: The Secret Life of Arctic Plants

This is an inquiry investigation where students replicate growing conditions of plants in the arctic. This is best complete in pairs.

Procedure:

- Fill one small container with 3 cm of potting soil
- Add flowering seeds and gently cover the seeds with the soil in the container
- Moisten soil and place in a sunny area of the classroom

Guiding Questions:

- How long do you think the seedlings will thrive in shallow soil?
- Which way do the roots grow?
- How long would it take for your seeds to sprout?
- Was it possible for your plant to produce a flower?

To make this activity into an open inquiry, have students add a variable to accurately replicate the short growing season of the arctic (e.g., ice packs to simulate permafrost, place container in the school fridge, etc.). It is recommended you use the Smarter Science framework to help students develop their own inquiry questions.

Materials List:

- potting soil
- clear containers (e.g., plastic cups)
- seeds of flowering plants

Connections:

This lesson can be used in both the Language and Mathematics program. The research component is language based whereas data collection and analysis is part of the Data Management strand in Mathematics.

Subject Area:

Environmental, Math, English

Connects to:

Grade 6, Grade 7

Assessment Strategy:

It is recommended you focus your assessment on process skills. To help get you started on this path, a series of charts have been provided for you.

- Process-Skill-Observing-9
- Process-Skill-Gathering-Data-10
- Process-Skill-Searching-6

Handouts/Assessments:

- The Flowering Plants of the Arctic
- The Benefits of Plants in the Arctic
- Steps to Inquiry Level 1-4

Planning Our Investigation

Step 1: Observing & Questioning

Place sticky notes of the same colour in the space below.

Place sticky notes of a new colour in the space below.

OBSERVE

See



Smell



Hear



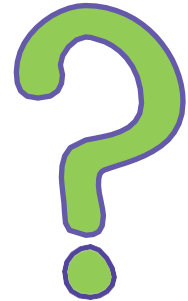
Touch



Taste



WONDER



Level: 1

Planning Our Experiment

Step 2(a): What could we measure or observe about the object, or event?

Brainstorm (Place sticky notes of the same colour in the space below.)

Measure or Observe

Step 2(b): What could we change or vary about the object or event that may affect what we could measure or observe?

Brainstorm (Place sticky notes of a new colour in the space below.)

Variables

Level: 1



Planning Our Experiment

Step 3(a): What will we change?

ONE VARIABLE WE WILL CHANGE:

WE WILL MEASURE OR OBSERVE THIS RESULT:

Changed Variable

(Place a sticky note from Step 2(b))



Measure or Observe

(Place a sticky note from Step 2(a) here)

Step 3(b): What will we not change?

VARIABLES WE WILL NOT CHANGE:

What conditions will be held constant so it is a fair test? Place remaining sticky notes from Step 2(b) here.

Unchanged Variables

Level: 1



Planning Our Experiment

Step 4: What is the question we want to explore?

If we change

Changed Variable

what will happen to

Measure or Observe

compared to our control?

Step 5: What is our prediction?

State how we will change the variable and predict the outcome.

We predict that...

We think this will happen because...

Level: 1



Name: _____

The Flowering Plants and Shrubs of the Arctic

Name of flowering plant or shrub	What is it's habitat?	Uses for the plant or shrub in the arctic	Source of information (e.g., book, website, mentor, etc.)

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Name: _____

The Benefits of Plants in the Arctic

Name of plant	Who could benefit from the plants in the arctic?	What are the benefits of plants in the arctic?	When are plants beneficial in the arctic?	Why are plants beneficial in the arctic?	How might plants be used in the arctic?

Name: _____

Name of plant	Who could benefit from the plants in the arctic?	What are the benefits of plants in the arctic?	When are plants beneficial in the arctic?	Why are plants beneficial in the arctic?	How might plants be used in the arctic?

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Process Skill - Observing

Process Skill	Students	Teachers	What This Skill Should Lead To
Observing	☐ using all five senses, as appropriate, to thoroughly understand an object's natural state ☐ detecting details in natural phenomena that go beyond that of the casual observer ☐ building understanding by connecting to past experiences	☐ prompting students to use all five senses ☐ encouraging students to use expansive, descriptive vocabulary, including scientific terms ☐ encouraging students to make connections to past experiences (e.g., what does this remind you of?) ☐ providing multiple opportunities to practise ☐ giving students problems that require them to decide what evidence (observations) are relevant, and to interpret the evidence	Systematic observation develops an enhanced descriptive vocabulary that becomes important as students practise other science skills, such as writing and reviewing. As students become better observers, they will become better able to detect patterns, classify information, predict events, and make inferences. Math skills will also improve, and students will have opportunities to integrate skills from the arts, including visual art, drama, and dance. Finally, observing leads to discussions of the role of bias when observations are interpreted by different observers.

Teacher Notes:

Process Skill - Gathering Data

Process Skill	Students	Teachers	What This Skill Should Lead To
Gathering Data	☐ working independently or in groups to collect and record data for inquiry ☐ using a wide variety of data-gathering tools (e.g., scientific instruments/equipment, surveys, observation checklists, statistics, online databases, interviews) to collect data ☐ locating data through research and organizing it for their purposes ☐ using appropriate strategies (e.g., tables, checklists) to organize and record data so it can be easily retrieved and analyzed at a later time ☐ ensuring the information collected is accurate; using proper data collection methodologies ☐ taking steps to minimize bias in the data collected (e.g., randomly choosing samples)	☐ making available scientific instruments/equipment and technology for students to select and use in their inquiries ☐ instructing students on the importance of accuracy (e.g., using a thermometer is superior to using touch) and quantity (e.g., multiple replications increase the reliability of the data) ☐ introducing data-gathering techniques. These can be modeled and explored before being used independently in investigations.	Students will be more engaged and will develop better data management skills.

Teacher Notes:

Process Skill - Searching

Process Skill	Students	Teachers	What This Skill Should Lead To
Searching	☐ locating their own sources of information based on their own questions ☐ re-framing their current understanding in light of new evidence ☐ evaluating the reliability of sources of information ☐ identifying potential sources of error and/or bias ☐ developing and using criteria to establish relevance, accuracy, and reliability of information ☐ discussing research with peers and teachers to gain additional perspective and construct new meaning ☐ developing and using strategies to collect, organize, and communicate relevant research ☐ developing and using strategies to interpret scientific vocabulary	☐ giving students sufficient time and resources for research ☐ giving students guidance and activities to develop research skills ☐ developing criteria for reliability ☐ giving students opportunities to discuss and question their research ☐ guiding the development of strategies to interpret scientific text	☐ critical literacy skills that enable assessment of information for accuracy, reliability, and relevance ☐ strategies for interpreting and understanding scientific text ☐ cooperative learning (through discussion of research with peers)

Teacher Notes: