# Elementary Science Learning Experience

# Integrated with Reading and Writing Instructional Resource

Grade 1 Example 1

*This example was adapted from a teacher submission.*

Science Experience Overview



Anchoring Phenomenon: Not all birds are alike, and some are quite different.

Driving Question: Why do all the birds look different?

Lesson Focus Questions:

1. What differences do you see in birds?
2. Why are the feathers different?
3. How do the feathers help the bird survive?
4. How can we use what we know about feathers to help us do different things?

AnimalSpot. (n.d.). Birds of Kentucky. AnimalSpot. https://www.animalspot.net/birds-in-us/birds-of-kentucky

*Kentucky Academic Standards (KAS) for Science:*

1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.\*

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| **Science and Engineering Practices** | **Disciplinary Core Idea** | **Crosscutting Concepts** |
| Constructing Explanations and Designing Solutions | LS1.A: Structure and Function  ETS1.B: Developing Possible Solutions | Structure and Function |

*Educators may have to engage with a standard multiple times throughout a year to meet the full intent of the standard. As a result, the following example may not encompass the entire scope of the standards identified*.

Reading and Writing Connection

Vibrant student experiences in science differ from those in Reading and Writing. However, intentionally aligning the topics enhances learning in both. The following, green-rated High-Quality Instructional Resource (HQIR) is used in Reading and Writing during the same time period as this science learning experience:

* HQIR: EL Education
* Knowledge-Building Topic: Birds’ Amazing Bodies
* Grade-Level Complex Text(s): *Birds* by Kevin Henkes, *Just Ducks* by Nicola Davies and *Feathers Not Just for Flying* by Melissa Stewart

The following Reading and Writing standards and tasks, along with Interdisciplinary Literacy Practices, play a supporting role and are integrated in this vibrant Science Learning Experience:

* Text-Dependent Tasks: Writing to Learn, Writing to Demonstrate Learning
* *Kentucky Academic Standards for Reading and Writing*: RI.1.1, RI.1.2, RI.1.3, RI.1.4, RI.1.7, RI1.10, C.1.5, L.1.2, L.1.4, L.1.5
* *Interdisciplinary Literacy Practices*: 1, 2, 3, 4, 6, 8

**Overall Learning Objective**: Exploring the similarities and differences of bird feathers.

**Launching the Anchoring Phenomenon**

Remind the students they have been learning all about birds from the books they have read. Take students on a nature walk outside and have them record in their science journal any birds they see. Ask them to observe how the bird looks, where they are located and what they are doing. Students can write or draw what they see as they talk with a partner on their nature walk. When the class returns, discuss what the students observed about the birds. As the students share, begin recording their observations in words and pictures on a chart. Encourage students to use discussion stems such as:

* I notice…
* I saw…
* I wonder why…
* How come…

AnimalSpot. (n.d.). Birds of Kentucky. AnimalSpot. https://www.animalspot.net/birds-in-us/birds-of-kentucky

Divide students into small groups and provide them with a set of bird pictures. Have students observe the similarities and differences between the birds. Have them sort the pictures based on similarities and differences.

Lead a class discussion about how they categorized their birds into groups. Have groups share their categories and what they noticed with classmates. Ask for similarities or differences between the way groups categorized the birds. Read the book Birds by Kevin Henkes and make connections to the categories and observations students have made up to this point. Encourage students to use discussion stems such as:

* I see…
* I want to add on to…
* Are you saying that…
* Can you say more...

Call attention to how students observed that birds have feathers. Note all observations about feathers by circling them on their observation chart in a different color. Explain they are going to examine feathers more closely on a variety of birds. As students watch the video [FOR THE BIRDS - Bird Feathers](https://www.youtube.com/watch?v=TMKOWKQgAcs) pause to allow students time to draw different feathers and record words that describe what they notice. During this first watch, do not read the captions in the video. This time is for close observation only. On a notice and wonder chart, record what students noticed about feathers in the video and what wonders they have.

## Learning Experience #1: How do birds use their feathers to survive?

**Learning Objective:** Identify ways birds use their feather to survive.

This is a table with the title Feathers: Class Notes. Subtitle: How do birds use their feathers to help them?
Column 1 title is "Describe the feather. The feather is..." with the example of "The feather is bright and colorful".
Column 2 is titled "How does this feather help the bird? The feather..." with the example "The bright color helps the bird find a mate to have more birds."
Column 3 it titled "Example" with the example "Peacock, Cardinal"Look at pictures of a variety of birds and notice and wonder about their feathers. Ask students to share how they think birds use their feathers to help them. When eliciting student ideas record them on a class chart. Return to their small groups and pass back out the pictures of birds. Have students categorize based on how feathers help them. Share out with classmates. Discuss do you agree or disagree with your classmates’ sorts. Record the ways birds use their feathers to help them on the class notes. In the class notes describe the feather, tell how the feather helps the bird, and provide an example.

Read the book Feathers Not Just for Flying by Melissa Stewart. Using the text, add to the class notes other ways birds use their feathers to help them. Encourage students to use the following discussion stems:

* In the text it said…
* I want to piggyback on \_\_\_\_’s idea…
* The reason I think that is….

Ask students to share what would happen to the bird if they didn’t have feathers? As students share encourage students to use evidence from their card sort, investigation and read aloud to support their thinking. As students make connections to how feathers help birds, introduce the word survive. Use a [Frayer Model](https://www.theteachertoolkit.com/index.php/tool/frayer-model) to work through the meaning of this word.

Note what questions students can answer on the notice and wonder chart. Do this by placing the answer beside the question or placing a check mark on top of the question to show students we can now answer that question.

Now that we have ideas on how feathers help birds, we are going to investigate how feathers help birds survive to deepen understanding.

**Learning Objective:** Investigate the ways that feathers help the birds survive.

## Learning Experience #2: How do bird feathers help them survive?

Complete three different investigations with students either as teacher-led investigations in centers time or complete these in whole group.

Investigations of how the feathers help birds survive.

1. Floating and Sinking
2. Camouflage
3. Staying Warm

**Floating and Sinking Investigation**

* Show students a short video of ducks in a small pond diving and swimming. Have students share what they notice and wonder about the ducks and how they are moving in the water. Ask, how do you think they stay afloat.
* Fill jars of water and provide students with a cotton ball. Explain to students the jar of water represents the pond the cotton ball represents the duck. Have students make a prediction about whether the cotton ball will sink or float. Have them draw their prediction and what might happen when the student places the cotton ball inside the jar of water.
* Allow students to put their cotton ball in the water and closely observe and record what happens by drawing what happened. Have students compare the results with their prediction. Was their prediction supported by the observational data? Have students turn and talk with their shoulder partner.
* Give each student another cotton ball and have them dip it in cooking oil and completely cover it. Have students make a prediction about whether the cotton ball will sink or float. Have them draw their prediction and what might happen when the student places the cotton ball inside the jar of water.
* Allow students to put their cotton ball in the water and closely observe and record what happens by drawing what happened. Have students compare the results with their prediction. Was their prediction supported by the observational data? Have students turn and talk with their shoulder partner.
* Have students turn and talk with their shoulder partner about what happened with the two different cotton balls and why?
* With the whole group, pose the following questions for discussion:
  + What were your observations of the two different cotton balls? Are they alike or different?
  + Did the results surprise you? Explain why and support your answer with evidence.
  + How would this investigation relate to birds that swim?
* Read Just Ducks by Nicola Davies. Have students turn and talk with their shoulder partner about what they learned about the ducks from the book.
  + Have a group discussion around the following questions, focusing on the last question.
    - Why did they bob their head in the water?
    - Why did they float?
* Have the students complete an exit slip to explain how feathers help ducks survive? Use the following sentence stem. Feathers help ducks survive by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Camouflage Investigation**

* Ask students, what might happen to a bird to cause it to not survive. Allow students to brainstorm their ideas and consider that birds could get eaten or hurt by another animal. Engage students in discussion about how birds can stay safe and away from this danger in their habitat? You may want to compare this to their lives and how they might avoid danger.
* Students have 3 different birds on a popsicle stick and 3 different habitats. The students must select which bird would survive best in which environment to avoid danger.
* After making their selection, the students respond to the following question using Flipgrid or in writing: Pick one of the birds and match it with the best environment to avoid danger. How might the feathers help the bird to avoid danger in that environment? Students may use a sentence stem such as, “The feathers would help the birds avoid danger in this environment because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.”
* Have the students watch the [Camouflage Video](https://academy.allaboutbirds.org/eastern-screech-owl-camouflage/). Have students to discuss what they learned from the video about how feathers help the birds survive. Encourage students to make connections they learn from the video to their birds and the different habitats.
* Allow students to go back to their response using a different color and add to their thinking after watching the video and discussing with their peers.

**Staying Warm Investigation**

* Begin by showing students different birds in cold environments like penguins or snowy owls. Have students share what they notice and wonder about these birds that live in cold places.
* Fill a bowl with cold water and add ice to make it very cold. The bowl needs to be large enough for students to place their hands inside of. In addition, gather large Ziplock bags and a thick piece of material or fleece large enough to wrap around a hand. A small piece of yarn or rubber band would be helpful in keeping the bag closed.
* Gather the students around the bowl and explain that they are going to compare how birds might feel with and without having feathers in a cold environment. Identify what each item represents in the investigation.
  + The bowl with cold water and ice represents the cold environment.
  + A hand inside the Ziplock bag represents a bird with no feathers.
  + A hand wrapped up with a thick piece of material or fleece in a Ziplock bag represents a bird with feathers.
* Have a student place their hand inside a Ziplock bag and remove air out of the bag.
* Consider tying a piece of yarn or placing a rubber band around the bag to keep it closed at the wrist. Allow the students to dip that hand into a bowl of ice water. Have the student describe how cold their hand feels after a few seconds. Remind students this represents a bird without feathers in a cold environment.
* On the students’ other hand wrap it with fleece or thick material and then place it in a Ziploc bag before dipping the into the ice water. Again, consider closing the bag with a piece of yarn or a rubber band. Have the student explain how cold it feels after a few seconds. Remind students this represents a bird with feathers in a cold environment.
* Ask students to compare how their two different hands felt and explain why. If a student is struggling with feeling the difference between their two hands, they can place both hands in the water at the same time for a few seconds for comparison.
* Ask students what role the feathers play for the bird. Guide them to understand that feathers provide insulation, helping to keep birds warm in cold environments.

Bring the class back together after all three investigations and point out that students have explored three important ways feathers help birds survive. Ask what all these investigations tell us about why feathers are so important for birds. Encourage students to support their ideas with evidence from the investigations. Other students may use the following stems to engage in the consensus discussion:

* Are you saying that…?
* Can you say more about that…?
* I agree with \_\_\_\_\_ because…
* I disagree with \_\_\_\_ because ….
* I want to piggyback (add to) what \_\_\_\_ idea.

## Learning Experience #3: How can we use what we know about feathers to help us do different things?

Begin with a review what students have learned about bird feathers up to this point. Capture the student ideas on an anchor chart. Have students rewatch the [FOR THE BIRDS-Bird Feathers Video](https://www.youtube.com/watch?v=TMKOWKQgAcs) in the first learning experience. As the students watch, read the captions as the students connect their in class experiences with the information in the video. Encourage the students to add to their anchor chart if they learn something new from the video.

**Learning Objective:** Compare duck feathers to other materials with the same structure and function.

Let’s think back to our book Feathers Not Just for Flying by Melissa Stewart where students learn that there are different purposes for feathers.

Now that we’ve seen how feathers help birds, let’s think about *why* feathers work the way they do. Feathers have a special **structure** (built in a certain way) that helps them do their **function** (job). Spend time discussing the investigations from learning experience #2 to introduce the terms structure and function. Talk about how the structure of the feather and how the function helped the bird. To support students in this discussion, provide students with a graphic organizer structure/function where students can draw and use words to explain their thoughts.

* **Floating/Sinking:** Remember how the oil-covered cotton ball floated in water? The structure of duck feathers has oil, just like we used on the cotton ball, which helps them float. So, the structure of oily feathers helps ducks stay on top of the water. That’s the function.
* **Camouflage:** Birds in the wild have different colors of feathers. This structure helps them blend into their environment so they can stay safe from predators. The function of camouflage feathers is to protect the bird.
* **Staying Warm:** When we wrapped our hands in fleece, it kept our hands warm in icy water, just like thick feathers do for birds. The structure of the thick feathers keeps birds warm, and that’s their function.

Provide various materials on a table that mimic the function of feathers foil, fleece, colored paper, camouflage material, cotton balls, Ziploc bag, wax paper, plastic wrap, sponge, rubber, Styrofoam, Show the students the materials and ask, what materials do we have that we could use to help us stay dry, hide, or stay warm just like bird feathers do for birds? Have the students categorize them by their similar function to bird feathers.

|  |  |  |
| --- | --- | --- |
| Materials that would help us stay dry | Materials that would help us hide | Materials that would keep us warm |
|  |  |  |

What problems do you think people could solve by mimicking how animals use their external parts to survive? Let’s think about ways we could use these ideas to make something helpful for humans.

* If we want to stay dry in the rain, how could we mimic the function of a feather to help keep us from getting wet?
* If we need to hide or stay safe, how could we mimic the function of a feather to prevent us from being visible?
* If we are cold outside, how could we mimic the function of a feather to help keep us warm?

Allow students to share their ideas and encourage them to think about how they might use the materials on the table to solve these problems. Provide real-world examples to support the discussion (sleeping bag, insulated footwear, raincoat, umbrella, tent, face paint, hunting clothing, etc.). Show pictures or videos of real-world examples.

Use the following sentence stem and have students connect the real-world example to the mimicry of the feather.

The \_\_\_\_\_ design mimics the \_\_\_\_ because it helps humans \_\_\_\_ just like the \_\_\_\_helps the \_\_\_\_.

*Example:*

The sleeping bag design mimics the fluffy feather because it helps humans stay warm just like the fluffy feather helps the bird to stay warm.

## Culminating Task

Introduce what a scuba diver is by watching a [short video](https://www.youtube.com/watch?v=U3_KMeV5ErA). Before students design their scuba suits, they will talk about what makes a good scuba suit. It should keep water out, keep the diver warm, and help them blend in with the water. They will also look at books and videos to learn about real scuba suits and the materials used to make them. This will help them produce great ideas for their own suits.

After students have looked at the types of materials that can mimic the external parts of birds such as feathers and how they might help us solve problems we have. Consider materials that mimic the natural function of birds to help a scuba diver survive in the water. Using the materials at your table, test materials in water to see which materials would be best for a design for a scuba suit for your scuba diving adventure. Draw a picture of your scuba suit and label the material that you think would be best. Write a sentence about why your material would be best to help the scuba diver.

## Student Work Samples:

*Please note that the following are samples of students’ work. Educators should not interpret these samples as exemplars.*

**Student 1**

**The child drew a blue scuba suit. Writing says "My scuba suit has fabric and oil. The fabric helps the scuba diver to stay dry. The oil helps the scuba diver to float."
Note that spelling and grammar has been corrected for the screen reader.**

**The student drew a scuba suit and labeled the goggles, gloves and flippers. They wrote "It will keep me dry and warm."
Note that spelling and grammar has been corrected for the screen reader.Student 2**

**The student drew a scuba suit and labeled the fabric and fluff. They wrote "The scuba suit has fabric outside the suit. In the inside of the suit there is warm fluff so the diver can stay warm.
Note that spelling and grammar has been corrected for the screen reader.Student 3**