Cultivating Inquiry and Data Literacy through Ecological Investigations with Arthropods

Matthew Retterath[1], Ivan Arismendi[2], Tatiana Latorre-B[2], Amanda Morrison[3], Kari O'Connell[2], Martha Downs[4]

Cultivating Inquiry

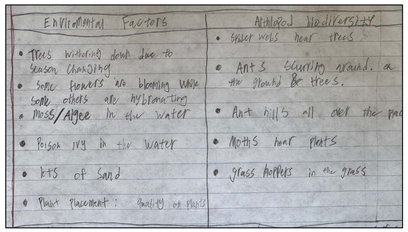
Students engage in three activities to spark inquiry in preparation for planning and carrying out an investigation.

"Asters and Goldenrod" from *Braiding Sweetgrass for Young Adults* by Robin Wall Kimmerer

- Explore the nature of science and inquiry.
- Reflect on personal experiences with inquiry.
- Wonder about the connection between plants and arthropods.

Wonder Wander

- 10 minute wander in an outdoor natural area.
- Record observations and questions related to environmental factors and arthropods.



Whole-group Brainstorming

- Compile observations of environmental factors and arthropods as a whole class.
- Identify and mark variables that can be investigated using available materials and resources.
- Draw connections between testable factors to represent possible ecological relationships.

Planning & Carrying Out Investigations

What will you manipulate for the *independent variable*?

Ground cover

Sampling specifics

Ground cover types:
- Sandy soil
- Tall grass
- Dirt
- Short grass

Effect on

What will you measure for the *dependent variable*?

Amount of arthropods

Sampling specifics

- Number of arthropod types
- Total number of arthropods

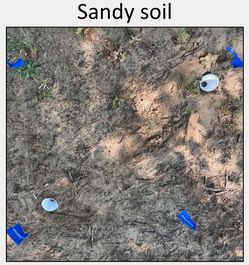
Investigation Question

How does the type of ground cover affect the number of types and total number of arthropods?

How will the *independent variable* be manipulated?

- Four, 1 m^2 sites selected representing each type of ground cover.

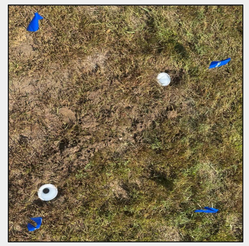
Sandy soil



Tall grass

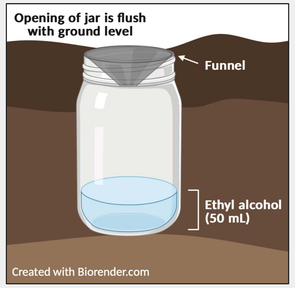
Dirt

Short grass



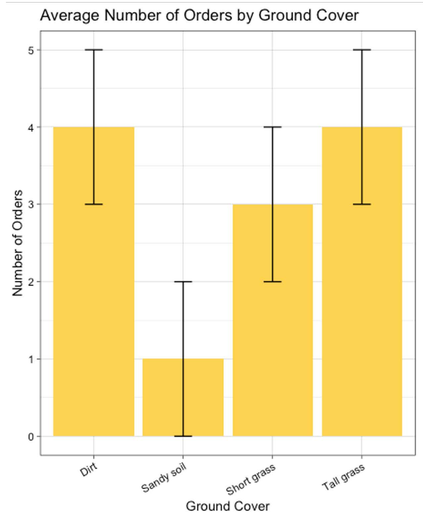
How will the *dependent variable* be collected and measured?

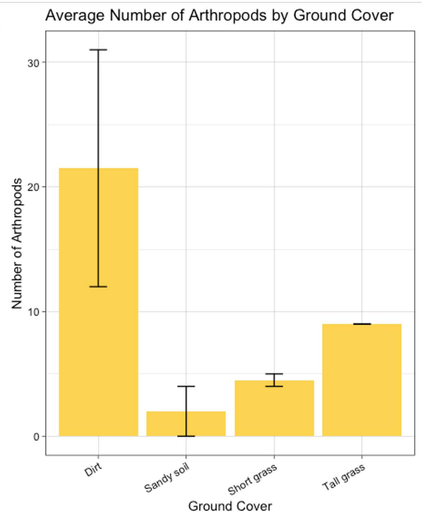
- Two pitfall traps per site, spaced 1 m apart placed into the ground.
- Traps set for 24 hours to collect arthropods.



- Arthropods will be identified by order and counted using identification guides and dissecting microscopes.

Results





Argumentation of Findings

Students engaged in argumentation via the Claim-Evidence-Reasoning (CER) model to talk about their experimental findings through a scaffolded activity.

Analysis of Findings

- Write down noticings about the data.
- Create a one sentence statement, based on the data, that answers the investigation question.
- Construct an explanation for how and why the data supports the statement including 1) describing patterns or differences in the data, and 2) speculation for why there is or isn't a difference between the groups.

Direction Instruction

- Take notes on the CER model.

Annotate Analysis and Write CER Paragraph

- Select and assign a color for claim, evidence, and reasoning.
- Highlight or underline each element of the CER in the analysis.
- Write formal CER paragraph from analysis annotation.

[1]Fridley High School, [2]Oregon State University, [3]Arctic Long-Term Ecological Research Site, [4]University of California Santa Barbara