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BAT BONANZA

Kindergarteners discover bats without leaving the classroom.

By Amanda J. Phillips, Catherine Scott, and Catherine E. Matthews

Aside from Halloween craft activities, most elementary students are taught little about bats. Generally, students learn that bats are not birds but flying mammals (the only flying mammal) and they roost or hang upside down. However, there is much more to these fascinating and often misunderstood animals. Because most children have never seen bats up close, I took a different approach to teaching my kindergartners about bats. I made bats out of craft sticks, wax paper, and colored construction paper (Figure 1) and let my students figure out what kinds of bats these were, where they

Figure 1.

Bat model.

Figure 2.

Close-up of wing.

lived, and what they ate. This opportunity aligned with *A Framework for Science Education's* Core Idea LS2: Ecosystems: Interactions, Energy, and Dynamics, which states that children should learn that animals depend on their surroundings for survival, including finding sources of food, water, and shelter by the end of second grade (NRC 2012). In addition, this lesson on bats was used to emphasize the scientific process skills of observation and classification, skills with which many young students have limited experiences.

Lifelike Models

Obviously, real bats were not animals that I could safely bring into the classroom for students to observe, nor did we have locations around our school where bats were known to roost. Instead, I explained to the students that we would use models of bats so that we could learn more about them without risking harm to the animals or ourselves. The use of models, including simplistic concrete models with young children, is the second practice promoted by *A Framework for Science Education* (2012) in helping students learn more about the world around them. I wanted to construct as realistic a bat as possible, so I constructed the bats to actual size. The bats' wings on the bat models were also fairly authentic creations. The bones found in bat wings are quite similar to those in the human arm and hand, which provides students with an opportunity to compare their arms and hands with the wings of this unique flying mammal. Bat hands, like human hands, have five fingers. The arm structure of a bat is also similar to that of a human, with long bones, tendons, and joints (Figure 2). The arm and hand of a bat, however, is covered with a thin membrane used in flying, whereas the human arm and hand is covered only with skin and hair.

I settled on four bats of varying sizes. I chose the smallest bat, the bumblebee bat, because I found a good children's book about this species called *Hello, Bumblebee Bat* (Lunde 2007).

Because I was making the smallest bat, I also wanted to make the largest bat, the flying fox, a fruit-eating bat that lives in Australia. Next, I chose a hammerhead bat, which lives in central Africa, and a spotted bat, which

Table 1.

Wingspans for the four bats used in this lesson, as well as the material used to represent the wing bones.

Bat	Wingspan	Material Used for Bones
Little Red Flying Fox	100 cm	Craft sticks
Hammerhead Bat	90 cm	Craft sticks
Spotted Bat	33 cm	Craft sticks
Bumblebee Bat	15 cm	Toothpicks

Figure 3.

Bat field guide.

lives in the southwestern United States and northern Mexico. The unique head shape of the hammerhead bat and the unique fur pattern of the spotted bat rounded out the four bats I decided to make (see Table 1, p. 57, for bat wingspan lengths). These bats would be easy for my students to tell apart. You might also choose to include a local bat species that children might see in their own backyards.

Learning to Use Field Guides

I wanted my students to learn how to use a field guide, a skill they would be able to use their entire lives to identify plants, animals, and other organisms. The idea of using field guides had been broached in our kindergarten classroom already when a "bug" appeared one day, and my children wanted to know what the bug was. I suggested that we use an online field guide (see Internet Resource) to insects (we could see the six legs and three body parts pretty clearly), and we correctly identified the classroom cockroach. The children were fascinated with the use of field guides and often suggested pulling it out when they didn't know what something was (like some trees in our school yard). The inquiring mind of a kindergartner is always saying, "What is that?" and by introducing the field guide, students learn that they can find the names of plants and animals on their own, making them more independent learners.

As emerging readers, the kindergarteners would need their field guide to be simple and mostly pictorial. I decided to create a field guide with just the four bat species I would be presenting. First, I created information sheets with a picture of the bat, a picture of their preferred food sources, and a picture of their habitat (Figure 3). I chose these characteristics because they were topics that kindergarten students were interested in and because they would align well with the NGSS Core Idea focusing on life science and needs of animals (NRC 2012). Then, I created a four-page field guide by assembling and stapling the information sheets together.

A student holds a model bat.

Figure 4.

Student's drawing and writing about bats.

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Students use the field guide to identify their group's bat species.

I used the 5E Model of Instruction (Bybee 2006) to develop the lesson and help guide my teaching practices and the students' learning. When I started my lesson on bats, I explained that each table group would receive one bat model and one field guide. Students were to use the field guide to identify the bat and learn what it ate and where it lived (see NSTA Connection for a copy of the lesson).

Initially, children matched the models of the bats to the photographs of the bats, looking for common characteristics such as color, head shape, and ear and nose shape. Once they were able to identify the bat pictures, they looked at the field guide to see what the bat ate and where it lived. I explained to students that as scientists, knowing the characteristics of bats such as food and location would help us identify what bats we had in our area, especially since a geographic location may have more than one bat species of similar size and color. My children were fascinated with the model bats and quickly learned to use the field guide. Enthusiastic students called out their finds: "Ms. Phillips, I got the bumblebee bat" and from another part of the room, "Ms. Phillips, my bat eats flowers." A student from one table noticed, "The bat at that table has a longer head than my bat!" Around the room I heard shouts of excitement as students used their field guides to learn the names of their bats.

Once table groups identified their first bat, the bats were passed around the room and each table group got to use their field guides to identify all four bats. The

students were assessed at the end of the lesson when they wrote about their first bat. In their writings, the students had to draw a picture of their bat and identify two facts about it that they learned through the field guide (Figure 4, p. 59). Each child was able to identify a bat and their two facts, showing that they followed the field guide correctly (see NSTA Connection for a sample rubric). This lesson was very successful as children were engaged for our entire 45-minute science period as they identified the bats and their characteristics with the help of the field guide. And, because they were so engaged and so focused they left knowing a lot more about bats, and I left feeling perhaps a little less batty than I might on a day that didn't go quite so well. ■

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Internet Resource

Bug Facts
www.bugfacts.net

References

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Connecting to the Standards

This article relates to the following National Science Education Standards (NRC 1996):

Content Standards

Grades K–4

Standard C: Life Science

- The characteristics of organisms
- Organisms and environments

National Research Council (NRC). 1996. *National science education standards.* Washington, DC: National Academies Press.

NSTA Connection

Download a rubric and the 5E lesson at *www.nsta.org/SC1303.*