Environmental Science Institute
THE UNIVERSITY OF TEXAS AT AUSTIN

2275 Speedway, Mail Code C9000
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(512) 471-5847
www.esi.utexas.edu

Explore Pollination

Lesson Plan for Grades: Middle School
Length of Lesson: 90 minutes

Authored by: UT Environmental Science Institute
Date created: 05/10/2017

Subject area/course:
- Science

Materials:
- Pipe cleaners
- Tissue Paper
- Tape
- Construction Paper
- Straws
- Cups
- Scissors
- Computers or tablets with internet access
- Poster board & markers

TEKS/SEs:

§ 112.18. Science, Grade 6; §112.19. Science, Grade 7; §112.20. Science, Grade 8
(3) Scientific investigation and reasoning. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions and knows the contributions of relevant scientists. The student is expected to:
- (A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;
- (B) use models to represent aspects of the natural world such as a model of Earth's layers

Lesson objective(s):
- Students will learn about pollination.
- Students will learn about different pollinators and their characteristics.
- Students will design a flower to attract a specific pollinator.

Differentiation strategies to meet diverse learner needs:
- The teacher should ask students whether they prefer to read or watch videos to learn about concepts; then have students learn in their preferred learning style. However, the teacher may assign students certain methods to improve their skills. For example, if a student prefers reading, teachers may have them watch a video and take notes to improve their listening skills.
- ELL students and students with learning disabilities should have multiple forms of instruction including visual and written instruction sheets as well as a verbal instruction and demonstration.

ENGAGEMENT (5 minutes)
- Teacher asks class "what is pollination?". Class watches *Hot Science – Cool Talks #107 "The Buzz About Bees"* with Dr. Shalene Jha (from 3:44 – 4:35) available at **www.hotsciencecooltalks.org**.
- Teacher asks class to share different types of foods, fruits or vegetables that depend on pollinators. Teacher can use **pollinator.org/list_of_pollinated_food.htm** to find a list of foods that depend on different pollinators. Some common items that depend on pollinators include coffee, tomatoes, almonds, chocolate!

EXPLORATION (20 minutes)
- Class divides into six teams; each group will research different pollinators. Each team will present a 3-minute presentation about their pollinator and characteristics of plants they pollinate.

EXPLANATION (35 minutes)
- Teams present a 3-minute presentation about pollinators and characteristics of plants they pollinate.
    - Teacher highlights physical characteristics of pollinators as well as physical plant adaptations that make it easier for pollinators to pollinate plants.
- If time allows, watch "An Orchid's Trap" video from Nat Geo Wild showcasing bees and orchids,

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www.youtube.com/watch?v=_uHJGdTgtXE (4:00 total time).
ELABORATION (20 minutes) • Class divides into smaller teams (2-3 students per team). Teams select one of the pollinators discussed. Using the information already provided, groups design a model of a flower that will attract that specific pollinator. • Teams must include a poster of the specific flower characteristics that will attract their specific pollinator including scent, color and physical structures. • Posters and models are displayed in a gallery walk. Each team evaluates the designs of three other teams using the rubric provided.
EVALUATION (10 minutes) • Models and posters are displayed in a gallery walk. Each team evaluates three other teams' designs using the rubric included.
SOURCES AND RESOURCES • **Dr. Shalene Jha's *Hot Science – Cool Talks #107,* "The Buzz About Bees",** www.hotsciencecooltalks.org • **Pollinator Partnership,** *"List of Pollinated Foods"***,** pollinator.org/list_of_pollinated_food.htm • **Nat Geo Wild,** *"An Orchid's Trap",* www.youtube.com/watch?v=_uHJGdTgtXE (total time 4:00) • **Pollinator Syndromes,** www.fs.fed.us/wildflowers/pollinators/What_is_Pollination/syndromes.shtml#traits

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EXPLORATION ACTIVITY (30 minutes):

Purpose: Explore the characteristics of different pollinators and the plants they pollinate

Materials: Computers or tablets with internet access

Safety Information: N/A

Procedure:

- Working in teams, students will research characteristics of different pollinators.
- Each team selects one pollinator to research from the list below:

  Bats ***Bees*** ***Beetles*** ***Butterflies*** ***Hummingbirds*** ***Flies***

- Teams complete the Exploration Activity (Student Worksheet) which includes the following:
  - Pollinator selected
  - Pollinator flower/plant characteristics including color, scent and shape
  - How pollen is collected by pollinator
  - Two plants, fruits, vegetables or nuts that pollinator likes
- Brainstorm with the class what terms to search for in their research.
  - A good starting point is the Pollinator Syndrome page at www.fs.fed.us/wildflowers/pollinators/What_is_Pollination/syndromes.shtml#traits
  - To find characteristics of pollinators and plants they pollinate, consider using the name of the pollinator and plants they pollinate (for example, "what plants do bats pollinate?")
  - Teams can also look for images of their pollinator and the key word pollen to see how a specific pollinator collects pollen from different plants
- Each team presents a 3-minute presentation with the information about their pollinator and the plants they like to pollinate.

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EXPLORATION ACTIVITY (STUDENT HANDOUT):

You are a team of scientists studying plants and pollinators. Working in your team, research ONE of the pollinators below and prepare a 3-minute presentation about their characteristics and the plants they pollinate.		
Bats Bees	Beetles Butterflies	Hummingbirds Flies
Pollinator:		
Characteristics of flowers or plants that attract this pollinator		
Color	**Shape**	**Scent**
How is the pollen collected by pollinator?		
Name two plants, flowers, fruits or nuts that need this pollinator.		

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EXPLORATION ACTIVITY (TEACHER HANDOUT):

Pollinator Characteristics

Pollinator	How is pollen transferred?	Plant Characteristics			
		Color	Shape	Scent	Plant Examples
Bats	pollen sticks to face and body	white, green or purple	bowl shaped, strong support	strong, fruity	avocado, cashews
Bees	pollen sticks to different parts of body (legs, face, abdomen) or specialized appendages	bright white, blue, purple (can't see red)	shallow landing platform	fresh, pleasant	strawberry, tomato, mango
Beetles	pollen sticks to body, legs	dull white, green	large, bowl-like	fruity, spicy	macadamia nut, magnolias
Butterflies	pollen sticks to legs	orange, red, purple	narrow tubes, wide landing pad	none	wildflowers, sunflowers, lavender
Hummingbirds	pollen sticks to beak and head	orange, red, white	large funnel-like, no landing platform but strong support	none	wildflowers, salvia, honeysuckle
Flies	pollen sticks to body and hair	pale, dark brown or purple	shallow, funnel-like or trap like	putrid	avocado, chocolate, cherry

Sources:

- **Pollinator Partnership,** *"List of Pollinated Foods"***,** pollinator.org/list_of_pollinated_food.htm
- **Animal Pollination,** www.fs.fed.us/wildflowers/pollinators/animals/index.shtml

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ELABORATION ACTIVITY (20 minutes):

Purpose: Design a model of a flower that will attract a specific pollinator.

Materials:

- Pipe cleaners
- Tissue Paper
- Tape
- Straws
- Cups
- Construction Paper
- Scissors

Safety Information: N/A

Procedure:

- Class divides into smaller teams (2-3 students per team). Teams select one of the pollinators discussed.

Bats ***Bees*** ***Beetles*** ***Butterflies*** ***Hummingbirds*** ***Flies***

- Using the information already provided, groups design a model of a flower that will attract a specific pollinator.
- Teams create a poster with specific flower characteristics that will attract their pollinator including scent, color and shape.
- Posters and models are displayed in a gallery walk. Each team evaluates the designs of three other teams using the rubric provided.

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EXPLORATION ACTIVITY (STUDENT HANDOUT):

Models and posters are displayed in a gallery walk. Your team needs to evaluate three other teams' designs using the rubrics below.

Model # 1 _____

1	2	3
Model is not included. Two or more of the following are missing from poster – pollinator name, plant characteristics that attract pollinator (color, scent, shape), how pollen is transferred.	Model is included. One of the following is missing from poster – pollinator name, plant characteristics that attract pollinator (color, scent, shape), how pollen is transferred.	Model is included. All of the following are included in the poster – pollinator name, plant characteristics that attract pollinator (color, scent, shape), how pollen is transferred.

Model # 2 _____

1	2	3
Model is not included. Two or more of the following are missing from poster – pollinator name, plant characteristics that attract pollinator (color, scent, shape), how pollen is transferred.	Model is included. One of the following is missing from poster – pollinator name, plant characteristics that attract pollinator (color, scent, shape), how pollen is transferred.	Model is included. All of the following are included in the poster – pollinator name, plant characteristics that attract pollinator (color, scent, shape), how pollen is transferred.

Model # 3 _____

1	2	3
Model is not included. Two or more of the following are missing from poster – pollinator name, plant characteristics that attract pollinator (color, scent, shape), how pollen is transferred.	Model is included. One of the following is missing from poster – pollinator name, plant characteristics that attract pollinator (color, scent, shape), how pollen is transferred.	Model is included. All of the following are included in the poster – pollinator name, plant characteristics that attract pollinator (color, scent, shape), how pollen is transferred.