Citizen Science Helps the Birds and Bees

By Christine Anne Royce

Going beyond a fieldtrip can be as easy as heading to your backyard or schoolyard, opening a book, or watching a video. This month's column connects the birds and the bees to children's books to help students make sense out of the vast diversity of nature. Younger students explore ways that a survey of birds can be used to determine if their habitats are being impacted by humans. Older students learn about why humans are concerned about the decrease in bees.

THIS MONTH'S TRADE BOOKS

Bird Count
By Susan Edwards Richmond
Illustrated by Stephanie Fizer Coleman
ISBN: 978-1-56145-954-4
Peachtree Books
32 pages
Grades K–2

SYNOPSIS

Young Ava is excited to participate in this year's Bird Count and is asked to be the one who tallies the birds observed. Over time, she has learned to observe birds by looking for them, listening to their calls, and contributes to the overall team count at the end of the day. The book also provides information on how to identify birds for the reader.

A Bee's Difficult Search for Food
By Mary Ellen Klukow
Illustrated by Albert Pinilla
ISBN: 978-1681524894
Amicus Ink
24 pages
Grades 3–5

SYNOPSIS

Part of the Animal Habitats at Risk series, this narrative explores the story of a scout bee who emerges from the hive in search of food. Unfortunately, there are many challenges that the bee faces as she looks for the field of flowers from prior years. The challenges are related to human's expansion on the land and the different obstacles that they bring.

NSTA Connection

Find a list of alternate books, student data sheets, and other resources at *www.nsta.org/science-and-children.*

Grades K–2: Counting Birds

PURPOSE

Students compare the similarities and differences to birds as they learn about the citizen science Bird Count.

MATERIALS

- *Bird Count*
- Pencils
- Bird Cards, Bird Observation Tally Sheet, Bird Watcher's Message (see NSTA Connection)
- 15 Birds and Bird Songs for Beginners video, Great Backyard Bird Count video, and Bird Varieties by Postal Code webpage (see Internet Resources)

ENGAGE

Begin by asking the students if they have ever noticed the difference in birds that they see in their local environment? What have they noticed about the birds? Are they different colors? Different types? Do they know the names of the birds they have observed? Have they ever tried to count them? Share *Bird Count* with the students by introducing the cover. Have students predict what they think the book might be about? Read the story and stop at the following pages to discuss what is happening:

p. 1–2 How does Ava and her mother help scientists know more about birds?

p. 3–4 In the story, what are the different areas where teams of people look for birds? What are some of the rules that people follow about counting birds? Why do you think they are important?

p. 5–8 What did Ava do when they heard the owl? What do you think each tally mark means in her notebook?

p. 9–12 Why couldn't Ava count the mockingbird when she saw it? Why do you think it is good that two or more people need to see or hear the bird to count it? How were the three characters helping each other find birds?

p. 17–18 When they counted the starlings, they came up with different numbers and took an average. Why do you think that the birds that are counted in the bird count are based on the best estimate?

p. 23–26 They count chickadees because they were far away from the last chickadee they saw and remind each other that the five geese in the cornstalks might be the same ones they counted earlier when they were flying. Why do you think it is important for bird watchers to know where they saw birds to know if they should count them again?

p. 29–30 When Ava and her team get back to the parking lot, they turn in their tally sheet to be included with the other teams' reports. Do you think different teams may have seen different birds? Why or why not?

EXPLORE

Provide each student or pair of students with a set of the Bird Cards (see NSTA Connection), which should be cut apart. Allow the students to examine the pictures at first and have them make some initial comparisons about similarities of the birds by asking them to do the following. Which birds would you put in a pile that has the following description—black feathers and body? Body is partly yellow and wings are a different color? Small brown birds? Birds that have some type of red on their body or feathers? Ask the students to describe

what they are thinking as they try and make groups? Do they think this might be more difficult if the bird is flying or in a tree? What tool did Ava and her mother have to help them? After students have had a chance to work with the different bird cards, share the 15 Birds and Bird Songs for Beginners Video (see Internet Resources) with the class. Allow the students to watch it through once and try and place the cards in the order of the birds in the video. Do not draw their attention to the fact that the names of the birds are on the video. After they have tried to order the birds, replay the video and freeze it at each bird. Ask the students to name the bird, check their order, and if students had it incorrect, ask them to explain what characteristics of the bird in the video were similar to the one they selected.

EXPLAIN

Involve the students in a discussion about birds that they observed in the video and on the card sets. Questions include:

> If all of these birds live in the same area or habitat, do you think it would be easy or difficult to help scientists to identify the birds by creating a tally? Why or why not? What was one of the rules mentioned in the story to help make sure the bird is identified properly?

Looking back at the cards that are of the blackbird, magpie, and starling, what are similarities about the birds that might lead to mistakes in identification? What are two differences about the birds that would help an observer correctly identify them? Now look at the nightingale, the song thrush, house sparrow, and wren. What are the similarities and differences of this group?

Look back at pages 15–16 in the text where they are looking at water birds near the marsh. Make the statement that these are all water birds in one habitat. What do students think are similarities about these birds in terms of what they might eat? If all of the birds in your card set lived in the same habitat that you observed in the video (field or wooded area), what do you think might be similar about what they eat?

To help connect the idea of the Audubon bird count and story to the actual process, share The Great Backyard Bird Count video (see Internet Resources) with students and ask them to listen carefully for reasons why helping scientists know what is happening about the birds is important to our environment.

ELABORATE

In the story, Ava and her mom use binoculars, a book that shows different types of birds called a field guide, a notebook, and a pencil as tools. Provide each student with a notebook, pencil, and card set. Teacher note: If you know of other birds that are regularly around the school setting and their names, add a picture of those birds to the set at this time as well. To determine what other birds may be in your area by postal code, visit the Bird Varieties by Postal Code website (see Internet Resources). Take the students outside and ask them to find a place to sit quietly as they look for birds. Remind students that once they see a bird, they should stay quiet so they don't scare the bird away. Using the Bird Observation Tally Sheet (see NSTA Connection), ask them to sketch the bird, which is something that John Audubon did as he travelled through the United States. Have them consider some of the questions that could help them identify the bird if they were using a field guide as well. When students return to class, ask them to share their pictures with small groups and describe their bird to others. Did anyone have a similar looking bird? What makes them think they might have observed the same bird or birds that were the same type?

The second part of the elaborate section asks students to create a message that helps to inform people about the importance of birds for our environment. Using the A Bird Watcher's Message (see NSTA Connection), ask the students to complete the statement and include a picture of a bird they have observed

EVALUATE

Through the diversity of different birds and a story that connects students to the idea of citizen science, they first provide examples of their prior knowledge about observation of birds. Students demonstrate their ability to organize visual images into groups, identify birds in videos based on characteristics, and also describe the similarities and differences of groups of birds. Students are then asked to take on the role of citizen scientist to create a sketch of a bird and generate a tally count similar to the young girl in the story.

GRADES 3–5: ABUZZ ABOUT BEES

PURPOSE

Students will describe the importance of the pollination of flowers by bees in our environment and explore reasons why bee colonies are dying.

ENGAGE

Post the two headlines and introductory paragraphs from articles about bees for the students (see NSTA Connection). Using only the information in these paragraphs, ask students to write down two questions that they have about bees each on a separate sticky note. Teacher's note: There are two different articles available from online student news outlets to select from, based on reading level of students. The articles focus on why honeybees are vanishing. Students will use the headlines and introductory paragraph at this point and return to the articles in the Explore part of the lesson. Ask students to read their questions to members of their table groups and to edit their questions so that they are clear. Have each group share the questions that they finalized with the whole class and record them on chart paper. Ask students to also try and group the questions they have related to the bees. Recommended groupings include: Why are bees important? What are things bees need for survival? What is happening to cause concern about the bees?

EXPLORE

After breaking students into groups, provide them with the I'm a Bee Researcher student data sheet (see NSTA Connection) and allow the groups to circulate through the different stations.

Station #1 – Why are bees important? Provide either printed out copies of the "Why Bees Matter" posters (see NSTA Connection) or allow students to access them online. Ask students to be "bee researchers" with the printed information and complete the section on their data sheet about the importance of bees.

Station #2 – How does pollination happen? Watch Bees in Slow Motion Pollinating Apple Blossoms (see Internet Resources). Students will stop the video at 32 seconds in order to make observations about the bee. After watching the video, ask teams of students to take turns using the Google Doodle for Earth Day 2020 (see Internet Resources), which asks them to move a bee across flowers to collect pollen and find flowers to pollinate. As they finish different levels, they are provided with additional information about honey bees, which they can include on their sheet along with answering questions about what they observed.

Station #3 –What are threats to bees? At this station, students are going to explore how parasites, poisons, and humans can be threats to bees. Using the video Why are the Bees Dying? (see Internet Resources), have students identify the three main threats to bees. Once they have done this on their sheet, ask them to return to one of the articles that were used at the beginning of the lesson and read the article all the way through to see if there is any additional information they can include.

Read *A Bee's Difficult Search for Food* to the class discussing the information at the following points.

p. 3 What is the job of a scout bee? What type of food for the bees is she looking for?

p. 4–5 What was in the field last year when she visited it? If she needs to locate nectar and pollen, why is she looking for flowers?

p. 6–7 What happened to the field? How do new housing developments impact bee colonies?

p. 8–11 What was the landscaper spraying on the dandelion? How do you think pesticides (introduce the word at this point) and removing dandelions impact a bee hive? Do you think the bee would have found some food in flowerpots on the porch? Why or why not?

MATERIALS

- *A Bee's Difficult Search for Food*
- Sticky notes
- Chart paper
- Article headlines, I'm a Bee Researcher Sheet, Why Bees Matter Posters, It's About Bees KLEWs chart, and Claim Evidence and Reasoning Chart (NSTA Connection)
- Bees in Slow Motion Pollinating Apple Blossoms video, Google Doodle for Earth Day 2020 game, Why are the Bees Dying? video (see Internet Resources)

p. 12–13 What has changed over time that reduced the number of flowers that bees might find?

p. 14–15 What types of plants did the scout bee find that she could use for food?

p. 16–17 What two things did she look for with the flowers? How are bees important for pollen being moved from flower to flower? What does she do with the nectar? What does pollination help do for the plants?

p. 18–23 When the scout bee arrives home, how does she communicate where the flowers are to other bees? Why is it important to help bees stay alive? What are some other insects that help to pollinate flowers? (in the end note titled Pollinators at Risk).

Return to the set of questions that the students had after reading the original headlines and introduction. Discuss as a class which questions have been answered already and what new questions students might have after hearing the story and engaging with the different media sources about bees.

EXPLAIN

Once groups have had a chance to interact with the different types of media about bees, engage them in a discussion around the following questions, as well as any question from the Engage part that are not yet answered.

- How do bees help produce food for people? What are types of plants that produce food thanks to bees?
- What do we call the moving of pollen from one flower to another by bees? Describe how this happens and why it is important?
- One of the points states that "without pollinators, the world would be less diverse and less delicious." What do you think that statement means?
- What food product do bees make that we use?
- What are some of the reasons that bees are dying? What is the cause of each reason?

ELABORATE

Students will now become advocates for the importance of bees by first working in groups to develop an argument for "Why bees are important to food production" and then create a public service announcement to answer "How humans can help to support the bee population." In groups of four, ask students to use the information they gathered in the explore and explain parts of the lesson to complete one poster size KLEWs Chart (see NSTA Connection), which helps them to organize their thinking. Students will use the information in the KLEWs chart to develop a Claim-Evidence-Reasoning (CER) sheet (see NSTA Connection). Once they have answered the questions about bees, ask them to create either a poster or short video. Using an app such as Google Draw or another one that allows them to develop a visual answer to the question or something like FlipGrid for a video answer to the question will also allow students to develop technology skills while creatively answering the question. Guidelines for the public service announcement include providing one way that humans can help support the bee population and why it is important.

EVALUATE

By using different types of media, students become researchers about bees and connect their research to the key points in the story. Students demonstrate their understanding of why bees are important for food production by developing a Claim, Evidence, Reasoning statement and public service announcement.

REFERENCES

National Governors Association Center for Best Practices and Council of Chief State School Officers (NGAC and CCSSO). 2010. Common Core State Standards. Washington, DC: NGAC and CCSSO. *www.corestandards.org/the-standards/english-language-arts-standards*

NGSS Lead States. 2013. *Next generation science standards: For states, by states.* Washington, DC: National Academies Press.

INTERNET RESOURCES

15 Birds and Bird Songs for Beginners
https://www.youtube.com/watch?v=RHnzqKfxSQw

Bee Headline Article #1 (lower level)
https://www.dogonews.com/2007/10/29/the-mystery-of-the-vanishing-honeybees

Bee Headline Article #2 (upper level)
https://www.sciencenewsforstudents.org/article/why-are-bees-vanishing-pesticides-disease-other-threats

Bees in Slow Motion Pollinating Apple Blossoms
https://www.youtube.com/watch?v=DmQ4_9lTqiM

The Great Backyard Bird Count
https://youtu.be/jW9ew3TKV1E

Bird Varieties by Postal Code
http://gbbc.birdsource.org/gbbcApps/checklist?

Google Doodle for Earth Day 2020
https://www.google.com/doodles/earth-day-2020

Why are the Bees Dying?
https://youtu.be/7KQrbvaNhgc

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