ALL for Science™
Authentic Literacy and Language for Science

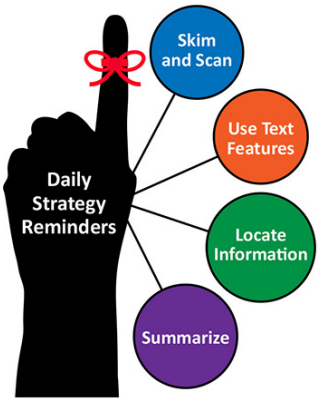
Baylor College of Medicine
DEPARTMENT OF EDUCATION, INNOVATION & TECHNOLOGY
CENTER FOR EDUCATIONAL OUTREACH

Day 6: Setting Up Learner Investigations

Mini-lesson	Children learn how to determine what the main idea of a section of text is as they read.
Inquiry Circles	Learners continue their research on ecosystems, answering new questions or finding additional information from different resources.
Guided Science Investigation	Learners set up their investigations, make their first observations, and document their first data.

Literacy Strategy: practice identifying the main idea	**Reading TEKS** ELA.3.6G	**CCSS** RL.3.2
Science Concept: designing and carrying out investigations is part of the process scientists use to find answers to their questions.	**Science TEKS** **2018–19:** 3.2A, 3.2B **2024–25:** 3.1B, 3.1E	**NGSS** 5-ETS1-3
Science and Literacy Connection: When authors don't tell us what the main idea of the text is, we must pay close attention to the important details. As scientists, we must pay close attention to every detail when designing and carrying out investigations.		

Mini-Lesson (15 minutes)



OVERVIEW

When scientists research a topic, they must decide what is the most important part of what they read. When we do this, we are determining the main idea.

Note: You are encouraged to create the "Main Idea" 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 (pond ecosystem)
- "Main Idea" anchor chart as a model
- exploratory text about pond ecosystems to model the strategy

PROCEDURE

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

Tell what the strategy is (declarative knowledge)

1. *Today we will practice determining the main idea of a section as we read about pond ecosystems. The main idea is the most important thing the author wants us to know about their topic. Getting the main idea is sometimes called "getting the gist" of a what we are reading.*

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

1. *Sometimes authors tell us the main idea. Usually they do that in the first or last sentence of a section. But, they don't always do that. Sometimes, they leave out the main idea and make us (as readers) work to figure it out. As a strategic reader, I will do this after each paragraph or section in the text I am reading. I do this because it makes my reading clear and helps me remember what I read.*

Tell how to use the strategy (procedural knowledge)

1. *The first thing I need to do is think about the topic (pond ecosystems) and what I already know about the topic.* (This could be information from inquiry circle time or during the scientific investigations).
2. *Now, I will draw a conclusion about what the author wants me to know about pond ecosystems—that is, I'll take what I already know about the topic and then I'll combine that with the most important details the author is telling me."* (Model this for learners while reading a section of from a text about ponds).
3. *Now, I have to put all these things together to get the main idea. I will think, "What would the author tell me was the most important idea from the reading if he or she were standing here next to me?"*
4. *I will put the main idea in my own words and record it on the Inquiry Chart.* (Use the class Inquiry Chart as a model.)

Science Inquiry Circles (30 minutes)

OVERVIEW

Work continues on team Inquiry Charts as children add additional information from a different resource, such as a book, website, or eBook.

MATERIALS

Each team needs:

- team Inquiry Chart
- pencils
- exploratory texts/media (see the "Ecosystem Resources" spreadsheet for ideas)

Teacher needs:

- class Inquiry Chart (pond ecosystem)
- exploratory text, website, or eBook about pond ecosystems to model the strategy

PROCEDURE

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

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. *Yesterday, some of you completed an entire column and others started to answer questions in a new column*. (This may or may not be true for your class. Please adjust as needed.) *Today you will answer more questions or add additional information from a different resource, such as a book, website, or eBook.* (Use another resource about pond ecosystems to model on the class Inquiry Chart how to record the source in a new row.)
3. *Now, inquiry teams will work together on their Inquiry Charts.* (Be sure to display the class Inquiry Chart as a model.)

During Inquiry Circles (20 minutes)

1. *As you add new information or answer a new question, it is important to record your resources on the Inquiry Chart as you complete it.* (Remind learners that the pond Inquiry Chart is visible as a guide. Also, you may choose to be more explicit for your class and only allow them to answer one question at a time daily. Use your judgement on the level of guidance.)
2. *Remember, we have anchor charts to help guide your thinking. Do not forget to use them while in teams***.** (Refer to all the mini-lesson anchor charts used to date, which should be posted in the classroom where learners can easily refer to them. Remind learners that they can use any of the reading strategies during inquiry circles.)
3. *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, walk around the room to facilitate as needed.)

After Inquiry Circles (10 minutes)

1. *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. What did the team learn about its ecosystem? Did team members determine the main idea while reading a section? What problems did the team encounter? How did the team resolve those problems?*
2. *The Data Scientist will now share with the entire class either something the team learned about their organism, which reading strategy they used, or how the team solved a problem.* (Try to encourage teams to share a variety of things. You do not want just facts about ecosystems, just

reading strategies, or just cooperative learning strategies. If you saw a great example in action, encourage that team to share with the entire class.)

Guided Science Investigation (30–45 minutes)

OVERVIEW

Today learners set up their investigations, make their first observations, and document their first data.

GUIDING QUESTIONS

How will we set up our investigations? What job will each team member have?

BACKGROUND INFORMATION FOR THE TEACHER

Designing and carrying out investigations is part of the process scientists use to find answers to their questions. Many times, investigations raise new questions for scientists to consider, or they may find that the data they collect cannot be used as evidence that supports their answers so that they have to rethink their planned investigation.

MATERIALS

Each team member needs:

- science notebook
- pencil

Each team needs:

- 2 small bottles of the green substance **(prepared ahead of time by the teacher)**
- Sharpie or black marker
- a numbered team box or tray containing goggles and materials requested by the team, etc. **(prepared ahead of time by the teacher)**
- "Safety Rules for the Investigation" sheet
- Team Data Log

Teacher needs:

- funnels
- 1 or 2 liter containers of the green substance
- small plastic bottles (2 per team)*
- markers
- goggles
- measuring or observation tools (hand lenses, measuring tape or rulers, etc.)
- any materials requested by the teams for their investigation
- "Safety Rules for the Investigation" sheet

***Note:** If using small drinking water bottles, they should be clean or new. Alternatively, there are small bottles available from Algae Research Supply.

SETUP

Before the class:

- Prepare boxes or trays for each team. The box should include goggles and the materials requested by the team. **Each team should have already indicated on their Team Data Log what they need for their investigation!** Write the team number on the box or tray (#1, #2, etc.).
- Teacher should fill **2 small bottles per team** with a minimum of 88mL (3 oz.) each of the green substance from the liter bottle(s) to prepare for distribution.
- Use a funnel to transfer 88mL (3 oz.) of the green substance into each bottle. This should be plenty for the investigation and it will leave some available in case it is needed. If the class is small, you may choose to give them more of the green substance in each bottle.
- Make copies of the "Safety Rules for the Investigation" sheet (1 per team).
- Teacher should consider which teams may need more guidance in setting up investigations.

SAFETY

Instruct the class on the proper way to handle their bottles of the green substance (see lesson). Keep paper towels handy for spills.

DAILY OBSERVATIONS

Today children will make their first observations of the green substance and record this in their Team Data Log. They will continue to document their observations daily through Day 13. Observations can be made any time of the day as long as they are done daily. Observations should take 5–10 minutes, depending on the data each team is collecting.

PROCEDURE

Engage

1. Announce, *Today, you will set up your own investigations and receive your bottles of the green substance! Remember, you are working as a team and each of you has a role.* (This is a good time to review those roles.)
2. Before you distribute the bottles, read the "Safety Rules for the Investigation" sheet with the class to make sure they understand the correct way to handle their samples.
3. Emphasize and model: **Sample bottles should be shaken with the cap securely closed, several times every day. After shaking, open the cap on the bottles and leave on loosely (but don't forget to tighten the caps the next time you shake the bottles!)**
4. The **Lab Director** should make sure the team is always following the safety instructions for handling the samples.
5. Point out where the materials/equipment are for their use. Remind them of the team number you have assigned them and instruct them to use that same numbered box (or tray) throughout the investigation.
6. Distribute the Team Data Logs. Remind the **Data Scientist** and **Equipment Director** to review it and make sure the team has all the equipment needed to set up their investigation.
7. Tell learners that you will be talking with each team to decide on the best location in the classroom for placing their investigations and to answer any questions that may arise.
8. Instruct the **Equipment Directors** to label their bottles with the team number you assigned them; also instruct them to label one bottle **"control"** (no changes) and the other bottle **"variable"** (changes). Learners can write directly on the bottles with Sharpies or markers.
9. **Inform learners that they will each need to write a description of their initial setup in their science notebooks and then make their first observations of the green substance on their**

Team Data Log. Remind them to date their entries! The **Lead Scientist** should check to make sure this is done.

10. Encourage them to record in their science notebooks any questions they may have about their observations.

Explore

1. Ask the **Equipment Directors** to collect the containers of the green substance for their team.
2. As the teams work to organize and set up their investigations, move between them to offer help or guidance as needed.
3. **Every team may have a different setup, so the teacher will need to provide the appropriate location for their investigations.**
4. **Allow as much time as needed for the children to set up their investigations!**

Explain

1. As children work to set up their investigations, ask them to explain what they are each doing (this should reinforce that each team member has a role).
2. Ask, *Can you explain your overall plan?* Reiterating their ideas may ensure that they are not leaving out any parts, and it gives them an opportunity to ask questions and reflect on their own reasoning.
3. The teacher can offer prompts through open-ended questioning (e.g., *What made you decide to…?* or *What do you expect will happen if…?*)
4. When all investigations have been set up, ask the **Lab Directors** to make sure the remaining materials have been put away and their areas are clean.
5. **Remind learners that they will use the Team Data Log to record information for a total of 8 days, beginning today**.

Elaborate

1. Share with learners, *Scientists often have to change their thinking about their investigations. Sometimes new questions come up or something unexpected happens and they have to rethink their plans. Science investigations may be changed and repeated many times.*
2. Inform the teams that they will have the opportunity to reconsider or modify their questions and data collection **only** in the next 2 days (to allow for enough observations) but that it must be approved by the teacher!

Evaluate

1. Did the teams label their containers “control” and “variable” and include the team number on each bottle?
2. Did the teams follow safety instructions for handling the cultures?
3. Did all learners write about their initial setup in their science notebooks?
4. Did the Data Scientists record and date their team’s first observations of the green substance on the Team Data Log?
5. Was each team member able to explain his or her role as they set up the investigation?
6. Are learners using science language in their communications?

Science Language

- A **testable question** is connected to a specific science concept and can be answered through an investigation or experiment.
- A **science investigation** is a plan for finding answers to questions and solving problems.
- **Evidence** is data collected from the investigation that supports (backs up) explanations and answers.
- **Data** are facts and information (such as images, words, and measurements) collected during an investigation.
- A **scientific variable** is something (a factor or condition) that can change or potentially change in a science investigation.
- In a science investigation, a **control** is a variable that remains unchanged or unaffected by other variables.

Expanded Standards

Reading TEKS

ELA.3.6G: 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

RL.3.2: determine the main idea of a text; recount the key details and explain how they support the main idea.

NGSS

5-ETS1-3: plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.

Science TEKS

2018–19: 3.2A: plan and implement descriptive investigations, including asking and answering questions, making inferences, and selecting and using equipment or technology needed, to solve a specific problem in the natural world. **3.2B:** collect and record data by observing and measuring using the metric system and recognize differences between observed and measured data.

2024–25: 3.1B: use scientific practices to plan and conduct simple descriptive scientific investigations and use engineering practices to design solutions to problems. **3.1E:** collect observations and measurements as evidence.