ALL for Science™
Authentic Literacy and Language for Science

Baylor College of Medicine
CENTER FOR EDUCATIONAL OUTREACH

DAY 8: STATING OUR CLAIM

MINI-LESSON

Teacher introduces the "Organizing a Reference List" anchor chart and models the strategy for the class.

SCIENCE INQUIRY CIRCLES

Teams work together to complete the Reference List Graphic Organizer for the sources used during their inquiry.

GUIDED SCIENCE INVESTIGATIONS

Teams make final observations on their seed germinations and begin the process of developing evidence-based claims.

ABBREVIATED STANDARDS

- Reading TEKS: 4.13G
- CCSS: W.4.8
- NGSS: 4-ESS-2, 4-LS1-1,
- Science TEKS: 2018–19: 4.2F; 2024–25: 4.1E, 4.3B

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Day 8: Stating Our Claim

Literacy Strategy: Organizing a reference list.

Science Concept: Scientific evidence is data used to support answers to questions or claims generated by investigations.

Science and Literacy Connection: Scientists support their claims with evidence both from their investigations and their research.

Mini-Lesson (15 minutes)

OVERVIEW

When scientists share their work, they always include a reference list. A reference list gives *credibility* to the work of scientists because it shows that they have read the work of other scientists. Readers expect investigative works to include reference lists because all writers (including scientists) should support their claims with evidence. Scientists use a reference list to show readers that their claim can be validated by investigations made by other scientists and authors.

Looking at an author's reference list is one way to evaluate the claim the author is making. Each source on a reference list includes specific pieces of information, such as the author, title, publisher, and publication date of a source. This is because other scientists should be able to use a reference list to find and read any of the sources listed.

NOTE: You are encouraged to create the "Organizing a Reference List" 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)
- Reference List Graphic Organizer
- "Organizing a Reference List" anchor chart as a model
- informational text about plants to model the strategy (see the "Ecosystem Resources" spreadsheet for ideas)

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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. *Today we will learn how to organize a reference list. A reference list is a record of all the sources (books, eBooks, websites, and videos) a scientist uses throughout an investigation. You can think of a reference list as a map that you can use to retrace the steps of your investigation. Anyone who wants to know more about your work can retrace your steps too.*

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

1. *I use a reference list whenever I want to share my work with others. I always include the author, title, publisher, and publication year for each source on my reference list because this specific information helps readers look up my sources for their own research. Listing my references gives my work credibility—it shows that I have read the work of other scientists and that I have evidence to support my claims.*

Tell how to use the strategy (procedural knowledge)

1. *First, I look at the "Sources" column on my Inquiry Chart to find all the sources I have used during my inquiry investigation.*
2. *Then I determine if each source is a book, eBook, website, or video—this tells me where I will record each source on my Reference List Graphic Organizer and what information I need to include.*
3. *I take note of any important information I already wrote down about my sources and add this to my Reference List Graphic Organizer. Important information includes the name of the author; the title of the book, eBook, website, or video; the publisher of the source; and the year the source was published. For online sources, I also include the URL (the link to the source).*
4. *I go back to each source and look for any important information I haven't recorded yet. This information can be tricky to find.*
    - *For a book, the author and title are usually on the cover. The publisher and year are usually in the first few pages or on the back cover. I might need to look through the fine print on these pages. The same is true for an eBook.*
    - *For a website, the title, author, publisher, and date are usually at the top of the webpage, but sometimes it is helpful to scroll to the very bottom of the page to look for additional information.*
    - *For a video, important information, such as the video's title, the name of the person (or entity) who posted it, and the year (or how many years ago) it was posted is usually right below the video.*
    - *For online sources (websites and videos), the author is sometimes an organization rather than a person. If you can't find a person's name, look for an organization. Such as "US Fish and Wildlife" or "Fort Worth Botanical Garden." This might be found in the URL.*
5. *Finally, I record "no author," "no date," or "no publisher" if a piece of information isn't available.*

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Science Inquiry Circles (30 minutes)

OVERVIEW

Today teams work together to complete the Reference List Graphic Organizer. You many need to make adjustments for teams who are still working on their synthesis statements.

MATERIALS

Each team needs:

- team Inquiry Chart
- access to informational texts/media previously used
- copy of the Reference List Graphic Organizer (print or digital copies; a digital copy, e.g., on Google Docs, that can be shared by the team might make it easier for learners to collect the URLs for digital sources)

PROCEDURE

Before Inquiry Circles

1. *It is time to get into our inquiry circle teams. You will be with the same inquiry team as yesterday.*
2. *Today we will organize our reference lists, so we need to be sure that we have completed the Inquiry Chart and our synthesis statements.* (Make adjustments for teams that have not yet finished.)
3. *Now, inquiry teams will work together on their reference lists.*

During Inquiry Circles (20 minutes)

1. *Today your team will work on creating one reference list that includes all of the resources you used for your inquiry.*
2. *Work together as a team to complete the Reference List Graphic Organizer. Make sure to include every source (books, eBooks, websites, and videos) your team used for your inquiry.*
3. *You can look at each source one at a time together or divide up the work.*
4. *If your team and another team used the same source, you might help each other find the reference information for that source.*
5. *My role is to help guide the inquiry circles, but I expect you to work as a team to solve your problems together.* (While teams are working together, walk around the room to facilitate as needed.)

After Inquiry Circles (10 minutes)

1. *The Lab Director will lead the discussion about today's results. What did the team learn about organizing a reference list? Which reading strategy did the team use, and how did it help? What problems did the team encounter? How did the team resolve those problems?*
2. *As we conclude our inquiry circles for today, the Data Scientist from each team will have a chance to share what they accomplished and any reading strategies they used.* (After you have allowed the teams to gather their thoughts, have the Data Scientist share with the class.)

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Guided Science Investigation (30–45 minutes)

OVERVIEW

Today learners make final observations on their investigations. Then they begin the process of developing claims using evidence from their investigations that supports their claims.

The teacher may allow as much time as needed today for this lesson if learners are not already familiar with a claims, evidence, and reasoning (CER) format.

GUIDING QUESTIONS

Do we have an answer to a question we have investigated? What is a claim? What claim or statement can I make about my investigation? What data have I collected during my investigation? How does my data provide the evidence to support my claim?

BACKGROUND INFORMATION FOR THE TEACHER

After an inquiry is concluded, scientists make claims based on the answers they found to the questions they were investigating. They analyze and organize data and look for patterns or connections that can provide the evidence they need to support their claims. The next step is to explain **how** the evidence supports their claim.

Using a claims, evidence, and reasoning (CER) approach teaches learners how to organize information logically, the way scientists do. It also helps them understand how to support an explanation by using relevant data. Moreover, making the connections between their claims and evidence develops reasoning skills that lead to successful argumentation in science and in any other core discipline.

MATERIALS

Each team member needs:

- science notebook
- pencil

Each team needs:

- digital access to (or paper copy of) the CER chart

Teacher needs:

- digital access to (or paper copy of) the CER Chart

SETUP

- Prepare to project the CER Chart.
- Give teams digital access to the CER Chart or a paper copy (1 per team).

SAFETY

There are no safety issues.

DAILY OBSERVATIONS

Today is the last day for seed-germination observations.

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PROCEDURE

Engage

1. Announce that today teams will make their final observations on their seed germinations.
2. Remind them that in their investigations they were observing how the amount of water the seeds received affected germination. The amount of water they added represented the amount of rainfall the seeds might receive in a natural environment.
3. After recording their last observations, explain that each team will make a **claim** about the results of their investigation. Explain that claims are statements that they (as scientists) make about what they believe is true. Their claim will be based on the changes they have observed over the last 5 days.
4. They will use **evidence** in the form of data (information) to support their claims. The evidence they use will be factual knowledge from their readings in their inquiry circles and data they collected from their science investigations that backs up their claim. Then they will think about and explain **how** the evidence supports their claim (**reasoning**).
5. Explain that making evidence-based claims is an important part of being a scientist because other scientists expect them to say things that are true and can be proven. Add that evidence-based claims are different from statements that may be their opinion or something they *think* about a topic.

Explore

1. Project and give teams digital access to the CER Chart (or ask the Equipment Directors to collect one paper copy of the CER Chart for their team). Direct learners' attention to the CER Chart and explain that **CER** stands for **C**laim, **E**vidence, and **R**easoning, the information they will work together as a team to provide.
2. Read through the CER Chart with the class, pointing out the information they need to include:
    - the **claim**, or statement, of what they believe is true, that answers the question
    - the factual **evidence** (data or information) that supports their claim
    - the **reasoning** that explains **how** the evidence supports the claim
3. Advise them to take time to discuss how to best provide the information asked for on the CER chart. Let them know that they may or may not agree on what claim or information they will provide. Remind them to listen respectfully to each other's ideas and to come to their decisions as a team.
4. As teams work, move between them and listen for the reasoning behind the claims they are making and the evidence they are choosing, but refrain from making any corrections. Also, listen carefully for any learner misconceptions and note which teams may need support.
5. If there is a dispute over the claim or evidence, remind them that scientists don't always agree and that they should respectfully consider all ideas until they have the evidence that proves otherwise. (If, after a team discussion, there is deadlock, you can offer the option of allowing team members to develop their own claim as long as they can support it with evidence.)

Explain

1. When time is up for writing the claims, ask the Data Scientists to share their team's completed work. Use open-ended questions to prompt discussions for clarification, such as *Can you explain or describe again*….? *How did you decide which data to use*? Invite the other team members to ask questions as well.
2. After discussion, congratulate the teams for their investigative work let them know you will review their CER Charts.

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Elaborate

1. Remind the class that they began this study by learning what inherited traits and acquired traits are. In their science investigations, they observed how an inherited trait can be changed in response to its environment. In this case, they observed how seed germination is affected by the amount of water (or rainfall) the seed receives.
2. Let them know that for the next two days, they will work on a culminating project for this unit that will be announced in the next class. Today they supported their claims with evidence from the science investigation, and they may have also included evidence from their reading in their inquiry circles. As part of their final project, they will use information from their investigations AND from their text-based inquiry.

Evaluate

1. Review the CER Charts. Did learners communicate (in their statements or as they worked) a reasonable understanding of how to make a claim, provide factual evidence to support their claim, and give a reasonable explanation of how the evidence supports their claim?
2. Note learner progress in using the CER format—does learners' work demonstrate increasing proficiency? What supports do learners need?
3. Are learners using new science language correctly in their verbal and/or written communications?

Science Language

- A **claim** is a statement of what you think is true based on observations and evidence.
- **Evidence** is data collected from the investigation that supports (backs up) explanations and answers.
- **Reasoning** means thinking about and explaining **how** the evidence supports a claim.
- **Data** are facts and information (such as images, words, and measurements) collected during an investigation.

Expanded Standards

Reading TEKS

4.13G: Develop a bibliography.

CCSS

W.4.8: Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

NGSS

4-ESS2-2: Analyze and interpret data to make sense of phenomena using logical reasoning. **4-LS1-1:** Construct an argument with evidence, data, and/or a model.

Science TEKS

2018–19: 4.2F: Communicate valid, oral, and written results supported by data.

2024–25: 4.1E: Collect observations and measurements as evidence. **4.3B:** Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

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