ALL for Science™
Authentic Literacy and Language for Science

Baylor College of Medicine
CENTER FOR EDUCATIONAL OUTREACH

DAY 13: MAKING CONNECTIONS

MINI-LESSON

The class combines synthesis statements about all the individual animals into a single synthesis statement that applies to all organisms.

SCIENCE INQUIRY CIRCLES

The class continues to work on combining synthesis statements into a single synthesis statement that applies to all organisms.

GUIDED SCIENCE INVESTIGATIONS

Teams share their caterpillar growth chart with each other to compare and draw conclusions about caterpillar growth.

ABBREVIATED STANDARDS

- Reading TEKS: 2(b)(6)(H)
- CCSS: W.2.2, SL.2.2
- NGSS: 2-LS4-1
- Science TEKS: 2.2(B), 2.3(A)(B), 2.5(A)(B)(C)

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Day 13: Making Connections

Literacy Strategy: Teams will synthesize information about all of the animals investigated in this unit

Science Concept: Analyzing data can give scientists information about recurring patterns that can help explain phenomena.

Science and Literacy Connection: After concluding research and investigations, scientists synthesize all of the information or data in a manner that will make sense to others who may look at it.

Mini-Lesson (15 minutes)

OVERVIEW

On this third day of practicing the strategy of synthesizing, inquiry circle teams will combine all previously written synthesis statements about their individual organisms into a single synthesis statement that applies to all organisms.

The whole-class discussion and synthesis review may take longer than the 15 minutes allotted in the mini-lesson. You may also need additional time today to have learners finish their own synthesis statements before you facilitate the whole-class synthesis. Therefore, we suggest you use this time in a way that best meets the needs of your class.

MATERIALS

Teacher needs:

- chart paper
- marker(s)
- class Inquiry Chart
- team synthesis statements from previous class

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 continue using the strategy "synthesizing information" you have been learning to create one synthesis statement about all the animals you researched. Remember that synthesizing is combining information from all of the sources we've used to create our own, new information.* (Refer to the "Synthesizing" anchor chart and remind the learners about the synthesis statement that each team wrote yesterday.)

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

1. *As a strategic reader, I synthesize when I combine information from different books, online resources, experts, and videos. Synthesizing helps me to organize and see things in a new way.*

Tell how to employ the strategy (procedural knowledge)

1. *Yesterday we organized information from your team Inquiry Charts to make a synthesis statement about each team's animal. Today you will use the same basic strategy to combine the synthesis statements about all your organisms into one statement.*
2. (Review the strategy and point out the steps on the "Synthesizing" anchor chart.) *To write this synthesis statement, the first thing we do is look at the synthesis statements from each team* and think about what is important from each statement. (These synthesis statements should be posted by the teacher where they can be seen by all.)
3. *Then we compare and contrast the important information from each of the statements. Ask yourself, How are they the same or how are they different?*
4. *Using this information, think about what can be added from your own statement that the others did not mention.*
5. *Finally, combine all the information together to write one synthesis statement.*
6. *As you write the synthesis statement, remember the concepts this unit has focused on:*
    - *Organisms have physical characteristics that help them survive. (What are the physical characteristics of your organism that helps it survive?)*
    - *Organisms go through life cycle stages.*
    - *Some organisms go through unique life cycle stages (What stages or changes does your organism go through as it grows?)*

    The synthesis statement you will write about all your organisms during inquiry circles should incorporate all of these concepts.
7. *When you have finished your synthesis statement the Data scientist will write it on a large sheet of chart paper. We will display them tomorrow.*

Science Inquiry Circles (30 minutes)

OVERVIEW

Today learners will work as a class with the teacher's guidance to create a synthesis statement for all organisms.

MATERIALS

Each team needs:

- team Inquiry Chart
- marker(s)
- team synthesis statements from previous class
- chart paper

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 their team's Inquiry Chart.) *Today **we will work as a whole class** to develop a synthesis statement about all organisms*.
2. *Each team will place the synthesis statement you wrote for your individual organisms on the board.* (Invite the Data Scientists from each group to come up to tape or affix their team's synthesis statement to the board for all learners to see.)

During Inquiry Circles (20 minutes)

1. *Now that all statements have been placed on the board, we can use the anchor chart to help us write a synthesis statement for all organisms. What should we do first?* (Hopefully they will say something like about *looking at everyone's statement and thinking about what was important from each source/team*. Take this time to read all team synthesis statements aloud.)
2. *What should we do now that we have read all of the synthesis statements?* (Learners should respond with something about *comparing and contrasting the important information and thinking about how the information is the same or different*. You may help learners find the similarities and differences by underlining similarities in one color and differences in a different color. If a statement is both similar to one team and different from another, use a double underline—one of each color—to show this.
3. *Using the information we have, think about what can be added from your own schema that we have not mentioned.* (Give learners a few moments to think, then allow them to share and write any relevant additional information on the board.)
4. *As a class, we will now write a synthesis statement for all the organisms. Remember the concepts this unit has focused on*:
    - *Organisms have physical characteristics that help them survive. (What are the physical characteristics of your organism that helps it survive?)*
    - *Organisms go through life cycle stages.*
    - *Some organisms go through unique life cycle stages (What stages or changes does your organism go through as it grows?)*
5. (Give learners time to discuss as a class. As they offer their ideas, write them on the white board or chart paper for all to see. Accept all responses. The teacher can guide the discussion toward refining their ideas into one statement. An example of a possible statement might be, *Organisms have different life cycles, but all organisms look like their parents because parents pass down their physical traits to their offspring. These traits help organisms survive.*)
6. (Once the class has created a synthesis statement for all organisms, ask the Data Scientists to write the statement on a piece of paper. The teacher will the copy these statements onto a piece of chart paper or poster board to hang near the "Synthesis" anchor chart for all learners to refer to.

After Inquiry Circles (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 circles about today's results.
3. (After you have allowed the teams to gather their thoughts, have the Data Scientists share with the class.

4. (After all learners 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, 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 learners can easily access them.)

Guided Science Investigation (30–45 minutes)

OVERVIEW

Teams will share the measurements on their Team Caterpillar Growth Chart with each other to compare and draw conclusions about caterpillar growth.

GUIDING QUESTIONS

How are the team growth charts similar? How are they different? What patterns do you see on the growth charts?

BACKGROUND INFORMATION FOR THE TEACHER

Sharing team data with other teams helps enhance learners' understanding of similarities and differences in investigations. This is an opportunity for learners to look at data in a new way and embody the role of a scientist.

In this activity, the Team Caterpillar Growth Charts will be placed on desks throughout the room and team members will conduct a "gallery walk" to make their observations. The teacher's role during this gallery walk is to facilitate conversations among learners and encourage the use of science language.

MATERIALS

Each team member needs:

- Butterfly Investigation Journal
- pencil
- paper

Each team needs:

- Team Caterpillar Growth Chart

SETUP

- Ask each team to turn in their Team Caterpillar Growth Charts.
- Place the Team Caterpillar Growth Charts around the room, leaving space for learners to walk from one chart to the next.

SAFETY

- Caution children about the appropriate way to move between desk or tables for gallery walk.
- 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 organisms (whether they are in the larva, pupa, or adult stage), take measurements of the larvae (if applicable), and record their observations in their science notebooks. Facilitate team discussions by asking questions, such as, *What did you notice? What has changed since the last time you observed your organisms?*

PROCEDURE

Engage

1. Gather the class around the growth habitats. Ask them to describe the biggest changes they have seen in the larvae. (Growth?) Accept all responses. **NOTE:** It is possible the chrysalises have formed already; teams can still discuss the growth of their caterpillars.
2. Bring the discussion around to the measurements teams have been recording. Explain that the measurements they have collected are called "data" by scientists. Scientists use data to help them explain and support their ideas.
3. Tell learners that they have been adding measurements to their growth charts every day. This has helped them to understand how much the larvae are growing. And, just like scientists, they use the charts to organize the data (measurements) they have collected.
4. Remind learners that teamwork is important—scientists cannot work alone; they work with other scientists and community members by sharing their information and results.
5. Sometimes scientists use poster sessions at meetings to share their results. These poster sessions are a type of gallery walk.

Explore

1. Tell the teams that they will take part in a gallery walk to observe and compare each other's growth charts.
2. Ask learners to write down what they notice about the charts. Possible observations could include how all of the charts show that the caterpillars grew bigger, how one team's chart showed that their caterpillar grew faster than another team's chart, how one team's caterpillar did not grow as big as another team's, etc.
3. Provide learners with sentence stems they can use when recording their notes. Write the possible sentence stems on the white board as you read them aloud. Include,
    - "I noticed . . ."
    - "This is different because . . ."
    - "I can conclude that this team's caterpillar . . . "
    - "These results show . . . "

    If necessary, model or "think-aloud" how to record your observations.
4. As teams move around the room from chart to chart, facilitate by asking questions, such as, *What do you notice? How is this chart the same as another team's chart? How is it different?*

Explain

1. After learners have completed their gallery walk, have them return to a whole-class setting to discuss their observations.
2. Begin a discussion with questions, such as, *Did you notice a pattern in all of the charts? Why is the length of yarn increasing each day? Did you notice anything different about some of the*

charts? Was there a particular day that each team saw a big jump in growth? What can you conclude?

3. Remind the class of what they have learned about caterpillars. *What is it they do every day?* (Eat.) *Why is eating so important to them?* (Caterpillars need to eat a lot to grow and develop. The food they eat stores the energy they need to transform into butterflies and also to fly long distances.)

Elaborate

1. Ask learners questions that encourage their predictions, such as, *How would the growth charts look different if the caterpillars didn't have enough to eat? What would have happened to your measurements if the caterpillars had remained in the larva stage for a few more days?*
2. Ask learners why it might be easier to understand data on a chart rather than just reading about it. (It's easier to see; you can see a pattern, etc.)
3. Explain that scientists use charts and graphs all the time to understand , or analyze, their data just like they did!

Evaluate

1. Did learners make good observations and comparisons about the data on the charts?
2. Did learners describe any patterns they observed?
3. Did learners use science language in their communications (written or oral)?

Science Language

- **Analyze** means to carefully examine details or specific information.
- **Data** are facts and information (such as images, words, and measurements) collected during an investigation.
- We use rulers, yardsticks, scales, and other tools to **measure** the size, weight, or amount of something.

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: **(H)** synthesize information to create new understanding.

CCSS

W.2.2 Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section; **SL.2.2** Recount or describe key ideas or details from a text read aloud or information presented orally or through media.

NGSS

2-LS4-1 Science & Engineering: Planning & Carrying Out Investigations -Make observations (firsthand or from media) to collect data that can be used to make comparisons.

Science TEKS

2.2 Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to: **(B)** analyze data by identifying significant features and patterns; **2.3** Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to: **(A)** develop explanations and propose solutions supported by data and models; **(B)** communicate explanations and solutions individually and collaboratively in a variety of settings and formats. **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; **(B)** investigate and predict cause-and-effect relationships in science; **(C)** measure and describe the properties of objects in terms of size and quantity.