Lesson Five: Weather Wonder

Grade Level: 2nd Grade

Time: Part 1: 30 minutes; Part 2: 45-60 minutes; Part 3: 30 minutes (presentation, results, and conclusion) See notes at the end of the lesson for information on the anticipated timeline of experiment results.

Essential Question: How can we be stewards of Wyoming's agriculture to benefit current and future generations?

Objective: Students will describe the cause and effect relationship of weather (freezing, heat, and wind) on plants and soil.

Purpose: During the experiments, students hypothesize the effects of climate variability and weather trends on crops. They will then test their hypothesis and make conclusions regarding the results of heat, wind, and freezing on plants. This will help them understand how farmers work to steward agricultural resources in certain environments.

Required Materials/Resources:

- Video: https://www.youtube.com/watch?v=9sGSRy7UfD0 *"How's Your Weather, Up There?"* (Source 1) *Video length: 1 minute 1 second.*
- Video: https://www.youtube.com/watch?v=-4iFhBBbqOc *The Big Hollow and the Power of Wind Erosion* (Source 2) *Video length: 1 minute 35 seconds.*

- Video: https://www.youtube.com/watch?v=qGhf7jKXp6I *Bill Nye – Erosion 1* (Source 3) *Video length: 7 minutes 43 seconds. (This video is not embedded in the lesson. It is an optional additional resource.)*
- Stress Effects on Plants: Teacher Resource
- Plants from the class garden (see Lesson 4 & Educator Essentials for unit)
- Freezer
- Lamp
- Fan or blow dryer
- Items to act as wind barriers
- Chart paper
- Stress Effects on Plants: Predictions and Observations (optional – one per student)
- White paper for assessment diagrams/drawings (one per student)

Suggested Teacher Preparation:

- Class garden from introductory lesson needs to be available.
- Read through the Stress Effects on Plants: Teacher Resource for helpful information about the timing of the plant experiments and some potential effects to notice. (Source 4)
- Check video links.
- Create anchor chart for hypothesis and results.
- Decide if you will have students record predictions and observations individually, print prediction and observation sheets, one per student, if using.

Standards:

Science: 2-ESS2-1, 2-PS1-4, 2-LS2-1 (Explicit)

Social Studies: SS2.5.4 (Practiced/Encountered)

ELA: 2.W.7, 2.SL.2 (Practiced/Encountered)

CVE: CV5.3.1 (Practiced/Encountered)

Vocabulary: (use as a reference as needed)

- **Climate -** Climate is the average weather in a place over many years. While the weather can change in just a few hours, climate takes hundreds, thousands, and even millions of years to change
- **Erosion -** when soil is picked up and moved to another place by ice, water, wind, or gravity
- **Weather -** the temperature and other outside conditions (such as rain, cloudiness, etc.) at a particular time and place

Instructional Procedure/Steps:

<u>Part 1</u>

1. Play the video *How's the Weather Up There?* (Source 1). https://www.youtube.com/watch?v=9sGSRy7UfD0

2. Say: **"In this lesson, we will experiment on our class garden to discover what will happen to a plant in different weather conditions."** Ask: **"What kinds of weather/seasons are common in Wyoming?"** *wind, freezing, heat, winter, spring, summer, fall, snow, rain, hail.*

3. Review the results of Lesson 4, specifically mentioning what happened with too much water (flood), not enough water (drought), and optimal watering. Have students hypothesize how these are a factor of weather and climate and then hypothesize the effects of drought and flood on crops.

In this task, students will be engaged in the higher order thinking skill of synthesis.

4. Have students Think-Pair-Share answers to the questions below. Create an anchor chart or use prediction and observation sheets for reference that states each prediction and then add experiment results.
    - **"What do you predict will happen to a plant exposed to heat?"**
    - **"What do you predict will happen to a plant exposed to cold or freezing temperatures?"**

- **"What do you predict will happen to a plant exposed to wind?"**

TEACHER NOTE: You might also want to show the Bill Nye video on erosion if students need more background knowledge about the concept.

5. Using plants from the class garden, place one plant in the freezer and one under a lamp (close proximity). Place one plant in front of a fan to demonstrate the effects of wind on plants and soil. A blow dryer can be used for more immediate wind erosion experiment results. Use teacher discretion when demonstrating the wind erosion experiment.

Part 2

1. Have students observe all plants and make notes of changes. Plants in the freezer and heat should have significant changes to note. Add observations and results to the prediction anchor chart or prediction and observation sheets.

2. After making observations, place all plants in ideal light and water conditions. The plants will be observed in Part 3 to monitor if climate effects are reversible.

3. Discuss the following question: "**How does weather affect crop growth in Wyoming?"** *Student responses should include: water amounts, temperature, and wind.*

4. Play video *The Big Hollow and the Power of Wind Erosion*. (Source 2). https://www.youtube.com/watch?v=-4iFhBBbqOc.

In this task, students will be engaged in the higher order thinking skill of synthesis.

5. Have students discuss the following question in small groups and then share out with the larger group. Ask: **"Are there any steps that we can take in Wyoming to change the effects of weather on crops currently and in the future?"** *Students responses should include: not over or under watering, keeping fields planted to prevent erosion, plant trees to protect crops.*

6. When students are finished sharing, ask: **"How does this impact being a good steward in Wyoming?"** Allow students to respond. Ask: **"How could we stop wind erosion from damaging the land?"** Students should brainstorm and test their ideas by placing items between the fan and plant to see which best reduces the wind. Emphasize that wind barriers like trees can slow erosion.

Part 3

1. As a whole group, observe plants from Part 2: step 2 looking specifically at the effects from freezing, heat, and wind. Ask: **"Which effects were either reversible or irreversible?"** Document students' observations and conclusions on the anchor chart or on prediction and observation sheets.

2. Say: **"In order to be good stewards of Wyoming, we have to take care of the land and be good caretakers of our crops."**

3. Pass out white paper. Have students illustrate and label a simple diagram/drawing explaining or showing at least one way to reduce wind erosion and/or help prevent freezing or drought. Have students also complete the following sentence stem: **My drawing/diagram demonstrates being a good steward of Wyoming agriculture by _____.**
    - *Some examples of preventing wind erosion include windbreaks or trees.*
    - *Some examples of preventing freezing include covering plants (small scale), plant in season crops, increase irrigation during excessive heat times.*

4. When students are finished, collect diagrams/drawings.

TEACHER NOTE: The science standard also suggests a physical replica, diorama, dramatization, and storyboard as possible types of models. Teachers may want to include those as options, depending on the time available and students' previous exposure to those types of models.

Extension Opportunity:
Write an opinion piece including ways to reverse weather effects on crops in Wyoming.

Assessment:
Evaluate drawings/diagrams on accuracy of ideas and the sentence stem on an understanding of stewardship.

Credits/Sources:

1. University of Wyoming Extension Office. (2009, January 28). *"How's Your Weather, Up There?"*. Retrieved June 22, 2017 from https://www.youtube.com/watch?v=9sGSRy7UfD0
2. University of Wyoming Extension Office (2017, October 20). *The Big Hollow and the Power of Wind Erosion*. Retrieved June 22, 2017 from https://www.youtube.com/watch?v=-4iFhBBbqOc
3. Taylor Cavalovitch. (2020, May 20). *Bill Nye – Erosion 1.* Retrieved July 18, 2022 from https://www.youtube.com/watch?v=qGhf7jKXp6I
4. University of Wyoming, Department of Plant Science, Dr. Andrew Kniss