



Day 8: What Are Scientific Illustrations?

Literacy Strategy: Making connections.

Science Concept: Observing and recording details through scientific illustration.

Science and Literacy Connection: Scientists and strategic readers make connections between what is already known and new information that is collected through observations, investigations, and reading.

Mini-Lesson (15 minutes)

OVERVIEW

Scientists make connections while doing research all of the time. When making observations on larvae, scientists may notice that the spines on a caterpillar remind them of the spines on a cactus. Since they already know that the spines help protect the cactus, this connection helps the scientists understand that the spines might be a defense mechanism against predators for both organisms.

NOTE: You are encouraged to create the “Making Connections” anchor chart with your learners as you move through the lesson, using the provided anchor chart as a model. Post it for easy reference when completed and remind learners to refer to the anchor charts during inquiry circles.

MATERIALS

Teacher needs:

- chart paper
- marker(s)
- class Inquiry Chart
- “Making Connections” anchor chart
- butterfly text to model the strategy

PROCEDURE

Each *italicized statement* below contains suggested wording the teacher may choose to use for the lesson; additional teacher actions and considerations are in parentheses.

Tell what the strategy is (declarative knowledge)

1. *Our strategy today is called “making connections.” It is thinking about the text and how it relates another text, something I already know, or the world. I can also think about how science relates to me, other sciences, and the world.*

Tell when and why to use the strategy (conditional knowledge)

1. *I use this strategy (making connections) when the text or something in the science investigation reminds me of something I already know. This strategy is important because it helps me organize information in my brain.*
2. *As I observe the world around me or read, my brain is always trying to match the new information with what I know. Some people call this “schema.” Making connections also helps me organize my new information (or observation) so I can remember it later.*

Tell how to employ the strategy (procedural knowledge)

1. (Model the strategy using text.) *The first thing I do is to ask myself, “How does this text relate to something I’ve already read before? How does it relate to something I’ve done before, or to something I’ve seen or heard before?”*
2. *Finally, using the connections I’ve made helps me to understand what I am reading in text or observing in science.*

Science Inquiry Circles (30 minutes)

OVERVIEW

Teams continue their research work to answer questions about their animals.

MATERIALS

Each team needs:

- team Inquiry Charts
- pencils
- access to informational texts/media

Teacher needs:

- “Animal Resources” spreadsheet for ideas

PROCEDURE

Each *italicized statement* below contains suggested wording the teacher may choose to use for the lesson; additional teacher actions and considerations are in parentheses.

Before Inquiry Circles

1. *It is time to get into our inquiry circles.* (Have the Equipment Directors gather the Inquiry Chart for their team.) *Today we will look for answers to different questions on your Inquiry Charts.*

During Inquiry Circles (20 minutes)

1. *The Lead Scientists will guide all research for the day by picking which questions will be answered, and the Data Scientists will record all source information and the answers to your research questions on the team Inquiry Chart. The Lab Directors and the Equipment Directors must help find the answers to the questions online and in texts.*

2. *My role is to help guide the inquiry circles, but I expect you to work as a scientific team to solve your problems together. (While teams are working together, walk around the room to facilitate as needed.)*

After Inquiry Circle Time (10 minutes)

1. *As we conclude our inquiry circles for today, each team will have a chance to share what they accomplished and learned.*
2. *The Lab Directors should lead the discussion with their inquiry circle team about today's results. For example, did your team use any reading strategies today? If so, which one(s)? What did your team learn about its organism? What problems did your team encounter? How did your team resolve those problems?*
3. (After you have allowed the teams to gather their thoughts, have the Data Scientists share with the class. Try to encourage teams to share a variety of things—you do not want just facts about animals, just reading strategies, or just cooperative learning strategies.)
4. (After all teams have shared, thank them for their hard work, and point out any excellent behaviors that you observed. If you noticed any problems in the teams during the lessons, take a moment to point them out, and explain your expectations for all future inquiry circles. Collect all Inquiry Charts or have the Equipment Directors put them in their normal classroom place for ongoing work so they can easily access them.)

Guided Science Investigation (30–45 minutes)

OVERVIEW

In this activity, learners will examine pictures of different butterflies. They secretly pick out their favorite butterfly and then write two sentences describing it. When finished, they can exchange their sentences with other learners to see if others can pick out the correct butterflies based on the descriptions.

GUIDING QUESTIONS

Why do scientists record notes of their observations? What is the value of written records?

BACKGROUND INFORMATION FOR THE TEACHER

Artistic abilities are just one tool scientists use for observing the natural world. Another tool is written descriptions. No matter how good a sketch or a drawing is of an animal, plant, or landscape, there are things that are very difficult to illustrate accurately. For example, many butterflies and other insects exhibit a color property called “iridescence.” This means that the scale color on the wings can change when viewed from different angles. It is difficult to exactly capture all the iridescence variations of a butterfly wing in sketches or even photographs. A written description, however, allows the scientist to report on the various iridescent colors the butterfly exhibits. Combining detailed notes with a sketch provides a more accurate description of the subject being studied.

MATERIALS

Each team member needs:

- copy of “My Favorite Butterfly” page
- pencil

- glue or tape
- scissors
- Butterfly Investigation Journal

Teacher needs:

- “Grayscale Butterflies” slide
- “Butterflies Are Colorful” slide
- projector and whiteboard

SETUP

- Prepare to project the “Grayscale Butterflies” slide; also prepare to project the “Butterflies Are Colorful” slide for Step 1 under “Elaborate.”
- Make copies of the “My Favorite Butterfly” page (1 for each team member).

SAFETY

- Remind teams daily to be gentle with the growth habitats during handling to prevent disturbing the larvae, especially once the chrysalis forms. Ideally, the growth habitats should be placed where teams can do daily observations without moving them.
- Please follow all district and school science laboratory safety procedures.
- It is good laboratory practice to have teams wash hands before and after any laboratory activity.

DAILY OBSERVATIONS

Give learners time to observe their caterpillars (whether they are in the larva, pupa, or adult stage), take measurements of the larvae (if applicable), and record their observations in their Butterfly Investigation Journals. Facilitate team discussions by asking questions, such as *What did you notice? What has changed since the last time you observed your caterpillars?*

PROCEDURE

Engage

1. Review with teams what they learned the day before about making scientific illustrations. What were they able to show in their illustrations? Did their illustrations look like the real butterfly image they were shown? What interesting things did they discover about the butterfly while sketching?
2. Ask learners if there are things about the butterflies that would be hard to sketch? Discuss butterfly behavior: How fast do they fly? Do they fly in a straight line? Do they like particular colors of flowers? Are they constantly moving, or do they rest from time to time? How long do they live?
3. Ask learners what they could do to record the behavior of the butterflies? Accept all responses.

Explore

1. Project the “Grayscale Butterflies” slide on a white board or screen. Tell learners that they will secretly select their favorite butterfly of the 12 shown; instruct them not to tell anyone which butterfly they choose!
2. Give each team member a copy of the “My Favorite Butterflies” page. Tell them to write two sentences describing the butterfly they chose in the Description Box. Challenge them to use

words that describe the butterfly in way tha will help other learners know exactly which butterfly they are writing about. **Important: the descriptions cannot include where the butterfly is located on the page.** (The pictures are deliberately depicted in grayscale so that learners must write a detailed description rather than just saying “the blue butterfly.” Color is only one of many butterfly properties, and seeing the colors may prevent learners from seeing the other properties.)

3. Make a list on the board of good descriptive terms learners can use (shape, size, patterns, etc.). Ask learners for their ideas. Include sentence stems to help them organize their thoughts, e.g.,
My favorite butterfly has . . .
My favorite butterfly looks like . . .
4. Give learners 5 to 10 minutes to select a butterfly and write a description. Remind learners to write their names on the “My Favorite Butterfly” page and not to tell anyone which butterfly they are writing about.

Explain

1. Collect, shuffle, and pass out the “My Favorite Butterfly” pages. Tell learners they have 5 minutes to read the descriptions and try to identify the butterfly being described.
2. After 5 minutes, begin calling on learners to read the descriptions aloud. After a description is read, learners should point to the butterfly on the white board or screen they think was being described. The learner who wrote the description will say whether or not it is the correct butterfly. Allow learners time to explain their descriptions.
3. Conclude the activity by returning the “My Favorite Butterfly” pages to your learners. Have them cut out their butterfly from the set of 12 and paste or tape it in inside the image square on the page.

Elaborate

1. Finally, project the “Colorful Butterflies” PowerPoint slide and ask learners to add color properties to their descriptions. Have each learner place the finished page in their science notebooks.

Evaluate

1. Did learner descriptions demonstrate developing complexity in their observations?
2. Did learners’ written or oral descriptions include science language?

Science Language

- A **scientific illustration** is picture or diagram that explains or helps make something clear, such as the anatomy of a butterfly.

Expanded Standards

Reading TEKS

2(b)(6) Comprehension skills: listening, speaking, reading, writing, and thinking using multiple texts. The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts. The student is expected to: **(G)** evaluate details read to determine key ideas.

CCSS

RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. **RI.2.2** Identify the main topic of a multi-paragraph text as well as the focus of specific paragraphs within the text.

NGSS

2-LS2-1 Science & Engineering Practices: Planning & Carrying Out Investigations Make observations (firsthand or from media) to collect data that can be used to make comparisons.

Science TEKS

2.1 Scientific and engineering practices. The student asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to: **(A)** ask questions and define problems based on observations or information from text, phenomena, models, or investigations; **(F)** record and organize data using pictures, numbers, words, symbols, and simple graphs; **2.5** Recurring themes and concepts. The student uses recurring themes and concepts to make connections across disciplines. The student is expected to: **(A)** identify and use patterns to describe phenomena or design solutions.