Native Seeds/SEARCH
Flower Botany- Where do seeds come from?

Appropriate Topics of Study: Science, Biology,

Learning Objectives:
Students will identify different parts of flowers, different types of flowers and understand pollination.

Students will learn the connection between flowers, pollen, pollination mechanisms, and seeds.

Students will engage in a range of collaborative discussions with other students and the instructor. Students will complete flower diagrams

Instructions:

Part 1: Parts of a Flower
Start by exploring the flower structures of a few, diverse store bought specimens. Sunflowers, lilies, and tulips are good options as they have pronounced male and female parts. Many realistic silk flowers can function as suitable substitutes. Ask students to discuss the function or purpose of different flower parts. Why do they have those different parts that sick up out of the flower? It is okay if they do not know the names of the different flower parts are at this point, the point is to explore and make inferences of why they have different parts. They might draw from personal experience and discuss how the colors or sent of the flowers attract bees. They might also know that the orange or yellow powder is pollen. Ask students to look for similarities and differences among the flowers. It should be fairly obvious that the sunflower is very different to the lily and tulips. But look at the sunflower under a magnifying glass? Are the similar parts more obvious? Move onto dissecting the flowers to expose the inner, concealed ovary. If available, have flowers from the garden. Some, like female cucumber or squash flower will provide nice specimens for observing the ovaries. Ask students where and how the seeds are made. Seeds come from flowers, but where are they?

After initial exploration of a few flowers, present a series of slides that discuss what the function and names are of different flower parts. There are several good videos that also discuss the anatomy of flowers and fertilization processes. Now that the students have some background, return to the flower and discuss the function of each part and the role they play in making seeds. Have the students complete the Flower Identification Handout, drawing and labeling different parts of their flowers.

Part 2: Schoolyard Flower Survey
Have students work in teams and collect data about a diversity of flowers from their school yard and garden. Students can collect flowers themselves of document flowers with digital photographs. Return to the classroom and dissect the collected flowers, naming their parts and

noting how they are similar or different from one another. Depending upon the diversity of flowers available to you it will be possible to group similar flowers together. This can lead into discussions about plant families and botanical classification. Do chile and tomato flowers look similar? What about eggplant flowers? Why is this?

Present a series of slides that discuss different pollination mechanisms such as insects, wind, and self-pollination. Advanced students can generate hypotheses about the pollination mechanism of the different collected flowers. Incorporate internet research to research the hypotheses about the pollination mechanism.

Materials:
A diversity of flowers
Magnifying glasses or eye loops
Knives or scissors
Tweezers
Flower Identification handout

Supplemental Information:

Biology: Growing Plants from the BBC
http://www.bbc.co.uk/bitesize/standard/biology/world_of_plants/growing_plants/revision/1/
Useful diagrams and discussion of seeds, flowers, and pollination mechanisms.

Smithsonian Education: Plants and Animals, Partners in Pollination
http://www.smithsonianeducation.org/educators/lesson_plans/partners_in_pollination/index.html

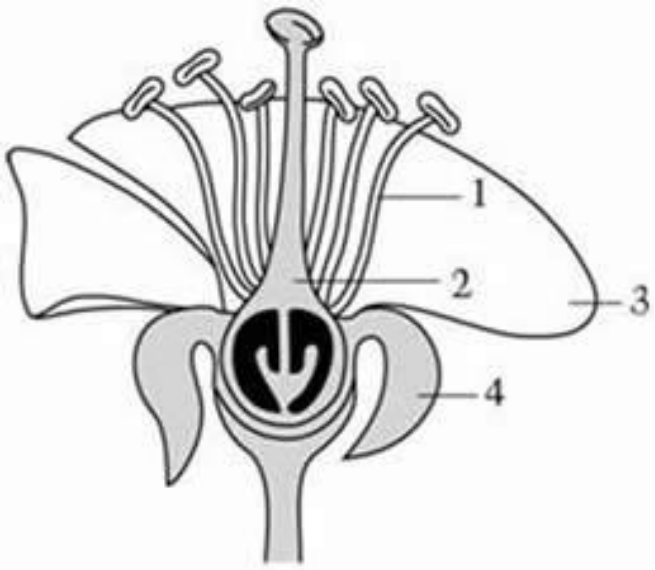
Additional Activities:
Climate Change and Pollination Research: Have individual or a group of students choose a specific, popular plant, and research how it is pollinated, when it flowers (sunlight and temperature sensitivity) and how sensitive its pollen is to temperature fluctuations. Have them present an argument of how changes in temperature would impact this plant's pollination process. Would increases or decreases in temperature influence this species ability to produce seeds? Would this species be threatened by changes to temperature? Would the influences be the same in all regions? Could changes to temperature actually increase this species range? What changes to the plant (or human behavior with growing the plant) would minimize impacts from temperature changes?

Flowers at lunchtime: Have students take note of the different types of food they consume at lunchtime and make an inventory list. They should come up with a list of the basic ingredients to the best of their skill level. Bread, for example, contains wheat flour, water, yeast, and salt. Younger students will likely just be able to list wheat. Have the students separate their food list into those that are plant based and those that are animal based. For those that are plant based, which are derived from flower (or seeds)? Fruits and vegetables are essentially flesh casings for seeds so this exercise should include plant based foods beyond edible seeds, like grains. Have the students research the pollination mechanism for each that derives from a flower. Which were pollinated by insects? Which foods would be absent if there were no insects to pollinate these foods?

FLOWER IDENTIFICATION HANDOUT

Option 1:

Instructions: Label the parts of a flower.



Option 2:

Instructions: In the space below, draw and label the parts of a flower.

- **Pistil** (female parts including the **stigma, style**, and **ovary**)
- **Stamen** (male parts including **anthers** and **filaments**)
- **Petals** and **sepals**