DAY 12 What Is Algae?		
Reading Strategy: Fix-Up Strategies	**Science Concept:** Algae are a diverse group of organisms that can be found both in marine and freshwater systems. They are capable of photosynthesis and have an important role as producers in aquatic food chains.	
Reading TEKS: 3.6 I	**ELPS:** Speaking K-12, 19 TAC 74.4(c)(4)	**Science TEKS:** 3(b)10A
Materials for Reading Mini Lesson: Chart paper, markers, pond ecosystem inquiry chart, pond text to model strategy		
Materials for Inquiry Circle Groups: Group inquiry charts, pencils, variety of nonfiction texts for each group, access to websites and online books		
Materials for Science Whole Group Lesson: See Lesson		
Content Vocabulary: **Plankton-** tiny and microscopic plants and animals that float freely in bodies of water. These organisms form the base of aquatic food chains. **Phytoplankton**- the single-celled organisms in the plankton community that are capable of making their own food. They are the primary producers in aquatic systems. **Zooplankton**- tiny animals in the plankton community that spend all or part of their lives drifting in aquatic environments. Some of them are larva that may grow up to become larger animals. **Larva**- an immature form of an animal that changes, like a tadpole **Algae**- a phytoplankton capable of making its own food using energy from the sun. It is a primary producer. **Diatoms**- a major group of microalgae. They are the only organisms with a cell wall made of transparent silica. **Silica**- a common mineral found on Earth made up of silicon and oxygen **Micron** – standard of measurement used to measure microscopic things		
Science and Literacy Connection: Scientists use different strategies for making sense of complex research text or data collected from investigations.		

For an expanded version of the Standards listed above, see page ___.

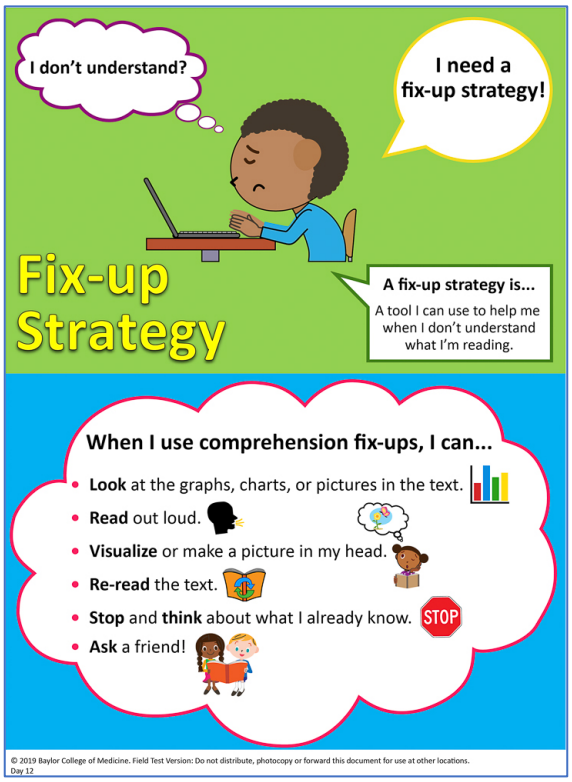
Reading Mini-lesson — 15 minutes

OVERVIEW

Whether reading a research text or trying to make sense of the data collected from an investigation, a scientist uses many strategies to make sure they understand what they are reading or observing.
As a student, I can use fix-up stratgies when I don't understand what I am reading.

Explain the strategy below as follows.

- **Tell what the strategy is (declarative knowledge)**
  - Say something like, "Today we will practice using comprehension fix-up strategies when we read. A comprehension fix-up strategy is a tool we use when we don't understand what we read."
- **Tell when and why to use the strategy (conditional knowledge)**
  - Say something like, "I use a comprehension fix up strategy when I am reading and I encounter a problem that causes me to not understand what I read. Sometimes when I am reading, I forget what I just read. Sometimes I am interrupted or distracted while reading. And, sometimes, the text is just too hard! When this happens, I use comprehension fix-up strategies because I am a strategic reader."
- **Tell how to employ the strategy (procedural knowledge)**
  While you model the strategy, you might want to say something like this to the readers:
  - Yesterday we learned how to monitor our comprehension. Remember, I use metacognition to listen to myself and talk to myself as I read to be sure everything makes sense! (Refer to the "Monitoring Comprehension" anchor chart.)
  - If I do not understand something that I read (because I was distracted, there was too much noise around me, or something else went wrong), then I need to use a comprehension fix-up strategy."
  - There are several comprehension fix-up strategies that I can use. But first, I have to recognize that something has gone wrong in my reading. I know something has gone wrong when I read and I think, 'What in the world did I just read?' Once I recognize that I'm not understanding, then there are a few things I can do to fix it. Some of them are:
    - I can look at the graphs, charts, and pictures in the text.
    - I can read out loud.
    - I can visualize or create a picture in my head.
    - I can re-read the text.
    - I can stop and think about what I already know.
    - I can ask someone in my inquiry circle.



Practice in text (print, video, or interview)
Post the anchor chart in your classroom so students can refer to it while in their inquiry circles. Encourage scientists to use the strategy during in their Inquiry Circles.

Inquiry Circle Groups — 30 minutes

OVERVIEW
Scientists work in teams when conducting research and investigations. Each day of this unit, students will work in inquiry circle groups while embodying the role of a scientist. They will do so by taking on roles of scientists in research by speaking like a scientist, reading like a scientist, and writing like a scientist.

PROCEDURE
Before Inquiry Circle Groups — 5 minutes
You might want to say something like this to the readers:

- It is time to get into our inquiry circle groups. You will be with the same research team as yesterday.
- When we research ecosystems, we will practice our roles as scientists. We will do this because scientists have a special way in which they observe the world, read scientific texts, and write reports. There is no better way to learn about science than to become a scientist!

During Inquiry Circle Groups — 20 minutes
You might want to say something like this to the readers:

- We have anchor charts to help guide your thinking. Do not forget to use them while in groups. (Refer to the "Tools of Inquiry" anchor chart and the daily anchor chart. Remind students that they can use all the reading strategies taught, not just the one for that day.)
- My role is to help guide the inquiry circle groups, but I expect you to work as a scientific team to solve your problems together.
- Do not forget to answer your research questions and record it on the inquiry chart. It is important to record your sources on the inquiry chart as you complete it. (Be sure to explicitly explain how students should use the chart.)

(While groups are working together, walk around the room to facilitate as needed.)

After Inquiry Circle Groups — 5 minutes
You might want to say something like this to the readers:

- As we are concluding our inquiry circle groups for today, each group will have a chance to share what they accomplished and learned.
- The Lab Director should lead the discussion with their inquiry circle group about today's results. For example, what did you learn about your ecosystem? Which reading strategies did you use? What problems did you encounter? How did you resolve those problems?
- The Data Scientist will now share with the entire class either something the group learned about their ecosystem, which reading strategy(ies) were used, or how the group solved a problem.

Science Whole Group Lesson — 30-45 minutes

OVERVIEW

Students will view slides/images of different types of algae to gain a better understanding of the diversity of organisms in this group. Then they will observe their own green substance under the microscope to compare.

Note: The identity of the green substance has not been revealed to this point. It is hoped that by the end of this lesson the students will discover on their own that their samples are indeed algae!

GUIDING QUESTIONS

Are all algae the same? How many different kinds of algae are there?

BACKGROUND INFORMATION

All algae are a type of phytoplankton (members of the plankton community) that contain chlorophyll to capture the sun's energy. However, these plant-like organisms do not have true roots, stems, or vascular tissue. They belong to the kingdom Protista. Scientists who specialize in the study of algae are called phycologists.

Algae are found almost everywhere on Earth and are important as the primary producers in aquatic food chains, feeding the smallest organisms like zooplankton to the biggest ones such as whales. They can also live in extreme environments like ice and hot springs!

Algae can range from microscopic single-celled size to more than 100 ft long! There are seven main groups of algae which include cyanobacteria (blue-green algae), green algae, brown algae (sargassum and giant kelp), and diatoms.

SAFETY

Review all safety measures for handling containers of green substance, and for handling of microscope.

MATERIALS

- What Does Algae Look Like? Pptx.
- Computer/projector
- Science notebooks
- Instructions for Using the Digital Microscope doc. (from Lesson 7)
- Containers of green substance
- Pipettes
- Petri dish
- Paper towels
- Images of Chlorella vulgaris algae
- Plastic bags for algae images

SET UP

- Prepare a station for viewing with the digital microscope and a computer

- Set up 1 pipette and 1 petri dish per team
- Place "Instructions for Using the Digital Microscope" doc. next to microscope.
- Print color images of the chlorella vulgaris algae (1 per team). Place in bags.
- Preview slideshow before the class
- Set up projector/computer
- Project the first slide for students to see as they walk into class

DAILY OBSERVATIONS

Students observe their samples and record data/information on data logs in their science notebooks.

PROCEDURE

Engage

1. Begin the class by directing their attention to the projected image on the screen.
2. Ask several volunteers to describe what they see, focusing on color, shape, etc.
3. Reveal that the image they are looking at shows a type of algae called diatoms. They are the only type of microalgae that has a cell wall made of transparent silica- looks glass-like. There are many other kinds of diatoms in amazing shapes. This slide has been stained blue so that the diatoms show up, otherwise it would be hard to see them.
4. Remind them that in the last lesson they learned that algae are the primary producers in aquatic ecosystems.
5. Algae is a type of phytoplankton, a member of the plankton community of microscopic organisms, so tiny that many cannot be seen without a microscope.
6. In fact, they have a special unit of measurement for microscopic things- it's called a micron (abbreviation for micrometer or a millionth of a meter!). Point out the symbol on the image.
7. To get an idea of how small 1 micron is, tell them that a human hair is about 60-75 microns across!
8. As you move through the slides, ask the students to write brief 2-3 word descriptions of the algae in their notebooks(EX: Slide 1- _____). Tell them you will discuss these later today.

Explore

9. After the slideshow, gather the class around the viewing station you have set up with the digital microscope.
10. Tell them that today since they are looking at microscopic images, they will have a chance to make a different type of observation on their green substance – looking at it under a microscope!
11. Let them know that you will be at the station to review the instructions for proper handling of the microscope and to help prepare a sample for viewing if needed.
12. Explain that while 1 team is at the microscope station looking at their investigation samples, the other teams will look over some digital photos of algae taken through a microscope.
    Note: the identity of their samples has not yet been revealed at this point. It is hoped that they will discover on their own that the samples are indeed algae by the end of this lesson!
13. All students should write down their observations and questions in the science notebooks for discussion later. Data Scientists should make sure their team is doing this!
14. Ask the Equipment Directors to collect a bag of images for their team (1 bag per team)
15. Have the first team come up and ask the Lead Scientist to walk them through the procedures for preparing a sample from their containers.
16. Allow up to 5 minutes max. for each team to make their observations at the microscope.

Explain

17. Ask students to share observations/questions about the different types of algae. (Listen for someone to ask if the model they built at the beginning of the unit is a diatom. You can tell them that the model was indeed a diatom *Stephanodiscus hantzschii)*.
18. You can calculate the size of the model in inches and microns! To calculate microns, multiply inches by 25, 400. (Ex: 5" diameter = 127.000)
    Note to teacher: one micron (micrometer) is 1000 x smaller than a millimeter; 1 micron= 0.001 mm; 1 mm = 1000 microns; 0.1 mm = 100 microns
19. What questions do they have about their own samples? (Does anyone ask or say that their samples are algae? Does anyone make the connection between one of the digital images and their sample?)

Elaborate

20. If they have not already made the discovery that their samples are algae, you may now announce that it is!
21. Ask: As the primary producers in aquatic food chains, where does algae get its energy from? (Accept all responses) From the sun! Algae live in the sunlight zone of aquatic systems: ponds, lakes, ocean, etc. Like land plants, they make their own food through photosynthesis.

Evaluate

22. Are student observations/questions more detailed and specific, communicating progress in their thinking?
23. Are all students engaged and working as a team?
24. Was a connection made between their samples and the algae images?
25. Did anyone correctly know where algae got its energy from?

Expanded Standards

Reading TEKS: 3.6I 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: (I) monitor comprehension and make adjustments such as re-reading, using background knowledge, asking questions, and annotating when understanding breaks down.

ELPS: Student Expectations for Speaking K-12, 19 TAC 74.4(c)(4) The student is expected to: (D) speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency; (E) share information in cooperative learning interactions.

Science TEKS: 3b2B: The student is expected to collect and record data by observing and measuring using the metric system and recognize differences between observed and measured data. 3b4: The student is expected to collect, record, and analyze information using tools, including cameras, computers, hand lenses, metric rulers, Celsius thermometers, wind vanes, rain gauges, pan balances, graduated cylinders, beakers, spring scales, hot plates, meter sticks, magnets, collecting nets, notebooks, and Sun, Earth, and Moon system models; timing devices; and materials to support observation of habitats of organisms such as terrariums and aquariums. 3b9B: The student is expected to identify and describe the flow of energy in a food chain and predict how changes in a food chain affect the ecosystem such as removal of frogs from a pond or bees from a field