<table>
<tr><th colspan="4">Day 10
Making Connections</th></tr>
<tr><td colspan="2">Literacy Strategy: making evidence-based claims part 1: communicating oral claims.</td><td colspan="2">Science Concept: Changes in Earth's environment directly affect the populations of all organisms. Some organisms adapt and survive; others do not. Making connections between organisms and their environment helps us to understand how they adapt to different habitats.</td></tr>
<tr><td>Reading TEKS:
3.7(C), 3.13(H)</td><td>CCSS:
SL.3.2, W.3.7, W.3.8</td><td>NGSS:
3-LS2-1, 3-LS4-1,
3-LS4-3, 3-LS4-4</td><td>Science TEKS:
(3)(b)(2)(B)
(3)(b)(3)(A)
(3)(b)(10)(A)</td></tr>
<tr><td colspan="4">Materials for Mini-lesson on Science-Based Disciplinary Literacies (referred to as Mini-lesson): chart paper, markers, sample inquiry chart, Making Evidence-Based Claims anchor chart.</td></tr>
<tr><td colspan="4">Materials for Inquiry Circles: team inquiry charts, pencils, variety of nonfiction texts for each group, access to websites and online books, access to anchor charts already introduced.</td></tr>
<tr><td colspan="4">Materials for Guided Science Investigation: see instructions beginning on page 5.</td></tr>
<tr><td colspan="4">Content Vocabulary:
Adaptations—changes that take place over long periods of time that make an organism better suited to living in a particular habitat or environment.
Evidence—data, observations, or other information collected from an investigation that can be used to support explanations and answers.
Data—facts or information collected during an investigation (e.g., images, measurements, or words).
Extinction—the dying out or disappearance of a particular species of plants or animals on Earth.
Species—a classification of organisms that share characteristics and are alike in some manner.</td></tr>
<tr><td colspan="4">Science and Literacy Connection: scientists formulate claims about their investigations, then use evidence acquired through their work to validate them.</td></tr>
</table>

Mini-lesson—15 minutes

OVERVIEW

Scientists often communicate the findings from their investigations. In addition to writing about their findings, scientists speak to others about their findings and the procedures they used to reach them. Scientists communicate claims about their findings, and they validate their claims by explaining the evidence that proves their claims are true. These kinds of claims often appear in oral (spoken) presentations where scientists share their work with other scientists. Scientists don't tell other scientists every single detail of their investigations. That would take a very long time. Instead, scientists must decide which parts of their findings are most important for other scientists to know, focusing on stating their claims and the evidence that makes their claims true. It is also important for scientists to explain details about their claims and the evidence that supports them so that they make sense to others.

PROCEDURE

Each statement in quotation marks below contains suggested wording the teacher may choose to use for the lesson.

EXPLAIN THE STRATEGY

Tell what the strategy is (declarative knowledge)

- "Today we will learn about making evidence-based claims. Evidence-based claims are statements that I make (as a scientist) that are true. I know they are true because I have data to prove those statements. These are different from statements that may be my opinion or something I think about a topic. Evidence-based claims can be communicated orally or in writing. Today, we will learn to communicate evidence-based claims when we are presenting orally. In the future, we will learn how to write evidence-based claims."
- "For example, in one of the books I read yesterday, the author said that cacti often have sharp spines to ward off predators. This was different from what my cousin told me, which was that the spines on cacti are there to poison me. The information I got from a book could be considered evidence-based, while what my cousin told me is really just his opinion, or he was repeating something someone told him. You probably have heard a lot of claims on the internet and on TV that are not based on evidence."

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

- "Making evidence-based claims is an important part of being a scientist. When I talk to other scientists, they expect me to say things that are true and that I can prove or can show that someone else has proven. This is also true when I'm talking to someone else (who may or may not be a scientist)."
- "I make evidence-based claims to communicate true and valid information to other scientists. I do this when I have learned something new and I want other scientists to learn it as well. When I state my evidence-based claims, I include the evidence I found through my inquiry AND how I found it. I also explain how my evidence supports my claim."
- "When I talk about my claims, I make sure to include details that help my audience understand me because other people might not know what I know just yet."

Tell how to employ the strategy (procedural knowledge)

While you model the strategy, you might want to say something like this to the readers:

- "The first thing I will do is choose one of my inquiry questions and look at the synthesis statement I wrote for that question."
- "Then, I will use my synthesis statement to make a claim. A claim will sound like an answer to my inquiry question. My synthesis statement and my claim might be very similar. "
- "Next, I will look at the evidence on my inquiry chart and the sources I listed."
- "Then, I will decide which piece(s) of evidence or which source(s) were most important in proving this claim to be true. This could be evidence from my reading or evidence from my scientific investigations."
- "Then, I will think about what I already know that validates (supports) my claim. I will be careful to include only my knowledge that is factual and that matches what I have read in the writing of other scientists. My claim should not include my opinions. If what I know is in agreement with what other scientists are saying, I can consider the claim valid."
- "Next, I will think about what I know and what my audience might not know just yet. I ask myself, What details should I include to help everyone understand my claim?"
- "Finally, I tell other scientists my claim, citing my evidence as part of my statement."

You might present the following as a model claim as part of this mini-lesson:

My inquiry question was, *What features of your plant allows it to survive and thrive in its habitat?*

Claim: Cacti have adaptations that help the cacti survive and thrive in dry environments.

Evidence: I read on the National Wildlife Foundation website that cacti live mostly in dry places, have thick stems to store water, and have a waxy coating to keep water inside the plant. In my investigation, I observed the waxy surface of a cactus. I have also seen cacti living in dry places like Texas and Arizona.

"The evidence supports my claim because these are examples of adaptations that can help plants survive in hot, dry places. Keeping water inside a plant would be helpful in an environment with very little water. Cacti have these adaptations, and this allows them to thrive in dry environments."

"Note that there are no opinions in this model. I might have an opinion about cacti, such as 'some cacti can be scary looking, and some are pretty.' This is my opinion and not a fact, so it does not serve to make my claim more valid."

Science Inquiry Circles—30 minutes

OVERVIEW

Scientists often work in teams when conducting inquiry and investigations. Today, students will work in inquiry circles teams to investigate different questions about plant groups.

Prior to starting the inquiry circle work, be sure to have texts and technology available for your learners. You have been provided with a list of suggested books and websites titled Plant Resources in the Day 10 folder. These are suggestions, and you may use other resources. You may need to provide learners with specific instructions on how to access websites within your school district, or you may want to create a click sheet of approved websites for learners to be distributed in your learning management system (Google Classroom, Schoology, etc.). As teams begin working, you may have some groups working online while others are working with traditional texts. This will depend on your access to technology and texts.

PROCEDURE

Each statement in quotation marks below contains suggested wording the teacher may choose to use for the lesson; teacher actions in parentheses.

Before Inquiry Circles

1. "It is time to get into our inquiry circle groups. You will be with the same team as yesterday, but we will rotate the scientific roles." (Assign roles at your discretion and have the Equipment Directors gather the inquiry chart for their team).
2. "You are already familiar with the inquiry chart and the inquiry questions. Today we will continue to look for answers to all of your questions."
3. "As you look for answers to your questions, you will practice your roles as scientists. You will do this because scientists have a special way of looking for answers. One way to look for answers is to do investigations. This means that they look at text (in books and on the computer) that might help them find information they can use."

During Inquiry Circles—20 minutes

4. "Today you will continue to investigate your plant group by using preselected websites on the computer (or tablet) and preselected texts." (The websites and texts are available in the Plant Resources document.)
5. "We have anchor charts to help guide your thinking. Do not forget to use them while working." (Refer to the Making Evidence-Based Claims anchor chart and the other anchor charts already introduced. Remind learners that each day they will practice the literacy mini-lesson during this inquiry circle time. Once you have taught several mini-lessons, they can use any of the reading strategies taught, not just the one for that day.)
6. "The Lead Scientist will guide all inquiries for the day by picking which question(s) will be answered. The Data Scientist will record all source information and the answers to your inquiry questions on the inquiry chart. Remember, it is important to record on your inquiry chart where you found the information (source) so that you do not plagiarize." (Point out to learners where sources are located on the inquiry chart and how one source may answer various questions. Remind your learners to record the title and author for texts and the URL for websites.) "The Lab Director and the Equipment Director must help find the answers to the questions online and in texts." (Be sure to model for learners where to record their source and where to record answers to specific questions. Explicitly show them how the inquiry chart will organize their progress.)
7. "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 Circles—10 minutes

8. "As we conclude our inquiry circles for today, each team will have a chance to share the questions they answered, as well as what they accomplished and what literacy strategies they used. The Lab Director will lead the discussion about today's results, and the Data Scientist will share your responses with the class. Discuss with your team, considering what you learned about your plant group. What problems did you encounter? How did you resolve those problems? Did you use a reading strategy? Which one, and how did it help you? What new questions do you have?" (After you have allowed the teams to gather their thoughts, have the Data Scientist share with the class.)
9. (After all learners have shared, thank them for their hard work, and point out any excellent behaviors you observed. If you saw an outstanding example of using a reading strategy or collaborative work, explicitly point it out. If you notice 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 learners put them in their normal classroom place for ongoing work so they can easily access them.)

Guided Science Investigation—30 to 45 minutes

OVERVIEW

Today teams review all of the information they have recorded on their Plant Observations chart, in their science notebooks, and on their inquiry charts to describe and analyze the changes they have observed in plants. Using this information, they will make claims about their findings, supported by evidence from their investigations.

GUIDING QUESTIONS

What changes do we see in plant groups over long periods of time? How are the plants we investigated similar? How are the plants we investigated different? Why did plants have to make changes at all?

BACKGROUND INFORMATION

As the investigations on plants wrap up, teams are asked to take a critical look at how plant populations have changed over long periods of time. Organisms develop structures and behaviors to help them survive as the environment changes around them. But not all organisms survive. Why do some organisms die-off or become extinct? What adaptations did plants make that made them better suited for a particular environment?

The descriptions in this unit of geologic time and environmental change have been limited to provide a snapshot of what Earth was like during the time periods in the fossil record when plants appeared. As you, the teacher, guide the children through this lesson, revisit the information discussed at the end of each day's investigation regarding environmental change.

SAFETY

There are no safety issues.

MATERIALS

All students will need:

- science notebooks

All teams will need:

- copy of Making Connections document
- Plant Observations chart
- access to inquiry charts
- access to all plant specimens
- access to all plant images (Days 6–9)

SET UP

- Make copies of the Making Connections document (one per team).
- Make all plant images, inquiry charts, and Plant Observations charts accessible for learners.
- Assemble all plant specimens together where they can be seen by the class.

DAILY OBSERVATIONS

There are no plant observations today.

PROCEDURE

Engage

1. Begin with *How do we make sense of what we have seen and learned from our plant observations?*
2. Instruct the children to open their science notebooks to a clean page. As you model it on the whiteboard, ask them to draw a medium-sized square and a medium-sized circle in their notebooks.

3. In the square, ask them to write something that "squares up" (makes sense) to them about all of the plant observations they have made. In the circle, they should write something that is still rolling around in their head (something confusing or that they don't understand). Give them 2 to 3 minutes to complete.
4. When time is up, ask them to share what they wrote with a partner on their team. As they do, walk among them and listen to their discussions.
5. Remind the teams that the differences they see in plant groups happened over very long periods of time, from millions to billions of years. Scientists don't always agree on the number of years it took for these differences, or changes, to take place because new information continues to emerge as they learn more from fossils and the rock record. Add that the rock record does provide evidence that Earth's environment was also changing over millions of years. *Is there a connection?*

Explore

6. Distribute the Making Connections document (one per team). Read over the instructions and each of the questions together.
7. Explain that they should look carefully **at ALL the information** on their Plant Observations chart to compare plants/plant groups. They can also use any notes from their science notebooks or information from their inquiry charts to answer the questions.
8. Tell the children that at the end of each day of observations, you gave a brief description of what the environment was like during the time period in which those plants first appeared in the fossil record. Ask them to look for notes on that information in their science notebooks.
9. Remind them to work as team, listening and considering what each team member contributes to the discussion.
10. Ask if there are any questions before proceeding. Let them know they have about 20 minutes to work. (Teacher may decide if more time is needed.)
11. As teams work, observe and listen to their conversations, offering only clarifications as needed. Encourage them to think out loud and discuss their thoughts. This is a good opportunity for children to share their ideas and help each other make sense of all of the information.

Explain

12. When time is up, tell the teams that you will be collecting their work for review. Before you collect the work, ask the Data Scientist from each team to share one answer from their work. Listen for evidence that supports their answers.
13. After all teams have shared, explain that the physical changes in plants we see over time were "adaptations" the plants made to survive. In other words, they had to change themselves to better "fit" into the habitats that were also changing around them. Some organisms didn't survive the environmental changes that occurred over millions of years, and as a result they became extinct.
14. Pointing to the assembled plant specimens, say *"We have been working with the plants in front of you for the past few days. Looking at them and thinking about what you have observed, how would you describe or explain what the "big picture" or "big idea" is for all these plant groups?* Accept all responses.
15. Collect student papers for review, and return them to the teams before they begin their culminating projects on Day 13.

Elaborate

16. Ask the teams to reflect on the questions they came up with to begin each daily investigation. Were they always successful in finding an answer? If so, why? (Were the questions related to the differences or changes between plants?) If not, why not? (Were the questions not related to the differences or changes?) Accept all responses.
17. Share that scientists often change and come up with better questions to get to the answers they want. Remind them that good science questions should be answerable through observations or investigations, specific and related to the science topic they are investigating, and answered using the tools, materials, and time available.
18. Announce that in the next class, they will use their new skills and knowledge about plants to identify plant fossils!

Evaluate

19. In reviewing their written answers and/or drawings, did learners reasonably describe or explain the answers to the questions?
20. Are their explanations supported by evidence?
21. As they worked, did all team members contribute to answering the questions?
22. Was any information from the science inquiry circle work and/or their science notebooks included?
23. Are learners using science language in their communications, either written or verbal?

Expanded Standards
Reading TEKS: 3.7 Response skills: listening, speaking, reading, writing, and thinking using multiple texts. The learner responds to an increasingly challenging variety of sources that are read, heard, or viewed. The learner is expected to (C) use text evidence to support an appropriate response. 3.13 Inquiry and Research: listening, speaking, reading, writing, and thinking using multiple texts. The learner engages in both short-term and sustained recursive inquiry processes for a variety of purposes. The learner is expected to (H) use an appropriate mode of delivery, whether written, oral, or multimodal, to present results.
CCSS: SL.3.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally. W.3.7 Conduct short research projects that build knowledge about a topic. W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
NGSS 3-LS2-1 Science and Engineering Practices: Construct an argument with evidence, data, and/or a model. 3-LS4-1 DCI Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. 3-LS4-3 DCI For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. 3-LS4-4 DCI Populations live in a variety of habitats, and change in those habitats affects the organisms living there.
Science TEKS: (3)(b)(2) Scientific investigation and reasoning. The learner uses scientific practices during laboratory and outdoor investigations. The learner is expected to (B) collect and record data by observing and measuring using the metric system and recognize differences between observed and measured data. (3)(b)(3) Scientific investigation and reasoning. The learner knows that information, critical thinking, scientific problem solving, and the contributions of scientists are used in making decisions. The learner is expected to (A) analyze, evaluate, and critique scientific explanations by using evidence, logical reasoning, and experimental and observational testing. (3)(b)(10) Organisms and environments. The learner knows that organisms undergo similar life processes and have structures that help them survive within their environments. The learner is expected to (A) explore how structures and functions of plants and animals allow them to survive in a particular environment.