

## Lesson Six: What's the Buzz About Pollination?

**Grade Level:** 2<sup>nd</sup> Grade

**Time:** 2 class sessions (time may vary depending on class.)

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

**Objectives:** Students will:

- Learn the important role that humans and animals play in pollination.
- Engage in the engineering process as they develop a simple model that mimics the function of an animal in pollinating plants.

**Purpose:** Students discover how humans, insects, and animals play a part in the pollination of plants.

**Required Materials/Resources:**

- Video: <https://www.youtube.com/watch?v=9AuVm1jpKEA>  
*Pollination of Flowers for Children.* (Source 1) *Video length: 6 minutes 48 seconds (content after 4 minutes 30 seconds is review).*
- *From Seed to Plant* by Gail Gibbons (Source 4)
- Pollinators PowerPoint presentation
- Materials for mock pollinators (cotton balls, pipe cleaners, straws, tape, clothes pins, foil, felt, string, etc.)
- Materials for mock pollen (crushed chalk, glitter, baby powder, crushed up Cheetos)
- Alfalfa flowers (2 flowers per student group)

TEACHER NOTE: As students continue to work through the design process, periodically ask them which part of the process they are using. This will help them to reflect on the thinking they are doing and will help ensure that they are not skipping any of the steps. Teachers who are new to the design process can learn more about it at: <https://www.youtube.com/watch?v=EU3m3KHiCPg> (Source 3) Video is 5 minutes 10 seconds long.

- Engineering Design Process poster (one to display) - (Sources 2,3)
- 3-2-1: Pollination prompts (one per student)

### **Suggested Teacher Preparation:**

- Preview the pollination video. Depending on your time and class, decide to either show the entire 7-minute video or only the parts that focus on the pollinators.
- Print and post the Engineering Design Process poster
- Think of an alfalfa pollinator of your own design that you can quickly sketch in order to model the sketching process to students in step 8.
- Gather and prepare the area and all materials needed for the pollinator creation and testing phases mentioned in steps 10-12 including making copies of the alfalfa flowers.
- Decide whether students will work in partners or small groups.

### **Standards:**

Science: 2-LS2-2, K-2-ETS1-2 (Explicit)

### **Vocabulary:**

- **Disperse** - to spread widely
- **Pollen** - the fertilizing element of flowering plants
- **Pollination** - transfer of pollen from one flower to the next to produce new seed

### **Instructional Procedure/Steps:**

1. Have students review the effects of weather on the survival of plants. Say: **“Weather can also affect another aspect of plant development called pollination.”** (It can delay flower blooming; it can keep bees dormant; the wind blows pollen, etc.)
2. Have students share what they know about pollination. You can also choose to read the short section in *From Seed to Plant* about pollination. Ask: **“What insects pollinate plants? What other animals help pollinate plants and how?”** Have students brainstorm and discuss the animals/insects that they have seen or know are here as pollinators in Wyoming. Review the importance of

pollination and crop growth.


3. Play the *Pollination of Flowers for Children* video: <https://www.youtube.com/watch?v=9AuVm1jpKEA>, pausing to discuss different sections and animals. Use the information from the video to have the students name how the insects/animals help flowers pollinate.
4. When the video is finished, have students discuss which things they brainstormed from step 2 that were in the video and which things they saw in the video that they didn't name when brainstorming.
5. Pose the engineering challenge. Say: **"You are an alfalfa farmer in the Big Horn Basin. You rely heavily on bees to pollinate your crops, so you can harvest and sell the seeds. This year, there was a frost that killed many bees in your area. You know that without bees your crops will not be pollinated; therefore, they will not produce enough seeds for you to sell. How can you use technology to create a pollinator to help offset the loss of bees in your area?"**
6. Place students in small groups or partners to brainstorm characteristics of a successful pollinator. Use the questions below and the Pollinators PowerPoint presentation to help guide the brainstorming process:
  - **"What would a man-made pollinator need to be/have in order to successfully move pollen from one flower to another?"**
  - **"What characteristics of natural pollinators (bees) would you want to try and replicate?"**  
*furry, fuzzy, something pollen will stick to, etc.*
7. Draw students' attention to the engineering design process poster. Read through the different steps of the process. Ask: **"Which parts of the process have they completed so far?"** Allow students to respond. Say: **"You will now continue to work through the remaining steps."**



TEACHER NOTE:  
Since the science standards are specific to modeling, it's important to be explicit with students regarding the different types of modeling they are doing in this lesson, how to create those models, and how the models are being used to represent aspects of pollinators. There is a cross content connection opportunity here, as well. Have the art teacher develop students' ability to create a sketch. This would make work with sketches in future scientific modeling more efficient and effective.

8. Using some of the brainstormed ideas, have students make a sketch of a pollinator they would like to create to pollinate their alfalfa crop. Say: **“You are going to model your pollinator with a sketch. A sketch is a type of drawing that engineers and other designers use to get their ideas down quickly. This type of drawing is done very quickly, and it isn’t intended to be a finished piece of work.”** Model drawing a sketch to emphasize that it captures the critical components of the pollinator but does not take a long time to construct.
9. Present students with various materials that they could use to create their pollinator (cotton balls, pipe cleaners, straws, tape, clothes pins, foil, felt, string, etc.) Ensure that each group has access to the same items.



In this task, students will be engaged in the higher order thinking skill of evaluation by discussing their success and the feasibility of using human designed pollination

10.  Give students the following parameters. Say: **“You must build a pollinator using the available materials that will transfer pollen from one flower to another.”** Flowers will be spaced one foot apart. Show students what will be used as the mock alfalfa flowers and simulated pollen (crushed chalk, glitter, baby powder, crushed up Cheetos), and demonstrate the distance that pollen must travel (one foot). Before the actual test, place the flowers one foot apart.
11. Give students time to create their pollinators from their sketches using the materials provided (approximately 20 min).
12. Once students have created their pollinators, have students test their designs with the mock pollen and mock flowers. If a pollinator is NOT successful, allow students time to revise their models based on what they have learned. They can retest their pollinators as time allows.

13.   To check for understanding, as students are designing and testing their pollinators, circulate among groups, and ask students to explain their models. Ask the following questions:

- **“How is your physical model like your sketch?”**
- **“How does this part of your model represent something that you saw in the video with animal pollinators?”**
- **“How does this part of your model help with the pollination process?”**

14. Once all student pairs or groups have a working pollinator to share, organize a gallery walk for students to be able to observe other students' work and share out their results. Before beginning the gallery walk, say: **“During this activity, you were being engineers. You worked on problem solving using two types of models. You used a sketch to create a physical model. As you talk about your pollinators and the pollinators of your classmates, use the word ‘model.’”**

15. When the gallery walk is finished, debrief with the whole class about what went well and what was challenging with the design process. Have students recap how they used the engineering design process to create their pollinators.

16. Guide students in a discussion about the importance of natural pollinators. Discuss how bees and other pollinators are really important. Say: **“Although we were able to design some successful devices, there is still a huge need for real live pollinators. As stewards, we must protect pollinators due to the role that they play in the plant life cycle.”** Ask students the questions below, and allow students to respond before moving on to the next one:



In this task, students will be engaged in the higher order thinking skill of synthesis through the design and invention of a new device.



In this task, students will be engaged in the higher order thinking skill of application by connecting their knowledge of pollinators and the engineering process to the work they are doing with their models.

- “How successful was the class in designing a pollinating device?”
- “Would it be realistic to replace natural pollinators with technology on a large scale?”
- “What would happen if bees, butterflies, bats, hummingbirds, and other pollinators disappear?”

**Possible extension activity:** Find a current events article about the importance of pollinators and discuss the implications if they go away. A possible example would be the “bee crisis.”

**Assessment:** Pass out the 3-2-1: Pollination prompts. Have students either complete the 3-2-1: Pollination prompts orally or write their responses on the paper. Check student responses for accuracy.

**Credits/Sources:**

1. Homeschool Pop. (2017, October 26). *Pollination of Flowers for Children*. Retrieved June 10, 2020 from: <https://www.youtube.com/watch?v=9AuVm1jpKEA>
2. Education to Save the World. (2014, January 8). *Engineering Design Process*. Retrieved June 22, 2017, from: <https://edtosavetheworld.com/2014/01/08/what-does-engineering-in-the-classroom-look-like/> Bullet points under each of the steps in the process were added by this website. The steps themselves come from the Engineering is Elementary website: <https://eie.org/eie-curriculum/resources/engineering-design-process-action>
3. Technovation. (2018, January 3). *What is the Engineering Design Process?* Retrieved October, 14, 2020, from: <https://www.youtube.com/watch?v=EU3m3KHiCPg>
4. Gibbons, Gail. (1991). *From Seed to Plant*. New York City, New York: Holiday House
5. Photo credits are listed in the PowerPoint presentation.