Beetopia World Lesson 1: Bumble Buzz

Students learn about the huge diversity of bumble bee species using an online community science database and observations in their own schoolyard.

Guiding Ideas

This project was developed with the American Beekeeping Federation's Kids and Bees program. Explore three new Minecraft worlds, created by Lifeboat, and use new lessons to introduce students to bees' dynamic and fascinating roles in their own hives and in broader ecosystems. Bumble Buzz is Lesson 1 of 3 for Beetopia World.

Learning Objectives

⬡ NGSS Science and Engineering Practices: Carrying Out Investigations; Analyzing and Interpreting Data
⬡ NGSS Crosscutting Concepts: Patterns
⬡ NGSS Disciplinary Core Ideas: LS2.A: Interdependent Relationships in Ecosystems; LS4.C: Adaptation
⬡ Recognize the diversity and distribution of bumble bees in the US

Performance Expectations

This lesson will enable students to:
⬡ explain that different species of bumble bee prefer different habitats
⬡ list and identify two of the common bumble bee species in their region.
⬡ observe and take comprehensive field notes about bumble bees in their natural habitat

Skills

Citizenship, Collaboration

Total time needed

55-100 minutes

Materials needed for classroom activities

Two printed copies per student of the Bumble Buzz Student Worksheet (one per student if not collecting data outdoors)
Colored pencils
One clipboard or hard other writing surface per student (if collecting data outdoors)
Cameras (if sharing data with bumblebeewatch.org)

Introductory questions

⬡ Where do bumble bees like to live?
⬡ How many different kinds of bumble bees are there?

Student Activities

Introduction (whole class) 15-20 minutes

Turn students' attention to the topic of bumble bees by posing the introductory questions above. Encourage curiosity and conversation; don't seek out specific answers. Let students know that during this lesson, they will learn about the diversity of bumble bee species and habitats.

Break students into pairs or groups of three, with each group sharing one computer/device. Direct students to navigate to bumblebeewatch.org, and to find the "Bumble Bee Sightings" map. There, set the filters for your state, "Verified" status, and color coding by species. Explain that each dot represents a bee that was identified by a community member (like a student!) and confirmed by a professional scientist. Explain that these citizen/community scientists are critical for helping professional scientists understand bee species distribution and habitat preferences, because professional scientists couldn't possibly get to all of those locations at so many different times of the year! Also explain that each different color of dot represents a different individual species of bumble bee.

Invite students to consider the data on the map. In their pairs or small groups, ask them to answer and discuss these questions: What do they notice? What do they wonder? What is surprising about this data? Gather the whole class back together, and invite a representative from each group to use one sentence to summarize what their small group discussed. Guide the discussion toward the large number of bee species represented, and toward patterns that emerge that indicate different species of bees preferring different places to live.

Minecraft Beetopia World (explore as individuals) 15-20 minutes

Direct students to the Beetopia World and tell them to meet bee guide Alejandro, who will show their characters the "Bumble Bee Garden." Here they will learn many fun facts about the fascinating world of our bumble bees! Ask students to take notes and photos along the way for use during the classroom component of the lesson.

Please note that other bee NPCs exist in Beetopia World; students will interact with them in other lessons. Also note that many of the NPCs have videos to share, so make sure students have headphones. If the students are having difficulty finding the sections of the hive, they can just ask the queen to send them to where they need to go!

In-Class Exercise and Discussion (whole class and small groups) 25-60 minutes

Break students back into their pairs or threes and direct them back to the map at bumblebeewatch.org. This time, set the filters to your state, your county, "Verified" status, and color coding by species. If a good selection of bee species has been identified close to your school, ask students to zoom in on the school's location; otherwise use the whole county or, if no bees have been logged in your county, include nearby counties or the whole state. Ask each small group to choose two different species of bumble bees that have been identified in your area; they can do this by choosing from the list below the map, or by clicking on individual dots to see the kinds of bumble bees identified in a specific location. If students need additional direction, common bumble bees in the western US include *Bombus huntii, Bombus vosnesenskii, Bombus mixtus, Bombus flavifrons, Bombus melanopygus*, and *Bombus fervidus*; Bumble bees common on the east coast include *Bombus impatiens, Bombus bimaculatus, Bombus griseocollis*, and *Bombus ternarius*.

As students are choosing their two species, hand out one copy of the Bumble Buzz Student Worksheet to each student along with colored pencils. Direct the students to write the names of their two chosen species on their worksheet, one next to each bee outline. Then, navigate to the "Bumble Bee Species" tab on bumblebeewatch.org and use the drop-down menu to pull up more information about each of the two species in turn. Note that the bees are listed in alphabetical order based on their scientific species name, so students might have to do some digging to find their bees.

For each of their two chosen species, direct students to fill in their Bumble Buzz Student Worksheet by coloring in the outlines to match the distinctive markings shown on the website. Also ask students to take notes alongside the bee drawings about floral associations (what kinds of flowers this species of bee prefers) and the time of year when these bees are active.

Note: For the next portion of the lesson, scope out a few areas in the schoolyard the day or morning before to see if bumble bees are present. Check grassy fields, flower beds, weedy patches, etc. If you do not have any bumble bee habitat onsite at your school, skip this section and continue to the concluding discussion.

Explain to students that they will now be practicing bumble bee observations "in the field". Hand out a new copy of the Bumble Buzz Student Worksheet to each student, and ask students to bring along a regular pencil, some colored pencils, and a clipboard or other firm writing surface. Lead students to a potential bumble bee habitat. Remind students that these bees will not sting, but that it's still important to move slowly, use quiet voices, and watch where your shadow falls to avoid scaring the bees away. Invite students to look for bumble bees, and use the colored pencils to fill in the first Bumble Buzz template to match a bee that they see. Direct students to note other observations on their worksheet: What was the bee doing when they saw it -- was it flying away? Flying from flower to flower? Landed on a plant? Landed on the ground? If the bee had landed, what was it on -- grass? Flower? One kind of flower or visiting many? What kind of flower(s)? Include metadata as well: date, time of day, location, and weather.

If you have the camera equipment, also invite students to take photos of the bumble bees to submit at bumblebeewatch.org.

If you have more than one bumble bee habitat at your school, repeat this observation and note-taking process at the second habitat.

Back in the classroom, catalogue the bumble bees you found: ask students to leave out their first copy of the Bumble Buzz worksheet on their desks, and invite the whole class to circulate through the desks while carrying their second copy of the worksheet (with the live observations), looking for matched markings between the desk copies and the in-hand copies of the worksheet. A matched set of markings may indicate which species they were observing outdoors; check additional data (time of year, preferred plants) for further confirmation. If students think they have a match, direct them to copy the name of the species onto their second Bumble Buzz worksheet. If students cannot find a match, direct them back to bumblebeewatch.org to search for the species they found.

After students have identified their observed bumble bees, gather the class back together. Ask the students to consider what they observed, and compare that to the data they saw at the beginning of the lesson on the map. Did they see the same kind of bees as were represented on the map? Why or why not? In the schoolyard, did the same kind of bees prefer the different habitats? What might make a bee choose one habitat over another? What might make a bee choose a habitat at some times of the year but not others? Remind students that not seeing bees also counts as data -- it tells you the kinds of habitats, weather, and other conditions that bees won't live in.

If contributing data to bumblebeewatch.org, follow the instructions for submitting photos and other information.

External Resources

Bumble Buzz Student Worksheet - This worksheet provides a template for students to record observations about bumble bee markings.

Bumble Bee Watch - A community science effort to find, identify, and map bumble bee species across North America.

This Vibrating Bumblebee Unlocks a Flower's Hidden Treasure - This 4-minute video shows that some flowers hold onto their pollen until the perfect buzzy bumble bee arrives to vibrate at the perfect frequency.

Vocabulary

generalist - a bee that can eat nectar and pollen from many different kinds of flowers

nest cavity - a hole in a tree, rock pile, or other structure in which bees choose to make a nest

Further Study

Bumble Bees of North America

The Xerces Society

Bumble Bee Conservation Trust

Bumblebees are going extinct in a time of 'climate chaos'