Grade 5: Life Science Module

Lesson Sequence 11: Summative Assessment: Assess and Improve the Health of an Ecosystem

Lesson Sequence 11: Summative Assessment: Assess and Improve the Health of an Ecosystem

Overview

Total Time: 3.5 hours of instruction (divided into three sections)

In this final lesson sequence, students return to the Life Science Module guiding question to demonstrate their understanding of how to assess and improve the health of an ecosystem. They complete an on-demand summative assessment in which they assess the health of an ecosystem and defend their argument with evidence. Then, in groups, students complete a performance task where they create an explanatory model to suggest ways the health of an ecosystem can be improved.

Life Science Module Guiding Question and Big Ideas

How do we assess and improve the health of an ecosystem?

- An ecosystem's health can be assessed by looking at the interaction of abiotic and biotic features in the ecosystem and observing how effectively the matter and energy flow within the system.
- An ecosystem's health can be assessed by looking at how effectively the web of producers, consumers, and decomposers have their needs met and cycle energy and matter.
- An ecosystem can be made healthier by strengthening the web of producers, consumers, and decomposers. This can be done by increasing the biodiversity of the ecosystem without disrupting the balance or creating instability.

Long-Term Learning Addressed (Based on NGSS)

Develop an argument that the flow of matter and energy among the sun, plants, and animals indicates the health of an ecosystem. (Based on NGSS 5-LS2-1)

This lesson sequence explicitly addresses:

Science and Engineering Practices:

- **Developing and Using a Model:** Use models to describe and/or predict phenomena. *Students develop an explanatory model to demonstrate how their suggestion will improve the health of an ecosystem.*
- **Engaging in Argument:** Support an argument with evidence, data, or a model. *Students construct several arguments. They assess the health of a forest ecosystem and argue whether or not removing a species will affect the health of the forest. Then they assess and make suggestions to improve the health of another ecosystem and construct an argument to defend their suggestions.*

Crosscutting Concepts:

- **Systems and System Models:** A system can be described in terms of its components and their interactions. *Students construct arguments that explain how the components of an ecosystem will be affected by a change in the ecosystem.*
- **Energy and Matter:** Matter is transported into, out of, and within systems. *Students use a model to explain how matter will cycle through the ecosystem after their suggestions are implemented.*

- **Energy and Matter:** Energy can be transferred in various ways and between objects. *Students use a model to explain how energy will cycle through the ecosystem after their suggestions are implemented.*

Disciplinary Core Ideas:

- **LS2.A: Interdependent Relationships in Ecosystems:** A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. *Students support arguments with explanations about the interdependence of organisms.*
- **LS2.B: Cycles of Matter and Energy Transfer in Ecosystems:** Matter cycles between the air and soil and among organisms as they live and die. *Students use a model to explain how matter and energy will cycle through the ecosystem after their suggestions are implemented.*

Lesson Sequence Learning Targets

- I can assess the health of an ecosystem based on the flow of energy and matter throughout the ecosystem.
- I can create an argument to defend my assessment of the health of an ecosystem.
- I can make a model that explains how the health of an ecosystem can improve.

Ongoing Assessment

- Scientists Meeting: Making Meaning
- Student science notebook: Improving the Health of an Ecosystem entry
- Summative Assessment: Assessing a Forest Ecosystem
- Improving the Health of an Ecosystem Explanatory Model

Agenda

Total Time: 3.5 hours of instruction

Section 1

1. **Opening**
   A. Introducing Learning Targets (5 minutes)
2. **Evaluating and Communicating Information**
   A. Revisiting the Anchoring Phenomenon (15 minutes)
   B. Scientists Meeting: Making Meaning (20 minutes)

Section 2

1. **Engaging in Argument**
   A. Summative Assessment: Assessing a Forest Ecosystem (60 minutes)

Section 3

1. **Engineering Design Cycle**
   A. Introducing the Challenge (10 minutes)

   Optional Extension: Alternative Performance Task: Improving the Health of Our Local Schoolyard Ecosystem

   Optional Extension: Alternative Performance Task: Improving the Health of Another Local Ecosystem

B. Imagining: Improving the Health of a Schoolyard Ecosystem (10 minutes)

C. Planning: Suggestions for Improving the Health of a Schoolyard Ecosystem (10 minutes)

Optional Extension: Peer Critique: Three Suggestions for Improvement

D. Creating: Improving the Health of a Schoolyard Ecosystem Explanatory Model (15 minutes)

E. Praise, Question, Suggestion: Improving the Health of a Schoolyard Ecosystem Explanatory Model (15 minutes)

F. Revising: Improving the Health of a Schoolyard Ecosystem Explanatory Model (30 minutes)

G. Pair Share: Improving the Health of a Schoolyard Ecosystem Explanatory Model (10 minutes)

Optional Extension: Presentation to Authentic Audience

Optional Extension: Community Service

2. **Communicating Information**

A. Reflecting on Learning (10 minutes)

Teaching Notes

Purpose of lesson sequence and alignment to NGSS standards:

- In this lesson sequence, students demonstrate their understanding of what makes an ecosystem healthy by constructing two arguments. They support their arguments with explanations about interdependent relationships (a Disciplinary Core Idea) and the cycle of matter and/or energy (Disciplinary Core Idea).
- In Section 1, students revisit the anchoring phenomenon and view images of Olympic National Park used in Lesson Sequence 1. In a Scientists Meeting, they come to consensus about the criteria for a healthy ecosystem and whether or not Olympic National Park meets the criteria.
- In Section 2, students construct two arguments (a Science and Engineering Practice) for the summative assessment. In the first argument, they apply the criteria for a healthy ecosystem to assess the health of an ecosystem. The criteria include the cycle of matter and energy and the interdependence of organisms. In the second argument, they consider the interdependence of organisms and argue whether removing one organism will affect the health of the ecosystem.
- In Section 3 students use the Engineering Design Cycle to complete a performance task. They study a schoolyard ecosystem and give suggestions for ways to improve the health of the ecosystem. They then create an explanatory model (a Science and Engineering Practice) that predicts how those suggestions will improve the health of the ecosystem.

How it builds on previous work in the Life Science Module:

- In Lesson Sequence 1, students observed images of an ecosystem found in Olympic National Park in order to assess its health. Students return to that same slideshow in this lesson sequence. This time they should know the criteria for a healthy ecosystem and can decide which images provide evidence for how fully the ecosystem meets the criteria.

How it connects to the CCSS Standards and EL Education's Language Arts Grade 5 Module 2:

- In Language Arts Grade 5 Module 2, students are studying the rainforest. Students could study a specific region of the rainforest and assess how well the rainforest they study meets the criteria for a healthy ecosystem.
- The Scientists Meeting in Section 1 provides students the opportunity to practice their speaking and listening skills while collaborating in whole group discussions (CCSS ELA SL.5.1).
- The arguments that students construct in Section 2 provide them the opportunity to practice argument writing (CCSS ELA W.5.1).

Possible student misconceptions:

- Students may think that humans cannot improve ecosystems. In fact, humans affect—both intentionally and unintentionally—the ecosystems that are around them very much. Some scientists call humans an invasive species! Sometimes humans can improve the health and the stability of an ecosystem, and sometimes we can harm the health and stability of an ecosystem.

Possible broader connections:

- Connect to students' lives by discussing examples of how local ecosystems may have been changed through deforestation or invasive species.
- Connect to other sciences by discussing other times when students may have made predictions.

Areas where students may need additional support:

- Students may need additional support when working in groups for the performance task. Consider the norms and structures you have in place for supporting effective group collaboration.
- Depending on the performance task option chosen, students may need additional time to create a high-quality model.

Down the road:

- N/A

In advance:

- Read each section and complete the Preparing to Teach: Self-Coaching Guide.
- Prepare technology necessary to play the Assessing the Health of an Ecosystem slideshow (see supporting materials for Lesson Sequence 1).
- Pre-determine pairs or triads for the Engineering Design Cycle in Section 3.
- Review the Praise, Question, Suggestion protocol (see the Classroom Protocols pack on Curriculum.ELeducation.org).
- Post: Lesson sequence learning targets, Life Science Module guiding question, Criteria for Healthy Ecosystems anchor chart, Concepts Scientists Think About anchor chart, and Scientists Do These Things anchor chart.

Optional extensions:

- *Alternative Performance Task: Improving the Health of Our Schoolyard Ecosystem*: Students gather data about the health of their local schoolyard ecosystem and suggest ways it can be improved. Consider doing this in lieu of the performance task (see supporting materials).

- *Alternative Performance Task: Improving the Health of Another Local Ecosystem*: Students gather data about the health of a local park ecosystem (or other public space). They suggest ways it can be improved. Consider doing this in lieu of the performance task.
- *Peer Critique: Three Suggestions for Improvement*. Students give and receive feedback on their suggestions to improve the health of the ecosystem before they begin to develop a model to show the effect of the suggestions.
- *Presentation to Authentic Audience*: Students present their ideas about how to improve a local ecosystem to the school board, parent association, school faculty, neighborhood association, park and recreation board, or other appropriate audience.
- *Community Service*: Students implement their plan to improve the local ecosystem or the schoolyard ecosystem.

Vocabulary

- N/A

Materials

General Materials

- ☑ Student science notebook (from Lesson Sequence 1; one per student)
  - — Anchoring Phenomenon entry (from Lesson Sequence 1; page 2 of student science notebook)
  - — Improving the Health of an Ecosystem entry (page 46 of notebook)
- ☑ Assessing the Health of an Ecosystem slideshow (from Lesson Sequence 1)
- ☑ Criteria for Healthy Ecosystems anchor chart (begun in Lesson Sequence 1; see Lesson Sequence 10)
- ☑ Scientists Do These Things anchor chart (begun in Lesson Sequence 2; see Lesson Sequence 10)
- ☑ Summative Assessment: Assessing a Forest Ecosystem (one per student)
- ☑ Summative Assessment: Assessing a Forest Ecosystem graphic organizer (one per student)
- ☑ Concepts Scientists Think About anchor chart (begun in Lesson Sequence 2)
- ☑ Performance Task: Improving the Health of an Ecosystem (one per student and one to display)
- ☑ Alternative Performance Task: Improving the Health of Our Schoolyard Ecosystem (optional; one per student and one to display)
- ☑ Performance Task Rubric: Improving the Health of an Ecosystem (blank; one per student and one to display)
- ☑ Performance Task Rubric: Improving the Health of an Ecosystem (example, for teacher reference)
- ☑ Sticky notes (nine per student)

Science-Specific Materials (gathered by the teacher)

- ☑ Materials for Improving the Health of an Ecosystem Model (used in Section 3)
  - — Chart paper (one piece per student)
  - — Markers (one set per group)
- ☑ Timer (optional; used in Section 3)

Section 1: Opening

A. Introducing Learning Targets (5 minutes)

- Give students specific positive feedback regarding all the good work they have done as scientists in sharing and listening to ideas to learn about what makes a healthy ecosystem. (Example: "I saw you really thinking about the way that biotic and abiotic features interact in a healthy ecosystem.") (1)
- Tell students that they are going to be using all of their learning from the past few weeks to think about how an ecosystem can be improved.
- Direct students' attention to the posted Life Science Module guiding question and lesson sequence learning targets and select a volunteer to read them aloud:
  - "How do we assess and improve the health of an ecosystem?"
  - ***"I can assess the health of an ecosystem based on the flow of energy and matter throughout the ecosystem."***
  - ***"I can create an argument to defend my assessment of the health of an ecosystem."***
  - ***"I can make a model that explains how the health of an ecosystem can improve."***
- Underline the word *assess*.
- Remind students they have been thinking a lot about the criteria for a healthy ecosystem, and they will demonstrate their learning in this lesson sequence as they assess ecosystems and think about how an ecosystem works as a system.
- Underline the word *argument*.
- Remind students they have been learning a lot about making arguments and providing evidence for their thinking, and they will create an argument about the health of an ecosystem in this lesson sequence.
- Underline the word *model*.
- Remind students they have had lots of practice making models and they will now demonstrate their understanding of how to make a model that explains how an ecosystem can be improved.

Preparing to Teach: Self-Coaching Guide

1. In this lesson sequence, students will be assessed on the content and skills taught in this module. Are there any lingering misconceptions I need to address? Do students need additional practice with constructing arguments or developing models?

Section 1: Evaluating and Communicating Information

A. Revisiting the Anchoring Phenomenon (15 minutes)

- Invite students to take out their **student science notebooks**, open to the **Anchoring Phenomenon entry**, and find the Assessing Ecosystem Health chart.
- Tell students they will watch the **Assessing the Health of an Ecosystem slideshow** of Olympic National Park from Lesson Sequence 1. Since the beginning of the module, they have learned a lot about the criteria for a healthy ecosystem, and they can look for evidence to assess the health of the ecosystem in the slideshow (1).

- Direct students' attention to the **Criteria for Healthy Ecosystems anchor chart** and select a volunteer to read the anchor chart aloud.
- Tell students that as they view the slideshow this first time, they should focus on how well this ecosystem meets the criteria for a healthy ecosystem and record or revise any notes in the Assessing Ecosystem Health chart.
- Play the Assessing the Health of an Ecosystem slideshow.
- Ask students to turn and talk with an elbow partner [(2)]:

  "What evidence did you see that the ecosystem meets the criteria for a healthy ecosystem?" (Responses will vary, but may include that there are different organisms and each part of the food web is present, and there is evidence that matter and energy are cycling and that the abiotic and biotic features are interacting in an effective way.)

  "What evidence did you see that the ecosystem does not meet the criteria for a healthy ecosystem?" (Responses will vary, but may include that there is no evidence about population size and how fully each organism is getting its needs fully met. One species was recently introduced into the park.)

  "I used to think ____, but now I think ____." (Responses will vary.)

Preparing to Teach: Self-Coaching Guide

1. What do I hope my students will notice and name in the slideshow? What questions can I ask to help them? What slides will I specifically pause and discuss?
2. What responses will indicate a lingering misconception?

B. Scientists Meeting: Making Meaning (20 minutes)

- Ask students to bring their science notebooks and gather for a Scientists Meeting.
- Using a total participation technique, invite responses from the group:

  "What are the norms of a Scientists Meeting?" (take turns talking, build on one another's ideas, disagree respectfully, ask questions to clarify information)
- Remind students that a Scientists Meeting is a conversation where they speak to one another as scientists and not just to the teacher.
- Share with students that the goal of today's meeting is to make meaning from the information they have learned and to see if they have found an answer to their initial question [(1)].
- Cold call a student to name the Life Science Module guiding question that the class has been investigating.
  - "How do we assess and improve the health of an ecosystem?"
- Using a total participation technique, invite responses from the group:

  "How do we assess the health of an ecosystem? What are some things we look at for evidence?" (the abiotic and biotic, the organisms, and evidence of the cycle of energy and matter)
- Direct students' attention to the Criteria of Healthy Ecosystems anchor chart and review as necessary.
- Elicit student thinking about each of the criteria on the anchor chart, including the matter and energy cycles in an ecosystem. Consider asking [(2)]:

  "What things do you see cycling within a healthy ecosystem?" (matter—including air, water, and solid matter—and energy)

"What might happen if matter—like water, air, or animal and plant bodies—weren't cycling?" (plants couldn't do photosynthesis; animals wouldn't get the resources they need to survive)

"What might happen if energy didn't cycle through the ecosystem? (If energy didn't cycle, animals wouldn't get energy from the things they eat and plants wouldn't be able to photosynthesize.)

"What additional criteria do we look for?" (Responses will vary. Students may go into more detail on the cycle of matter and energy and cite biodiversity and a complete food web.)

"How fully does Olympic National Park meet the criteria?" (Responses will vary, but may include: Olympic National Park mostly meets the criteria. From the evidence in the slideshow, it seems there is a diversity of organisms getting their needs met and the abiotic and biotic features are working together to cycle matter and energy. However, there is at least one non-native species, and students don't know the population size of the organisms. More evidence is needed.)

- As students share, encourage them to use evidence from their student science notebooks and prompt them to see connections between one another's work:

  "Does anyone else think something similar?"

  "How are these ideas the same? How are they different?"

  "Can someone paraphrase what Student A said"?

  "Did anyone come to a different conclusion?"

  "Can you add to what Student A said?"

- After a few minutes of noticing and naming similarities, lead the class to consensus. Consider saying something like: "I'm seeing some patterns emerge. I think we're all agreeing and making meaning from the things we've learned around how to assess the health of an ecosystem."

- Ask students:

  "Can someone put what we've learned about healthy ecosystems into words?" (Responses will vary, but should include some version of the "big ideas" of the module.)

  "Can someone explain a rule for assessing the health of an ecosystem?" (Responses will vary, but should include some version of the "big ideas" of the module.)

  "How do we improve the health of an ecosystem?" (Responses will vary, but may include maintaining or improving the biodiversity of an ecosystem or helping the abiotic and biotic features interact in a balanced and stable way.)

- As students share out, encourage them to provide evidence for their ideas and to see connections between one another's work [(3)].

- After a few minutes, give students specific positive feedback for persevering in answering this guiding question and congratulate them on thinking deeply about ecosystems. Assure them they will get a chance to demonstrate their thinking on the summative assessment.

- Invite students to return to their seats.

Preparing to Teach: Self-Coaching Guide

1. If I documented the initial gathering ideas conversation in Lesson Sequence 1, now is a good time to show it to students so they can see their intellectual growth.

2. What am I looking for my students to articulate in this meeting?
3. What students do I want to be sure to draw into the discussion at this time since this will be a good "dress rehearsal" for the summative assessment?

Section 2: Engaging in Argument

A. Summative Assessment: Assessing a Forest Ecosystem (60 minutes)

- Direct students' attention to the **Scientist Do These Things anchor chart**. Tell students they have been working hard to develop the skills of a scientist and today they will demonstrate those skills on the summative assessment when they construct two arguments.
- Remind students of the steps for making an argument:
  - Preparing for the argument:
    1. Pose the question.
    2. Identify evidence that answers the question.
    3. Evaluate whether that evidence is good enough.
  - Making the argument:
    1. Make a claim (answer the question).
    2. Use the evidence and scientific reasoning to support the claim.
    3. Explain why the evidence is sufficient and relevant.
- Distribute the **Summative Assessment: Assessing a Forest Ecosystem** and the **Summative Assessment: Assessing a Forest Ecosystem graphic organizer** (1).
- Invite students to follow along, reading silently in their heads, as you read the directions to Part I of the summative assessment aloud.
- Ask students to give a quick thumbs-up, thumbs-down, or thumbs-sideways to show how well they understand their task in Part I. Answer clarifying questions.
- Remind students they can gather evidence from the picture of the ecosystem and the data chart on the summative assessment sheet, as well as their student science notebook.
- Ask students to give a quick thumbs-up, thumbs-down, thumbs-sideways about whether or not they have an idea about the evidence they will use. Note students who are unsure about what they will write and check in with them individually during the assessment to answer clarifying questions.
- Tell students they will use the space provided under Part I on the Summative Assessment: Assessing a Forest Ecosystem graphic organizer to help them organize their ideas before they write their argument (2).
- Tell students to begin working on Part 1.
- After 30 minutes, refocus whole group (3).
- Invite students to follow along, reading silently in their heads, as you read the directions to Part II of the summative assessment aloud.
- Ask students to give a quick thumbs-up, thumbs-down, or thumbs-sideways to show how well they understand their task in Part II. Answer clarifying questions.
- Remind students they can gather evidence from the picture of the ecosystem and the data chart on the summative assessment sheet, as well as their student science notebook.

- Tell students they will use the space provided under Part II on the Summative Assessment: Assessing a Forest Ecosystem graphic organizer to help them organize their ideas before they write their argument.
- Tell students to begin working on Part II.
- After 30 minutes, collect students' summative assessments.

Preparing to Teach: Self-Coaching Guide

1. What supports do I have in place for assessments?
2. What students would benefit from constructing this argument orally instead of in writing?
3. Will this be sufficient time for my students? If not, how much time will I give them?

Section 3: Engineering Design Cycle

A. Introducing the Challenge (10 minutes)

- Direct students' attention to the third lesson sequence learning target and read it aloud:

  — "I can make a model that explains how the health of an ecosystem can improve."
- Direct students' attention to the **Concepts Scientists Think About anchor chart**.
- Tell students they are going to use all that they have learned about energy and matter and how systems work as they think about the way to improve the health of an ecosystem.
- Lend authenticity to the task by saying something like: "In the last lesson sequence we learned about the reintroduction of wolves in Yellowstone National Park. Scientists did a great deal of research before they decided to reintroduce the wolves. Scientists studied all of the organisms, how they were behaving, what they needed in order to grow and survive effectively, and changes in populations. Then they studied the wolves' behavior, quantity of food, level of reproduction, and so on. The decisions scientists make to change something in the ecosystems are complex and well researched. You will be working as scientists today as you collect evidence on an ecosystem and think about how the components interact."
- Ask a student to read aloud the first and last bullet in the "Develop a Model" column of the **Scientists Do These Things anchor chart**.
  - "A model can be a drawing or diagram, a physical replica, or a simulation."
  - "Models can be used for making predictions."
- Tell students that they are going to use what they have learned about making explanatory models to communicate their ideas about how to improve the health of an ecosystem.
- Distribute and display the **Performance Task: Improving the Health of an Ecosystem (or the Alternative Performance Task: Improving the Health of Our Schoolyard Ecosystem)** [1] [2].
- Ask students to follow along as you read the task aloud. Answer clarifying questions.
- Display the blank version of the **Performance Task Rubric: Improving the Health of an Ecosystem**. Tell students you will work together as a class to fill in the specifics of the rubric. Ask students to turn and talk with an elbow partner:

"How can you convince someone that your suggestions will really improve the health of an ecosystem?" (by creating a convincing model that shows how each of the criteria of the health ecosystem will be more fully met)

"What does a model need in order to thoroughly explain how the ecosystem will become healthier?" (drawings of each part of the food web and basic abiotic and biotic features; explanatory labels and arrows that show everything working together)

"What makes something high-quality?" (has had multiple drafts and revisions; is neat and well crafted)

- As students share out, capture their ideas on the displayed version of the Performance Task Rubric: Improving the Health of an Ecosystem. Refer to **Performance Task Rubric: Improving the Health of an Ecosystem (example, for teacher reference)** as necessary [3].
- Move students into pre-determined pairs or triads.
- Invite them to open their student science notebooks to the **Improving the Health of an Ecosystem entry**. Remind them that although they are working in pairs or in a group, they should each take their own notes in their student science notebook.
- Post the following directions. Let students know they will complete each of these steps over the course of the Engineering Design Cycle. Review directions and answer clarifying questions.
  1. Study the data presented on the performance task, including the pictures of the ecosystem.
  2. Determine two or three suggestions for how to improve the health of the ecosystem and construct an argument for each suggestion.
  3. Develop a model that explains the suggested changes and what you predict will be the effect on the health of the ecosystem.
  4. Use peer critique to improve your model.

Preparing to Teach: Self-Coaching Guide

1. If I have chosen the Improving the Health of Our Schoolyard Ecosystem option, what authentic audience will I introduce at this point?
2. Students will be more interested and engaged in a local ecosystem that they can observe firsthand. How can I implement the Improving the Health of Our Schoolyard Ecosystem optional extension?
3. What experience do my students have with creating a rubric? Should I take more time here?

B. Imagining: Improving the Health of a Schoolyard Ecosystem (10 minutes)

- Tell students to begin by studying the data about the ecosystem as a group and taking notes in their student science notebooks.
- Circulate to support them as they work in their groups [1].

Preparing to Teach: Self-Coaching Guide

1. What groups may need additional support analyzing the data?

C. Planning: Suggestions for Improving the Health of a Schoolyard Ecosystem (10 minutes)

- After 10 minutes, refocus whole group.

- Tell students to move on to step 2: Determine two or three suggestions for how to improve the health of the ecosystem and construct an argument for each suggestion.
- Remind students to think about the effect each suggestion will have on the entire ecosystem and especially on the criteria for a healthy ecosystem. They should ask themselves:

  "How will this suggestion affect the plants and animals?"

  "How will this suggestion affect the interaction of abiotic and biotic features?"

  "How will this suggestion affect the big cycles in an ecosystem?"
- Circulate to support students as they work in their groups [1].

Preparing to Teach: Self-Coaching Guide

1. I may choose to have the students write the argument or outline their arguments so they can orally present their arguments when they share their models with a partner. If they are writing their arguments, they may need more time.

D. Creating: Improving the Health of an Ecosystem Explanatory Model (15 minutes)

- After 10 minutes, refocus whole group.
- Tell students it is now time start on step 3: Develop a model that explains the suggested changes and what you predict will be the effect on the health of the ecosystem [1].
- Remind students this model will demonstrate their thinking.
- Distribute **materials for Improving the Health of an Ecosystem Model**.
- Invite students to begin making their explanatory model. Remind them that although they are working in groups, they should each complete their own explanatory model.
- Invite students to begin making their explanatory models.
- Circulate to support them as they work.

Preparing to Teach: Self-Coaching Guide

1. This is an opportunity for students to show independent mastery of developing and using models. Depending on the needs of my students, will I have students create a model as a small group or use the small group as thought partners and then create the model individually?

E. Praise, Question, Suggestion: Improving the Health of a Schoolyard Ecosystem Explanatory Model (15 minutes)

- After 15 minutes, refocus whole group.
- Tell students they are going to use the Praise, Question, Suggestion protocol to give feedback to their classmates on their explanatory models. Remind them that they used this protocol in Lesson Sequence 9. Review as necessary. Refer to the Classroom Protocols pack on Curriculum.ELeducation.org for the full version of the protocol.
- Remind (or teach) students the classroom norms for peer critique:
  - Be helpful.
  - Be kind.
  - Be specific.

- Ask students to name the resources that will help them give high-quality feedback. Be sure they list the following [1]:
  - Criteria for Healthy Ecosystems anchor chart
  - How to make a model from the Scientists Do These Things anchor chart
  - How to make an argument from the Scientists Do These Things anchor chart
  - Performance Task Rubric: Improving the Health of an Ecosystem
- Move students into new pairs and distribute **sticky notes**. Tell students they will use the sticky notes to give one comment of praise, one question, and one suggestion about the explanatory model of their partner. They should write their feedback on the sticky notes and place them directly on their classmates' explanatory models [2].
- Tell students their feedback should address how clearly they can see the effect of their classmates' suggestions in their explanatory models.
- Consider using a **timer** to ensure that all students have adequate time to provide and share their feedback.
- Ask students to begin the protocol.
- Refocus students whole group and ask them to return to their seats.

Preparing to Teach: Self-Coaching Guide

1. Where can I post this list of resources so students can refer to it throughout the peer critique process?
2. Do I want students to work as pairs or triads?

F. Revising: Improving the Health of a Schoolyard Ecosystem Explanatory Model (30 minutes)

- Invite students to use their group members' feedback to complete another draft of their explanatory model and/or make revisions to their current draft, depending on the level of revision needed.
- Circulate to support students as they work [1].

Preparing to Teach: Self-Coaching Guide

1. How much time will my students need to create a product of which they will be proud?

G. Pair Share: Improving the Health of a Schoolyard Ecosystem Explanatory Model (10 minutes)

- After 30 minutes, refocus whole group.
- Tell students they will now have the opportunity to share their completed explanatory model with another student [1].
- Move students into new pairs, inviting them to take their explanatory models with them.
- Post and review the following directions:
  1. Decide who will be Student A and who will be Student B.
  2. Student A explains his or her suggestions for improvement and shows Student B his or her explanatory model and reads the labels aloud.

3. Student B asks at least one question about the explanatory model.
4. Student A answers Student B's question(s).
5. Student B provides feedback: "I like how you ____, and I learned ____."
6. Repeat steps 2–5 with Student B.

- Collect and post students' Improving the Health of an Ecosystem Explanatory Models.

Preparing to Teach: Self-Coaching Guide

1. If students are going to present their models to a more authentic audience, this is a good opportunity for practice. Should I structure this as a peer critique protocol and have peers concentrate on the oral presentation of ideas?

Section 3: Communicating Information

A. Reflecting on Learning (10 minutes)

- Invite students to silently walk around and observe all of the completed Improving the Health of an Ecosystem Explanatory Models.
- After 5 minutes, refocus whole class and invite them to discuss the following: (1) (2)

  "What is the most interesting new learning about the health of ecosystems?"
- Offer a sentence frame as necessary: "I used to think ____, but now I think/know ____." (Example: "I used to think that an ecosystem with lots of different plants was crowded, but now I think it is more healthy.")

Preparing to Teach: Self-Coaching Guide

1. Depending on the performance task, I may want to make this reflection more robust.
2. Will I capture this information in a public and visible way?

Notes