EQuIP Rubric for Science

Plants, Animals, & Their Environments

Do birds, other animals, and plants need people to help them live?

Curriculum Developer: OpenSciEd

GRADE K | FEBRUARY 2026

nsta
National Science Teaching Association

Category I Rating

A	B	C	D	E	F
Explaining Phenomena/ Designing Solutions	Three Dimensions	Integrating the Three Dimensions	Unit Coherence	Multiple Science Domains	Math and ELA
EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE

Score Category I: 3

Category II Rating

A	B	C	D	E	F	G
Relevance and Authenticity	Student Ideas	Building Progressions	Scientific Accuracy	Differentiated Instruction	Teacher Support for Unit Coherence	Scaffolded Differentiation Over Time
EXTENSIVE	EXTENSIVE	ADEQUATE	EXTENSIVE	EXTENSIVE	EXTENSIVE	EXTENSIVE

Score Category II: 3

Category III Rating

A	B	C	D	E	F
Monitoring 3D Student Performance	Formative	Scoring Guidance	Unbiased Tasks/Items	Coherent Assessment System	Opportunity to Learn
EXTENSIVE	EXTENSIVE	ADEQUATE	EXTENSIVE	EXTENSIVE	EXTENSIVE

Score Category III: 3

UNIT K.4

Sum Categories	**9**
Rating	**E**

Overall Summary Comments

This unit is designed for the *Next Generation Science Standards* (*NGSS*), including clear and compelling evidence of the following criteria:

- **I.A Making sense of phenomena and designing solutions to a problem drive student learning.**
  - There is extensive evidence that making sense of how birds, plants, and other animals can live with or without help from people and designing solutions for what people can do with water and trees to make it easier for some plants and animals to live and grow drives student learning. Materials are organized so that students regularly return to the phenomena and/or problem to add layers of explanation or iterate on solutions based on learning, and regularly build on what they have learned from smaller phenomena or problems to explain a broader phenomenon. Student questions and prior experiences related to the phenomenon or problem extensively motivate sense-making and/or problem solving. When engineering is a learning focus, it is integrated with developing disciplinary core ideas from life and earth and space sciences.
- **I.C Integrating the Three Dimensions**
  - There is extensive evidence that student sense-making of how birds, plants, and other animals can live with or without help from people requires student performances that integrate elements of the SEPs, CCCs, and DCIs. In the unit, there are numerous events in which students are expected to figure something out (a phenomenon) or solve part of a problem in a way that requires a grade-appropriate element from each of the three dimensions working together.
- **II.D Teacher Support for Unit Coherence**
  - There is extensive evidence of teacher support for unit coherence. The materials support teachers in facilitating coherent learning experiences over time by providing guidance on recognizing what students figure out in a lesson, what questions remain unanswered, and what new questions could be addressed in the next investigation.
  - Strategies for ensuring coherent student sense-making over-time from the students' perspective are facilitated by using an "Our Growing Ideas Chart". This serves as a public artifact of student thinking as it evolves.

The unit was reviewed to "provide constructive criterion-based feedback and suggestions for improvement to developers" (EQuIP Rubric for Lessons & Units: Science (Version 3.1). Reviewers recommend focusing on the following criteria during revisions:

- **I.B Three Dimensions**
  - There are limited opportunities for students to build, use, and demonstrate science ideas that plants can change their environment. ESS2.E: Biogeology **ESS2.E-P1: Plants and animals can change their environment.**
  - There are limited opportunities for students to use **ARG-P2: Distinguish between explanations that account for all gathered evidence and those that do not** as claimed in lesson 7.

- **II.C Building Progressions**
  - The materials do explicitly identify prior learning expected for all three dimensions, but not at the element level for all dimensions. The materials do provide some explicit support to teachers to clarify why certain terminology is used in the unit and the boundaries of the science ideas for Kindergarten. There was no evidence found of alternate conceptions that students may have during the unit
- **III.C Scoring Guidance**
  - There is limited evidence that the "Assessment targets — for grade-appropriate elements of all dimensions being assessed and their use together — are incorporated into the scoring guidance"

Why are there two colors of text in this report?

Black text is used in this report to identify direct quotations or paraphrases of a lesson/unit (the evidence) and why/how this evidence indicates the criterion is being met (the reasoning). (EQuIP Rubric for Lessons & Units: Science (Version 3.1))

Black text is also used for evidence and reasoning that does not affect the rating of the criterion.

Purple text is used in this report to identify direct quotations or paraphrases of a lesson/unit (the evidence) and why/how this evidence indicates that the criterion is NOT being met (the reasoning). (EQuIP Rubric for Lessons & Units: Science (Version 3.1)) The exception to this is when a criterion is rated as "extensive." In those cases, purple is used as a visual cue to *"provide constructive criterion-based feedback and suggestions for improvement to developers"* (EQuIP Rubric for Lessons & Units: Science (Version 3.1)).

CATEGORY I
NGSS 3D Design

I.A. Explaining Phenomena/Designing Solutions **6**

I.B. Three Dimensions **10**

I.C. Integrating the Three Dimensions **30**

I.D. Unit Coherence **32**

I.E. Multiple Science Domains **35**

I.F. Math and ELA **38**

I.A. Explaining Phenomena / Designing Solutions

EXTENSIVE

Making sense of phenomena and/or designing solutions to a problem drive student learning.

i. Student questions and prior experiences related to the phenomenon or problem motivate sense-making and/or problem solving.

ii. The focus of the lesson is to support students in making sense of phenomena and/or designing solutions to problems.

iii. When engineering is a learning focus, it is integrated with developing disciplinary core ideas from physical, life, and/or earth and space sciences.

The reviewers found **extensive** evidence that making sense of how birds, plants, and other animals can live with or without help from people and designing solutions for what people can do with water and trees to make it easier for some plants and animals to live and grow drives student learning. Materials are organized so that students regularly return to the phenomena and/or problem to add layers of explanation or iterate on solutions based on learning, and regularly build on what they have learned from smaller phenomena or problems to explain a broader phenomenon. Student questions and prior experiences related to the phenomenon or problem extensively motivate sense-making and/or problem solving. When engineering is a learning focus, it is integrated with developing disciplinary core ideas from life and earth and space sciences.

i. Student questions and prior experiences related to the phenomenon or problem motivate sense-making and/or problem-solving.

Student-centered focus on phenomena or problems

- Unit Overview "What is the anchoring phenomenon and why was it chosen? The anchoring phenomenon for this unit is students' experiences observing birds in their natural environments to wonder how birds, other animals, and plants live with or without help from people. The unit starts in Lesson 1 by focusing specifically on birds in their environments, which sometimes include people, and on signs that instruct people not to feed birds or to avoid leaving anything for wildlife. This leads students to wonder if birds, as well as other animals and plants, actually need help from people to live, whether through feeding or otherwise. The unit begins with birds as a focal organism, and students gradually gather evidence about other animals and plants as they work to explain the overarching phenomena. (Unit Overview)
- Lesson 1, Explore, Step 1: "Introduce the bird phenomenon. Share a story about a time when you were outside and noticed people feeding birds. Display slide A and explain that it was similar to what is happening in this photo on slide A." … "Connect our experiences. Display slide C. Have students turn and talk and then invite a few students to share their related experiences feeding or helping birds (or other animals) in their communities using prompts like the following and encourage students to use their words, bodies, and/or drawings to express their ideas during this brief discussion" (Lesson 1, Teacher Guide)
- Lesson 2, Navigate, Step 1: "Use the Notice and Wonder chart to recall where we left off. Gather in a shared meeting space and display the Notice and Wonder chart (refer to slide A). Use prompts like the following to facilitate a brief discussion about what the class did in Lesson 1 to begin this science unit. Invite students to use the images and words on the Notice and Wonder chart to support their sensemaking as they talk with their peers. Prompts to use: What were we wondering? What did we decide to do to find out more about birds? Transition to sharing community bird examples. Summarize key points of the discussion, including any ideas students shared about the many observations of birds they made and the questions they had about what birds were doing and if they needed people. Prepare to transition to sharing community examples" (Lesson 2, Teacher Guide)

- Lesson 2, Synthesize, Step 6: "Begin to facilitate a Building Understandings Discussion. Re-read the lesson question on Our Growing Ideas chart and have students briefly turn and talk about what we did in this lesson to try to answer that question.Invite students to turn and talk with a partner about what we figured out about what birds need to live. Take a couple of minutes to ask a couple of students to share their ideas...Explain that we will use these ideas to make a claim to answer the lesson question...Write the claim in the chart column 'What did we figure out?'...Using the observations and stories they shared in class and the sorts they did of the bird cards, ask a few students to explain how what we did helped us figure what birds need to live...Remind students of the unit question, Do birds, other animals, and plants need people to help them live? Ask students to turn and talk about how today's investigation - observing patterns of what birds need - relates to the unit question. Then, ask students to share their ideas" (Lesson 2, Teacher Guide).
- Lesson 3, Navigate, Step 1: "Develop today's lesson question with students. Building on students' shared questions, co-construct the lesson question with students. The lesson question should be something like, "*How do birds get what they need to live and grow?*" but be sure to use wording your students have been using. Add the lesson question to the next row of Our Growing Ideas chart to continue to keep track of what we figure out. Navigate to investigating how birds get what they need to live and grow. Ask students to use their words or bodies to show how they think we could answer this question. Listen for: Go outside and observe lots of birds. Observe pictures of birds getting what they need. Watch videos of birds getting what they need to live and grow. Indicate that we seem to be very curious about how birds get what they need to live and grow, and that we could make lots of observations. Thank students for these ideas and, building from their ideas, suggest that they have experience observing cards in the previous lesson so they could start with those observations of birds and what they are doing to get what they need to live and grow. If students started to raise ideas about how birds met their needs based on their observations in Lesson 2, recall those for the class" (Lesson 3, Teacher Guide)
- Lesson 4, Synthesize, Step 2: "Display slide C with the image of children feeding birds and the wildlife signs to remind students of our unit question, Do birds, other animals, and plants need help from people to live? Read the unit question aloud for the class and ask how what we showed with our model can help us to continue thinking about that question. Prompts to use: How did what we figured out in this lesson help us get closer to answering our unit question, Do birds, other animals, and plants need people to help them live?..." (Lesson 4, Teacher Guide).
- Lesson 5, Synthesize, Step 6: "Prepare to update Our Growing Ideas chart. Display Our Growing Ideas chart for (refer to slide M) and ask students to remain in the Scientist's Circle for a Building Understanding Discussion. Remind students that we are using this chart to keep track of all that we are doing and figuring out throughout the unit, so we want to add the ideas we figured out to answer our lesson question about *what other animals need to live and grow and how do they get those things* (point to the Lesson 5 question on the chart)" (Lesson 5, Teacher Guide)
- Lesson 7, Synthesize, Step 2: "Display slide C and refer to the class' version of the unit question on Our Growing Ideas chart. Read the unit question aloud for the class and ask how what we showed with our model can help us to continue thinking about that question. Prompts to use: How did what we figured out in this lesson help us get closer to answering our unit question, Do birds, other animals, and plants need people to help them live?" (Lesson 7, Teacher Guide).
- Lesson 8, Explore, Step 2: "Facilitate a discussion about what observations to make around the school. Display slide B. Have students turn and talk with a partner about how they think they - and other kids and adults - can meet their needs while at school. Then, use the following prompts to facilitate a brief class discussion sharing students' ideas about where and what to observe. As you are discussing with your class where to observe in the school, ensure accessible pathways so all students— including those with mobility challenges— can move comfortably and fully participate" (Lesson 8, Teacher Guide)

Consistent student-driven learning over time

- Lesson 1, Synthesize, Step 5: "Summarize student questions. Remind students that scientists ask questions about the world around them and then work to figure out the answers to their questions. Explain that we will work to figure out the questions we have on the Notice and Wonder chart. Point out that many of our questions are about what birds might need and why they are using or are near different things where they live, which might include food/objects from people or other people-made things. Say something like, It sounds like we have some different ideas about what birds need and how they get those things! Other people have different ideas about this too!" (Lesson 1, Teacher Guide)
- Lesson 4, Synthesize, Step 2: "Recall the unit phenomenon. Display slide C with the image of children feeding birds and the wildlife signs to remind students of our unit question, *Do birds, other animals, and plants need help from people to live?* Read the unit question aloud for the class and ask how what we showed with our model can help us to continue thinking about that question" (Lesson 4, Teacher Guide)
- Lesson 7, Synthesize, Step 2: "Transition to the next component while connecting back to the unit question. Display slide C and refer to the class' version of the unit question on Our Growing Ideas chart. Read the unit question aloud for the class and ask how what we showed with our model can help us to continue thinking about that question" (Lesson 7, Teacher Guide)
- Lesson 10, Navigate, Step 1: "Revisit the unit question to motivate the need to gather information during the gallery tour. Gather students in a Scientists Circle and display Our Growing Ideas chart (refer to slide A). Remind students of the unit question, Do birds, other animals, and plants need people to help them live? Explain to students that they have found out about how people can change the environment in the past few lessons and so they should make new arguments that answer that question later in the lesson. Use the following prompts to lead a discussion to recall what they did last time and support students in realizing they need to gather further information from each others' solutions in order to make an argument answering the unit question again. You can refer to Our Growing Ideas chart to support students during this discussion" (Lesson 10, Teacher Guide)

When multiple phenomena and /or problems are used

- Lesson 5, Explore, Step 3: "Revisit the unit question to motivate the need to gather information during the gallery tour. Gather students in a Scientists Circle and display Our Growing Ideas chart (refer to slide A). Remind students of the unit question, Do birds, other animals, and plants need people to help them live? Explain to students that they have found out about how people can change the environment in the past few lessons and so they should make new arguments that answer that question later in the lesson...Introduce the Animal Needs handout. Display slide E and suggest using drawing and writing to show others evidence we gathered about each animal" (Lesson 5, Teacher Guide)
- Lesson 8, Synthesize, Step 5: "Connect to the anchoring phenomenon and Unit Question. Remind students of the unit question, Do birds, other animals, and plants need people to help them live?. Use prompts like the following to support students in connecting what they figured out today about people meeting their needs to what they have figured out about other animals living and growing in their environments" (Lesson 8, Teacher Guide)

ii. The focus of the unit is to support students in making sense of phenomena and/or designing solutions to problems.

Close match between the phenomena/problems and the student learning objectives throughout the materials

- Lesson 1, Front Matter Lesson Learning Goal 1.A Use observations to **develop a model that represents birds** and **the places they live (system)**. Lesson 1, Explore, Step 4: "Turn and talk about observations. As students return to the classroom, come to a shared meeting space. Display slide H and use the directions on the slide to prompt students to briefly turn and talk about what they observed about birds using their Birdwatching Observations handout. Give each partner about 1 minute to share. Motivate developing a shared representation of our observations. Once both partners have shared, ask the class to give a thumb up or hand up if there was something similar about their observations. Then, have students give a thumb up or hand up if there was something different. Use students' show of thumbs/hands to emphasize how there were both similarities and differences in what students drew on their Birdwatching Observations handout. Use this to motivate creating a shared class representation of birds outside of school that captures the different details the class noticed as a whole" (Lesson 1, Teacher Guide)
- Lesson 5, Front Matter Lesson Learning Goal 5.B **Obtain information from infographics** to **determine patterns** in what **animals need to live and grow** and how **can get what they need from where they live.** Lesson 5, Connect, Step 6: "Obtain information from infographics. Read each infographic one at a time, pausing to use questions like the following in obtaining information about what each of the animals needs." … "Continue the discussion to describe patterns. Once the class has discussed each infographic, continue the discussion to use this information to describe patterns of animal needs" (Lesson 5, Teacher Guide)
- Lesson 7, Front Matter Lesson Learning Goal 7.A **Use a model to represent relationships between animals, plants, and their environments, and how they use parts of their environment to meet their needs (e.g., food, water, air, shelter)**. Lesson 7, Synthesize, Step 2: "Use a model to explain. Once the class has agreed upon what has been added to the model, transition to using the model to answer the lesson question: *How do animals and plants live in their environments?* Use prompts like the following to facilitate this part of the discussion. Prompts to use: Based on our model, how can we answer our lesson question, *How do animals and plants live in their environments?* What claims can we make? Feel free to use words, your bodies and the model to express your ideas! What evidence do we have to explain [select a claim students made]? How does our model show that?" (Lesson 7, Teacher Guide)

iii. When engineering is a learning focus, it is integrated with developing disciplinary core ideas from physical science, life, and/or earth and space sciences.

When students are designing solutions to problems (with or without connections to ETS DCIs)

Students design solutions for what people can do with water and trees to make it easier for some plants and animals to live and grow to answer the question: What happens to plants and animals when we use natural resources and what can we do about it?

- Lesson 9, Explore, Step 2: "Demonstrate additional website features. Show students how each of the icons will bring students to more information about using trees and using water, including links to solutions. Share that on this website, solutions are the different things people can do when using trees and water to make it easier for some plants and/or animals to live and grow." … "Plan to research in pairs. Let students know that they will work with a partner to use the website to read about one of the two resources (trees or water) and that each student can pick the solution they are most interested in to write about" (Lesson 9, Teacher Guide)

- Lesson 9, Explore, Step 2, My Solution student handout prompts students to "1. Circle the resource you researched: Trees, Water. 2. Circle who could be affected when people use the resource: Plants, Animals, Both. 3. Draw and/or write about one solution and how it could make it easier for some plants and/or animals to live and grow.
  - 9.A **Obtain information using a website with various text, text features, and media about how people doing things to meet their needs and live comfortably uses natural resources** and can **affect the world around them.**
  - 9.B **Obtain information using a website with various text, text features, and media about how people can reduce their impacts (cause) so animals and plants can meet their needs to live and grow (effect).**
  - **DCI, ESS3.C.P1: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.**
  - **DCI, ETS1.B.P1: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.**
- Lesson 10, Connect, Step 3: "Engage in a class gallery tour. Begin the gallery tour. As students move about the room, circulate and use the following prompts to support them in gathering information from each others' presentations in order to identify ways people can make it easier (cause) for some animals and/or plants to live and grow (effect). What solution did you find? How could that solution make it easier for some plants and/or animals to live and grow?" (Lesson 10, Teacher Guide)

Criterion-Based Suggestions for Improvement: N/A

I.B. Three Dimensions

(All 3 dimensions must be rated at least "adequate" to mark "adequate" overall)

EXTENSIVE

Builds understanding of multiple grade-appropriate elements of the science and engineering practices (SEPs), disciplinary core ideas (DCIs), and crosscutting concepts (CCCs) *that are deliberately selected to aid student sense-making of phenomena and/or designing of solutions.*

Document evidence and reasoning, and evaluate whether or not there is sufficient evidence of quality for each dimension separately.

Evidence needs to be at the *element level* of the dimensions (see rubric introduction for a description of what is meant by "element")

The reviewers found **extensive** evidence that the materials provide students with opportunities to build understanding of grade-appropriate elements across the three dimensions, as students regularly engage with all three dimensions to make sense of the anchoring or lesson-level phenomenon. The unit centers on students using clearly identified and addressed targeted elements from all three dimensions to explain whether birds need people to survive.

Rating for Criterion: SEP

EXTENSIVE

i. Provides opportunities to *develop and use* specific elements of the SEP(s).

The reviewers found **extensive** evidence that the materials provide opportunities to develop and use specific elements of the SEPs:

MOD: Developing and Using Models

- Claimed Element:
  - **MOD: P3 Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).**

DATA: Analyzing and Interpreting Data

- Claimed Element:
  - **DATA: P3 Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.**

ARG: Engaging in Argument from Evidence

- Claimed Elements:
  - **ARG: P1 Identify arguments that are supported by evidence.**
  - **ARG: P2 Distinguish between explanations that account for all gathered evidence and those that do not.** Limited Evidence was found.
  - **ARG: P5 Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument.**

INFO: Obtaining, Evaluating, and Communicating Information

- Claimed Elements:
  - **INFO: P1 Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).**
  - **INFO: P3 Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.**
  - **INFO: P4 Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.**

MOD: SEP Developing and Using Models

Claimed Element: **MOD: P3 Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).**

Claimed that "students use the following element in more complex ways as the unit goes on" in Lessons 1, 4, and 7. Evidence was found in 1, 4, and 7. Examples include:

- Lesson 1, Explore, Step 4: "Prepare to develop a model. Explain to students how scientists can *draw to explain their ideas about something they observe in the world*, and this drawing is called a model. If this is not the first OpenSciEd unit of the year, connect to the models that students have done in previous science units, which have previously only been named as "drawing and explaining". Suggest that the class use a model to show our observations of birds outside of our school. The model can answer the question:"What did we observe in the places birds live?...Develop an initial class model. Display slide J. Use the following prompts to support students in collectively developing a model. Consider using the following strategies to support all students in participating in the model's collaborative co-development. Start the conversation by having students share some of the observations they made that were similar to their partner's (during the earlier turn-and-talk) As time and space permit, have students come up to directly add a sticky note with a word or drawing to represent their observation to the model, share one after another, or talk to a partner about their ideas before sharing with the class. Ask students for a symbol or image idea that could help us represent their idea" (Lesson 1, Teacher Guide)
- Lesson 4, Synthesize, Step 2: "Facilitate a Consensus Discussion to collaboratively add to the Bird Model from Lesson 1. Have students turn and talk to their partner about what we should add or change to our class model. After students have discussed with their partner, bring students back together and use the following prompts to guide the discussion for revising the class model to explain how birds live in their environment" (Lesson 4, Teacher Guide)
- Lesson 4, Synthesize, Step 4: "Support claims with evidence. Ask students to look over Our Growing Ideas chart and the updated Bird Model for their evidence for why they voted the way they did. Allow students time to turn to a partner to share what their evidence is for their claim. After students have shared, let students know they will be showing what their evidence is by adding a sticky note to the Our Growing Ideas chart and to the class model" (Lesson 4, Teacher Guide)
- Lesson 7, Synthesize, Step 2: "Facilitate a discussion to collaboratively add to the class model. Use prompts like the following to facilitate a class discussion to add to the class model. Consider using the following strategies to support all students in participating in the model's collaborative co-development. Use discussion formats like turn and talk or think, pair, share before having students offer ideas to the group. Invite students to the model to add drawings, printed images, words, labels, and/or other representations that have shared meaning for the class. For ideas that students share, elicit agreement or disagreement from the rest of the class, using a "thumbs scale" to show agreement (thumb up), disagreement (thumb down), or not sure (thumb to the side). For ideas where the class disagrees or is not sure, add a question mark to the model. To build in more movement, consider designating a side of the model/board/screen for agreement and the other for disagreement" (Lesson 7, Teacher Guide)

DATA: Analyzing and Interpreting Data

Claimed Element: **DATA: P3 Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.**

Claimed that "students practice analyzing and interpreting data frequently throughout the unit" in Lessons 1, 2, 3, 5, 6, and 8. Evidence was found in all claimed lessons. Examples include:

- Lesson 1, Explore, Step 4: "For ideas that students share, elicit agreement or disagreement from the rest of the class, using a "thumbs scale" to show agreement (thumb up), disagreement (thumb down), or not sure (thumb to the side). For ideas where the class disagrees or is not sure, add a question mark to the model" [Lesson Question: What did we observe in the places birds live?](Lesson 1, Teacher Guide)
- Lesson 1, Explore, Step 4: "Motivate developing a shared representation of our observations. Once both partners have shared, ask the class to give a thumb up or hand up if there was something similar about their observations. Then, have students give a thumb up or hand up if there was something different. Use students' show of thumbs/hands to emphasize how there were both similarities and differences in what students drew on their Birdwatching Observations handout. Use this to motivate creating a shared class representation of birds outside of school that captures the different details the class noticed as a whole" [Lesson Question: What did we observe in the places birds live?]((Lesson 1, Teacher Guide)
- Lesson 2, Explore, Step 4: "Facilitate a discussion to share patterns of bird observations. Use the prompts like the following to have groups share their observations and thinking about what the birds are doing in the Bird Cards. While facilitating the discussion, use a class copy of Bird Card Observations to record the class' thinking by using a document camera, recording responses directly onto the image of the handout on slide I, or other preferred method of representing the class data" [Lesson Question: What do birds need to live?](Lesson 2, Teacher Guide)
- Lesson 2, Explore, Step 3, Analyzing and Interpreting Data sidebar: "Scientists distill many, many observations into patterns. In this Explore, students will make observations of new birds, adding to their growing set of bird observations (first-hand observations in Lesson 1 and community examples in the opening Connect). In this lesson, they will use this growing set of observations to identify patterns in bird actions and eventually bird needs" [Lesson Question: What do birds need to live?] ((Lesson 2, Teacher Guide)
- Lesson 3, Explore, Step 2: "Lead a discussion to identify patterns. Remind students that scientists share and compare their observations to identify patterns they can use as evidence to answer their lesson question. Explain that they will share their observations of what the birds were using and what they were doing with those things on the Bird Environment Cards to possibly meet their needs, in order to try and identify patterns across all of the birds on the Bird Environment Cards. Then use the following prompts to guide the discussion, making sure to hear from students in each needs group" [Lesson Question: How do birds get what they need to live and grow?] (Lesson 3, Teacher Guide)
- Lesson 5, Connect, Step 6: "Continue the discussion to describe patterns. Once the class has discussed each infographic, continue the discussion to use this information to describe patterns of animal needs" [Lesson Question: What do other animals need to live and grow and how do they get those things?] (Lesson 5, Teacher Guide)
- Lesson 6, Explore, Step 4: "Facilitate a class discussion to describe patterns. Have students come back together and use the prompts below to lead a discussion to make sense of what they figured out. During the discussion, encourage student-to-student discussion and their use of evidence from patterns of their plant observations as documented on their handouts in order to come to an agreement about the evidence we have and how that supports the claims we have made about what plants need" [Lesson Question: What do plants need to live and grow and how do they get those things?] (Lesson 6, Teacher Guide)
- Lesson 8, Explore, Step 4: "Lead a class discussion about how people get natural resources. Once students have finished circling and writing and briefly shared their observations with their partners, bring students back to a Scientists Circle with their handouts (refer to slide J). Use the following prompts to facilitate a discussion about what students observed. As students share in the discussion, use blank copies of the Environment Observations 1 handout and Environment Observations 2 handout to annotate for a shared understanding of what students figured out about how people can change the environment to get the natural resources they use for everything they do" [Lesson Question: How do people get what they need to live and grow?] (Lesson 8, Teacher Guide)

ARG: Engaging in Argument from Evidence

Claimed Element: **ARG: P1 Identify arguments that are supported by evidence.**

Claimed that "students use these elements periodically to support overall development of the practice" in Lessons 4 and 7. Evidence was found in Lessons 4 and 7. Examples include:

- Lesson 4, Synthesize, Step 5: "Prompt students to self-reflect. After students have had 5-10 minutes to work on their arguments, pause their writing and display slide G. Support students to engage in self-reflection around their argument and next steps by reading through each question on the slide. For each question, give students time to view their work and decide if that is something they have completed or if it is something they still need to work on. Emphasize that students can always add more detail to their writing or drawing, even if they noted all parts were done" (Lesson 4, Teacher Guide)
- Lesson 7, Synthesize, Step 3: "Transition to partners to plan arguments. Display slide E and have students meet with a partner to discuss how they would answer that question now that we have gathered evidence about the ways birds, other animals, and plants can meet their needs and live in their environments. Use the directions on the slide to explain directions. 1. Have each partner share their claim and supporting evidence for animals and plants from the model with a partner. Some strategies students can use to share their evidence are verbally sharing their evidence, acting out how the plant and/or animal lives in their environment, and/or pointing to evidence from the model they plan to use. 2. Discuss whether the evidence shared fits with the claim the sharing partner wants to make. 3. Work together to make suggestions for evidence from the model that could work with their arguments. Listen in and check in with partners who may need help selecting new evidence or adjusting their claims prior to writing" (Lesson 7, Teacher Guide)

Claimed Element: **ARG-P2: Distinguish between explanations that account for all gathered evidence and those that do not.**

Claimed "students use these elements periodically to support overall development of the practice" in Lesson 7. Limited evidence was found in lesson 7, examples include

- Lesson 7, Synthesize, Step 3: "Distribute the Plant and Animal Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to use information from their partners and share more evidence for how plants and other animals get what they need from their environment with or without people, to support their claim. As students work, circulate to check in with students and provide support using prompts like the following. Prompts to use:...What other evidence did we add to the model about how animals live in their environment? How did we show them getting food/water/shelter/air?...What other evidence did we add to the model about how plants live in their environment? How did we show them getting water/light?...Is there any evidence you want to add or change that better supports or matches the claim you circled?..." (Lesson 7, Teacher Guide) Students are not asked to compare the quantity or quality of evidence associated with different arguments.
- Lesson 7, Synthesize, Step 4: "This is where students use their bodies to move to different areas of the room to vote for yes, no, or maybe to the question Do birds, other animals, and plants need our help? Identify the three areas around the room that represent yes, no, maybe. Make sure the space is accessible for students with mobility challenges. This is similar to how students answered the question in Lessons 1 and 4. If continuing the lesson on a new day, return students' Plant and Animal Argument assessments. Vote with your body. Have students move to the area of the room that matches the argument they made on their Plant and Animal Argument assessment" While students are voting to decide which claim is supported, there are not clearly stated questions or prompts to specifically target this element.

Claimed Element: **ARG: P5 Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument.**

Claimed "students use these elements periodically to support overall development of the practice" in Lesson 4, 5, 6, and 7. Evidence was found in all claimed lessons. Examples include:

- Lesson 4, Synthesize, Step 2: "For ideas that students share, elicit agreement or disagreement from the rest of the class, using a "thumb scale" to show agreement (thumb up), disagreement (thumb down), or not sure (thumb to the side). For ideas where the class disagrees or is not sure, add a question mark to the model. To build in more movement, consider designating a side of the model/board/screen for agreement and the other for disagreement" (Lesson 4, Teacher Guide)
- Lesson 5, Explore, Step 5: "Repeat with the other animals. Continue this process with the other animal groups so all students have a chance to share their arguments. Emphasize areas of disagreement and/or uncertainty. Once all groups have shared, use the handouts and needs cards organized in the Scientists Circle to emphasize that we have different ideas about what needs each of these animals are meeting. Use these different ideas to motivate gathering more information about animal needs" (Lesson 5, Teacher Guide)
- Lesson 6, Explore, Step 4: "Check for agreement among partners. To motivate having a class discussion, ask students if they agreed (thumbs up) or disagreed (thumbs down) with their partners' claim about what all plants need to live and grow. If it looks like all partners agreed, say something like, let's talk more as a class to see if we all agreed as a class, not just in partners. If there is disagreement, say something like, let's come together to look at the evidence together as a class" (Lesson 6, Teacher Guide)
- Lesson 7, Synthesize, Step 4: "Facilitate a consensus discussion. Facilitate the Consensus Discussion to collectively construct a class claim supported with evidence to answer the unit question. During this discussion, support students in finding areas of agreement and follow up to ask what evidence supports those ideas. If all of the class made a similar yes/no/maybe claim, have students share their arguments to uncover all of the evidence the class has collectively gathered to support that claim. If there are multiple claims shared that can be supported by evidence, acknowledge how students used the evidence to support their ideas while then pushing them to consider how these ideas work with all of our evidence to help us come to an agreement. Ask, "Does all of our evidence support this idea?" or "Does (claim) help us understand why (piece of evidence)? If there is disagreement, encourage students to ask each other for clarification (can you tell me more about your thinking? But what about_____?) and ask students to consider all of the evidence (What evidence supports that idea? How do you know? Feel free to tell about or point to evidence on our class model)" (Lesson 7, Teacher Guide)

Claimed Element: **ARG: P6 Construct an argument with evidence to support a claim.**

Claimed that "students use this element with increasing responsibility as the unit goes on" in Lessons 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10. Evidence was found in all claimed lessons. Examples include:

- Lesson 1, Synthesize, Step 6: "Make initial arguments. Display slide M. In order to help students see that we have work to do to figure this out, tell the students that they will now get to choose where their thinking is about the question Do birds, other animals, and plants need help from people to live?. Reassure students that we do not expect to know the answer right now, but scientists like to try to explain why things happen. Share that they will choose yes, no, or maybe using a Vote with Your Body protocol. This is where students use their bodies to move to different areas of the room to vote for yes, no, or maybe to a given question using the following steps. 1. Identify the three areas around the room that represent yes, no, maybe. Make sure the areas selected and paths to those areas are accessible for students with mobility impairments. Alternatively, for students with very limited mobility, students can point to yes/no/maybe cards on a desk or have partner-assisted movement to a chosen area for full-body participation. 2. Then instruct students to stand up and move to the answer they agree with most. 3. Once students have selected

their answer, give students a few moments to discuss why they chose that answer with their group. 4. After groups have discussed, ask for a few volunteers to share the group's discussions. 5.Then, after each group has shared, give students the opportunity to change locations if they have changed their mind. 6. Once students have stopped moving, have the class count how many students are in each group. Record how many students answered yes, no, and maybe, as we will return to our ideas in Lesson 4" (Lesson 1, Teacher Guide)

- Lesson 2, Synthesize, Step 6: "Use evidence to support our ideas. Remind students (or explain) that scientists use their observations as evidence to answer their scientific questions. Evidence is the observations or information that help answer a scientific question. Using the observations and stories they shared in class and the sorts they did of the bird cards, ask a few students to explain how what we did helped us figure what birds need to live. As students share, support them in responding to and building off of one another's ideas. Then, add photos and artifacts to the column titled, 'How did we figure it out?' Teachers should add the class copy of Bird Card Observations to the Our Growing Ideas Chart" (Lesson 2, Teacher Guide)
- Lesson 2, Synthesize, Step 6, Engaging in Argument from Evidence sidebar: "This Building Understanding discussion is the first time in this unit that students explicitly engage in the practice of making claims and using evidence to support those claims. They learn the difference between claims and evidence. Support students as they make claims to answer the lesson question, What do birds need to live?. Emphasize the importance of using evidence to support their claims. By participating in these types of Building Understanding discussions, students learn how claims and evidence work together to answer a question by forming a scientific argument" (Lesson 2, Teacher Guide)
- Lesson 3, Synthesize, Step 4: "Lead a discussion about students' claims. Co-construct our current understanding of what we have figured out using the prompts below. As students share ideas, add them to the column titled "What did we figure out?" Remind students of the lesson question, *How do birds get what they need to live and grow?* Remind students that a claim is an *answer to a science question*. As students share ideas, continue to support them in responding to and building off one another's ideas. Make sure to look for movements and gestures, as well as what students verbalize as they share their ideas" (Lesson 3, Teacher Guide)
- Lesson 3, Synthesize, Step 4, Engaging in Argument from Evidence sidebar: "In Lesson 2, students began to consider how scientists use argumentation through discussions of various claims and evidence while adding to Our Growing Ideas chart. The separate prompts for sharing claims and evidence are done purposefully to support students in identifying the difference between claims and evidence, and how discussing each supports scientific argumentation. As students continue to engage in science discussions, they will work towards simultaneously sharing their claims and evidence. Students will explicitly name what a scientific argument is in Lesson 4 and construct an argument in response to the unit question" (Lesson 3, Teacher Guide)
- Lesson 4, Synthesize, Step 4: "Vote with our bodies. Show students the three areas around the room that represent yes, no, maybe. Make sure the areas selected and paths to those areas are accessible for students with mobility impairments. Ask students to stand up and move to the answer they agree with most, based on what we have figured out so far. Support claims with evidence. Ask students to look over Our Growing Ideas chart and the updated Bird Model for their evidence for why they voted the way they did. Allow students time to turn to a partner to share what their evidence is for their claim. After students have shared, let students know they will be showing what their evidence is by adding a sticky note to the Our Growing Ideas chart and to the class model" (Lesson 4, Teacher Guide)
- Lesson 5, Explore, Step 3: "Introduce the Animal Needs handout. Display slide E and suggest using drawing and writing to show others evidence we gathered about each animal. Explain to students that you have a handout that we can use. Review with the class the information they can record on their Animal Needs handout. Noting that they will 1. Circle the animal they are observing 2. Draw what the environment looks like before and after the animal the animal does something to possibly meet one of its needs. 3. Write a sentence to make a claim about what need the animal could be meeting and why you think so" (Lesson 5, Teacher Guide)

- Lesson 6, Synthesize, Step 6: "Lead a discussion about students' claims. Co-construct our current understanding of what we have figured out using the prompts below. As students share ideas, add them to the column titled "What did we figure out?" Remind students that a claim is an *answer to a science question*. As students share ideas, continue to support them in responding to and building off one another's ideas." ... "Continue the discussion about students' evidence. Remind students that in science, we use evidence to support what we have figured out. Evidence is the observations, data, or information that helps answer our scientific question. Add students' ideas using words, photos, and artifacts to the column titled, "How did we figure it out?" Allow students to refer to investigation materials and artifacts and attach images to the chart" (Lesson 6, Teacher Guide)
- Lesson 7, K.4 Lesson 7 Student Assessment 1 Plant and Animal "1. Circle a claim to answer this scientific question: Do animals and plants need people to help them live? YES NO MAYBE 2. Use the box and lines below to draw or write your evidence." (Lesson 7, K.4 Lesson 7 Student Assessment 1 Plant and Animal)
- Lesson 8: "Lead a discussion about students' claims. Remind students of the lesson question, How do people get what they need to live and grow? As students share ideas, add them to the column titled "What did we figure out?" Remind students that a claim is an answer to a science question. As students share ideas, continue to support them in responding to and building off one another's ideas, you may consider posting the Discussion Supports handout with sentence starters students can use. Make sure to look for movements and gestures, as well as what students verbalize as they share their ideas. Continue the discussion about students' evidence. Remind students that in science we use evidence to support what we have figured out. Evidence is the observations, data, or information that helps answer our scientific question. Add students' ideas using words, photos, and artifacts to the column titled, "How did we figure it out?" Allow students to refer to investigation materials and artifacts and attach images to the chart" (Lesson 8, Teacher Guide)
- Lesson 9, Synthesize, Step 3: "Continue the discussion about students' claims. Co-construct our current understanding of what we have figured out using the prompts below. As students share ideas, add them to the column titled "What did we figure out?" Remind students of the lesson question, What happens when people, plants, and animals with similar needs live in the same place and what can people do about it?" ... "Prompts to use: How can we answer our lesson question, What happens to plants and animals when we use natural resources and what can we do about it? What claims can we make?" (Lesson 9, Teacher Guide)
- Lesson 10, Synthesize, Step 5: "Revisit how to make arguments about whether or not plants and animals need people to help them live. Display slide G and tell the students that in a moment they will choose one of the following: yes, plants and animals need people to help them live, no, plants and animals do not need people to help them live, maybe/not sure if plants and animals might need people to help them live.To help facilitate this choice, remind students that we used the Vote with Your Body process before and we can do that again here. Vote with our bodies to answer the unit question. Instruct students to move to the answer (claim) they think best answers the unit question...Discuss the evidence supporting their claim for yes, no, or maybe answering the unit question" (Lesson 10, Teacher Guide)

INFO: Obtaining, Evaluating, and Communicating Information

Claimed Element: **INFO: P1 Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).**

Claimed "students use these elements periodically to support overall development of the practice" in Lessons 2, 5, 6, 7, 8, and 10. Evidence was found in all claimed lessons. Examples include:

- Lesson 2, Connect, Step 5: "Introduce a book about birds' needs. Display slide J and introduce the What Every Birds Needs book. Read the title aloud for students and have them briefly turn and talk about how this book might be able to help us answer our questions about what birds need to live" (Lesson 2, Teacher Guide)

- Lesson 5, Connect, Step 6: "Obtain information from infographics. Read each infographic one at a time, pausing to use questions like the following in obtaining information about what each of the animals needs" (Lesson 5, Teacher Guide)
- Lesson 6, Connect, Step 5: "Engage students in the interactive read aloud. Read the Plant Care Cards. Pause at the indicated places in the book to have students answer the questions, as well as the prompts connecting to their own observations. Prompts to use: Page 1: What do plants need to live and grow? How is this similar to what we have observed? Page 6: What changed about where the beans were growing? Why did that change happen? Page 9: What did the bench look like before the plant grew? What about after?" (Lesson 6, Teacher Guide)
- Lesson 7, Connect, Step 5: "Introduce a book that could help provide evidence about people. Display slide J to show the We are all Animals! book. Build on the suggestions that students shared to suggest that this book might give us more evidence to help us answer our questions about people living in the same environments as animals and plants and how people meet their needs. Facilitate an interactive read-aloud using associated prompts. To promote discussion and connect to the lesson and unit goals, read pages 1-16, pausing to engage students in discussion using prompts such as those provided in the book and following table" (Lesson 7, Teacher Guide)
- Lesson 8, Connect, Step 3: "Engage students in the interactive read-aloud. Read the Natural Resources book. Pause at the indicated places in the book to help students find out that people use things from the environment for everything they do, including meeting their needs. Use the final questions in the following table to lead a brief sensemaking discussion after reading the book. Pause to use gestures, point to illustrations, and allow students to discuss ideas with a partner in their preferred language to offer multiple means of engagement and support deeper understanding" (Lesson 8, Teacher Guide)
- Lesson 10, Connect, Step 2: "Motivate using a text. Display slide B and introduce the Meet the Expert: Mallery Quetaki book. Explain that the book will be a good resource for students to figure out how someone can communicate about science ideas with the community. Use the following prompts to guide a discussion about the Meet the Expert: Mallery Quetaki book. Prompts to use: Page 3: Why does Mallery make artwork? Page 3: Why does Mallery make artwork?" ... "Page 9: What does Mallery do to share her ideas? How does this help her communicate with others? Page 10: How can we communicate our solutions?" (Lesson 10, Teacher Guide)

Claimed Element: **INFO: P3 Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.**

Claimed "students use these elements periodically to support overall development of the practice" in Lesson 9. Evidence was found in Lesson 9. Examples include:

- Lesson 9, Connect, Step 3: "Obtain information from the website. Give time for students to obtain information from the website. As students work together, circulate to listen for student ideas and pose the following questions, helping pairs think more deeply about the information on the website and how to record it" (Lesson 9, Teacher Guide)

Claims Element: INFO: P4 **Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.**

Claimed "students use these elements periodically to support overall development of the practice" in Lessons 8 and 10. Evidence was found in Lessons 8, 9, and 10. Examples include:

- Lesson 8, Explore, Step 4, Obtaining, Evaluating and Communicating Information sidebar: "During the circling on the Environment Observations 1 handout and Environment Observations 2 handout, as well as the subsequent discussion, students have an opportunity to begin communicating their ideas using words, images, and gestures

about how people can change the environment to get natural resources we use for everything we do. Students will have further opportunities to communicate their ideas of people's impact on the environment and how to reduce their impact in Lessons 9 and 10" (Lesson 8, Teacher Guide)

- Lesson 8, Explore, Step 8: "Hand out the Environment Observations 1 and Environment Observations 2 handouts and have students begin working. Hand out the Environment Observations 1 handout to half of the students and the Environment Observations 2 handout to the other half of students, as well as a writing utensil to each student. Have students begin working on observing what happened to the environment after people got the natural resource" (Lesson 8, Teacher Guide)
- Lesson 9, Connect, Step 3, Obtaining, Evaluating, and Communicating Information sidebar: "Here, students begin to communicate a solution for reducing human impact using drawing, writing, and/or their spoken descriptions using information from the website. They will continue to develop this practice when they share these solutions in Lesson 10" (Lesson 9, Teacher Guide) Evidence was found in lesson 9, but was not claimed by the authors.
- Lesson 10, Connect, Step 3: "Introduce the Gallery Tour and its purpose. Explain that students will be sharing their solutions during a class gallery tour! Explain that a gallery tour is when people move around and look at all the work that is displayed. Remind students that Mallery displays her art so that people in her community can learn from her paintings. Have students briefly turn and talk with a partner about the following questions to set the purpose for a class Gallery Tour" (Lesson 10, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- Ensure that "[s]tudents are supported to develop deep competence in specific elements such that they could be applied to more than one context" (Detailed Guidance, p. 10)
  - Consider removing the ARG: P2 claim for Lesson 7 or enhance instructional language within the body of Lesson 7 to ensure that students are comparing different arguments based on the quantity and quality of evidence.
  - Consider adding a claim for INFO: P4 in the SEP-DCI-CCC Matrix for Lesson 9. This was not claimed in the SEP-DCI-CCC Matrix, but evidence was found in Lesson 9.

Rating for Criterion: DCI — EXTENSIVE

ii. Provides opportunities to develop and use specific elements of the DCI(s).

The reviewers found **extensive** evidence that the materials provide opportunities for students to develop and use specific elements of most of the DCI elements listed as key learning objectives, in the service of making sense of phenomena or designing solutions to problems. Students have multiple opportunities to build the following science ideas:

ETS1.B: Developing Possible Solutions

- Claimed Element: **ETS1.B-P1: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.**

ESS2.E: Biogeology

- Claimed Element: **ESS2.E-P1: Plants and animals can change their environment.** There is limited evidence that students develop or use the understanding that plants can change their environment.

ESS3.A Natural Resources

- Claimed Element: **ESS3.A-P1: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.**

ESS3.C: Human Impacts on Earth Systems

- Claimed Element: **ESS3.C-P1: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.**

LS1.C: Organization for Matter and Energy Flow in Organisms

- Claimed Element: **LS1.C-P1: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.**

ETS1.B: Developing Possible Solutions

Claimed Element: **ETS1.B-P1: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.** (**ETS1.B-P1**)

Claimed in Lessons 9 and 10. Evidence was found in Lessons 9 and 10. Examples include:

- Lesson 9, Explore, Step 2, "Discuss people's possible impact of using trees. Use the following prompts to support students in using their previous experiences to share ideas about the possible impact of people using trees on plants and/or other animals. Encourage students to share in their small groups and/or with a partner before having groups share with the whole class." (Lesson 9, Teacher Guide)
- Lesson 9, Explore, Step 2, "Introduce the My Solution handout. Return to the lesson slides and display slide C. Use it to show students the *My Solution* student assessment, reading all the directions out loud to show students where they can record information from the website. Depending on students' previous experiences with research, it may be helpful to toggle back to the website to help students visualize and discuss where they can find the different information for each prompt on the handout." (Lesson 9, Teacher Guide)
- Lesson 9, K.4 Lesson 9 Student Assessment 1 My Solution "3. Draw and/or write about one solution and how it could make it easier for some plants and/or animals to live and grow." (Lesson 9, K.4 Lesson 9 Student Assessment 1 My Solution)
- Lesson 10, Connect, Step 3: "Self-reflect using the Communication Checklist. Distribute students My Solution assessments from Lesson 9. Give each student a few minutes to practice their presentation making sure they discuss the solution and how it makes it easier for some plants and/or animals to live and grow. As needed, provide time for students to revise any aspect of what they are sharing based on their reflection."
- Lesson 10, Connect, Step 3: "Engage in a class gallery tour. Begin the gallery tour. As students move about the room, circulate and use the following prompts to support them in gathering information from each others' presentations in order to identify ways people can make it easier (cause) for some animals and/or plants to live and grow (effect). What solution did you find? How could that solution make it easier for some plants and/or animals to live and grow?" (Lesson 10, Teacher Guide)

ESS2.E: Biogeology

Claimed Element: **ESS2.E-P1: Plants and animals can change their environment.**

Claimed in Lessons 3, 4, 5, 6, 7, and 8. Evidence was found in all claimed lessons. Examples include:

- Lesson 3, Connect, Step 3: "Watch a Bird making nest video of a bird making a nest. Display slide G and explain to students that they will watch this video and draw on the Bird Environment Observations handout together. Play the Bird making nest video. Pause the video after 3 seconds and have students do a turn and talk to share observations about what the environment looked like. Have students share out and come to agreement that the grasses were standing tall. Draw this together in the Before section of the Bird Environment Observations handout. Once students have finished drawing and writing the Before segment, then play the video until the end. Have students do another turn and talk to discuss what the environment looked like after the bird pulled the grasses for its nest. Come to an agreement that the environment had less grass and a nest was built. Together, draw what happened to the environment (e.g., grasses) after the bird pulled them to make a nest for shelter" (Lesson 3, Teacher Guide)
- Lesson 4, Synthesize, Step 2: "Take a movement break. Pair students and have them take turns showing their partner how birds meet their needs in their environment. Encourage students to use their bodies to show how a bird might change their environment while meeting their needs (e.g., build a nest, dig for a worm, peck at a tree)" (Lesson 4, Teacher Guide)
- Lesson 5, Explore, Step 4: "Make observations. Give students time to view the video in their small groups. As students watch (and rewatch) their videos, circulate to groups to listen for student ideas and pose the following questions, helping students to think more deeply about what the animals may be doing and why. Prompts to use: What does it look like where this animal lives? What parts of the environment do you notice? What is the animal doing in this video? Feel free to use your hands and bodies to express your ideas! How does the environment look after they do that? Is it the same or different? Why do you think the animal changed the environment? (if needed, what need could they be meeting?) Why do you think so?" (Lesson 5, Teacher Guide)
- Lesson 5, K.4 Lesson 5 Handout 1 Animal Needs "1. Circle the animal you observed. 2. In the boxes, draw and/or write what the environment looks like before the animal does something and after the animal does something to meet a need. 3. What need do you think the animal is meeting? Why?" (Lesson 5, K.4 Lesson 5 Handout 1 Animal Needs)
- Lesson 6, Connect, Step 5: "Engage students in the interactive read aloud. Read the Plant Care Cards. Pause at the indicated places in the book to have students answer the questions, as well as the prompts connecting to their own observations. Prompts to use: Page 6: What changed about where the beans were growing? Why did that change happen? Page 9: What did the bench look like before the plant grew? What about after?" (Lesson 6, Teacher Guide)
- Lesson 6, Synthesize, Step 6: "Co-construct our current understanding of what we have figured out using the prompts below...Prompts to use: What did we figure out about what plants need? What claims can we make?...What did we figure out about how plants get what they need to live and grow? What claims can we make?...Remind students that in science, we use evidence to support what we have figured out...Prompts to use: How did we figure out what plants need to live and grow?...How did we figure out how plants get what they need?" (Lesson 6, Teacher Guide). While students are discussing claims about what plants need to live and grow (LS1.C-P1), they are not discussing claims or evidence about plants changing their environment (ESS2.E-P1).
- Lesson 7, Synthesize, Step 2: "Once the class has agreed upon what has been added to the model, transition to using the model to answer the lesson question: How do animals and plants live in their environments? Use prompts like the following to facilitate this part of the discussion. Prompts to use: Based on our model, how can we answer our lesson question, How do animals and plants live in their environments? What claims can we make?...Ideas to look and listen for: Plants get sun and water they need from their environment. Animals and plants change their environments

to get what they need to live and grow." (Lesson 7, Teacher Guide, p19). While there is language to prompt educators to look and listen for students sharing about plants changing their environment, students are primarily discussing claims about what plants need to live and grow (LS1.C-P1). There is limited evidence that students use evidence to support the claim that plants change their environment (ESS2.E-P1).

- Lesson 8, Explore, Step 4: "Hand out the Environment Observations 1 and Environment Observations 2 handouts and have students begin working. Hand out the Environment Observations 1 handout to half of the students and the Environment Observations 2 handout to the other half of students, as well as a writing utensil to each student. Have students begin working on observing what happened to the environment after people got the natural resource" (Lesson 8, Teacher Guide)

ESS3.A Natural Resources

Claimed Element: **ESS3.A-P1: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.**

Claimed in Lessons 1, 2, 3, 4, 5, 6, 7, 8, and 9. Evidence was found in all claimed lessons. Examples include:

- Lesson 1, K.4 SEP-DCI-CCC-ELA-Math-Matrix: "In this first lesson of the unit, students begin to figure out that living things (birds) live in places that have the things they need when they make observations of birds in their environments. Their observations may include initial ideas about needing water, air, or other resources--like food--from the land, but these ideas will be developed in later lessons. Humans using natural resources for everything they do will also be addressed in later lessons. See the unit front matter for more details."
- Lesson 2, Explore, Step 3: "Sort bird cards. Distribute a Bird Card Observations handout to each student and a set of Bird Cards to each group. Explain to students that they will sort the cards into categories based on what the birds are doing. Circulate as groups work together, and press them to explain their thinking for their categories...The goal of the sorting is for students to observe what birds do in their natural environments without people around and start to make connections to how the birds' activities indicate a particular need that birds have" (Lesson 2, Teacher Guide)
- Lesson 3, Explore, Step 2: "Work with a partner to observe birds' actions and the things they use. Partner students and give each set of partners one of the cards from the Bird Environment Cards and a dry-erase marker. As partners are observing the bird on their bird card, use the following prompts while circulating to partners: What is the bird doing? What need might the bird be trying to meet? What is the bird using to possibly meet its need? Have you had any experiences seeing birds doing this? When? What were they doing? Compare birds' actions and the things they use with other partners. Once students have recorded their observations of how the birds on the cards might be meeting their needs and what they might be using to meet their needs, have students briefly find another partner and share their observations" (Lesson 3, Teacher Guide)
- Lesson 4, Synthesize, Step 2: "Facilitate a Consensus Discussion to collaboratively add to the Bird Model from Lesson 1. Have students turn and talk to their partner about what we should add or change to our class model. After students have discussed with their partner, bring students back together and use the following prompts to guide the discussion for revising the class model to explain how birds live in their environment. Consider using the following strategies to support all students in participating in the model's collaborative co-development. Use discussion formats like turn and talk or think, pair, share before having students offer ideas to the group. Invite students to the model to add drawings, printed images, words, labels, and/or other representations that have shared meaning for the class. For ideas that students share, elicit agreement or disagreement from the rest of the class, using a "thumb scale" to show agreement (thumb up), disagreement (thumb down), or not sure (thumb to the side). For ideas where the class disagrees or is not sure, add a question mark to the model. To build in more movement, consider designating a side of the model/board/screen for agreement and the other for disagreement" (Lesson 4, Teacher Guide)

- Lesson 5, Synthesize, Step 7: "Facilitate a discussion about students' claims. Co-construct our current understanding of what we have figured out using the prompts below. As students share ideas, add them to the column titled "What did we figure out?" As students share ideas, continue to support them in responding to and building off one another's ideas. Make sure to look for movements and gestures, as well as what students verbalize as they share their ideas. Prompts to use: How can we answer our lesson question, What do other animals need to live and grow? What claims can we make? What did we figure out about how animals get what they need?" (Lesson 5, Teacher Guide)
- Lesson 6, Connect, Step 5: "Engage students in the interactive read aloud. Read the Plant Care Cards. Pause at the indicated places in the book to have students answer the questions, as well as the prompts connecting to their own observations. Prompts to use: Page 1: What do plants need to live and grow? How is this similar to what we have observed?" (Lesson 6, Teacher Guide)
- Lesson 7, Synthesize, Step 2: "Select an animal and a plant to add to the class model. Suggest to students that we choose one animal and one plant to add to the class model as a way of representing all the animals explored, since it would be too much to add all the animals we investigated to the model. Also, the animals we investigated all have the same needs (just met by using different things) so the animal we choose to add can then represent the many animals we investigated. For example, if the class chooses to add a turtle to the model, invite a student to add an image printed from Printable Chart Images or draw an image of a turtle before using prompts like the one below to elicit ideas about how to show other parts of the environment and relationships between parts of the environment on the model (e.g., lines connecting an animal/plant to something it needs within the environment or a label)" (Lesson 7, Teacher Guide)
- Lesson 8, Explore, Step 2: "Hand out the Needs Cards on key rings to each student and make observations around the school. Remind students of the class and/or school rules for quietly and safely moving through the building. Hand out a set of Needs Cards on a key ring to each student and begin your school tour to make and record observations and the needs possibly associated with the observations. As students hold up a Needs Card first ask them, What did you observe? And then follow-up with questions like: What need do you think that connects with? Why do you think that? What are they using to possibly meet that need?" (Lesson 8, Teacher Guide)
- Lesson 9, Synthesize, Step 4: "Continue the discussion about students' claims. Co-construct our current understanding of what we have figured out using the prompts below. As students share ideas, add them to the column titled "What did we figure out?" Remind students of the lesson question, What happens when people, plants, and animals with similar needs live in the same place and what can people do about it?" (Lesson 9, Teacher Guide)

ESS3.C: Human Impacts on Earth Systems

Claimed Element: **ESS3.C-P1: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.**

Claimed in Lessons 1, 9, and 10. Evidence was found in 1, 9, and 10. Examples include:

- Lesson 1, Synthesize, Step 5: "Develop a unit question. Summarize the class' current thinking about birds (and other animals and plants) and what they may need in the places they live to form a question that will drive the work of this unit, such as Do birds, other animals, and plants need people to help them live? Use wording that captures how your class has been talking about this phenomenon, and add the question you develop to the top of the Notice and Wonder chart (refer to slide L)" (Lesson 1, Teacher Guide)
- Lesson 1, Synthesize, Step 6: "Make initial arguments. Display slide M. In order to help students see that we have work to do to figure this out, tell the students that they will now get to choose where their thinking is about the

question Do birds, other animals, and plants need help from people to live?. Reassure students that we do not expect to know the answer right now, but scientists like to try to explain why things happen. Share that they will choose yes, no, or maybe using a Vote with Your Body protocol" (Lesson 1, Teacher Guide)

- Lesson 1, K.4 SEP-DCI-CCC-ELA-Math-Matrix: "In this first lesson of the unit, students begin to figure out that people can impact the world around them when they consider whether or not birds need help from people through the phenomenon of people feeding birds in their local community. As the unit progresses, students will more deeply identify the impact of people on the world around them and how people can make choices to reduce their impacts on the land, water, air, and other living things around them. This lesson will not address how the things people do to live comfortably affect the world around them."
- Lesson 9, Explore, Step 2, "Discuss people's possible impact of using trees. Use the following prompts to support students in using their previous experiences to share ideas about the possible impact of people using trees on plants and/or other animals. Encourage students to share in their small groups and/or with a partner before having groups share with the whole class." (Lesson 9, Teacher Guide)
- Lesson 9, Explore, Step 2, "Discuss people's possible impact of using water. Use the following prompts to support students in using their previous experiences to share ideas about the possible impact of people using water on plants and/or other animals. Encourage students to share in their small groups and/or with a partner before having groups share with the whole class." (Lesson 9, Teacher Guide)
- Lesson 9, Explore, Step 2, "Demonstrate additional website features. Show students how each of the icons will bring students to more information about using trees and using water, including links to solutions. Share that on this website, solutions are the different things people can do when using trees and water to make it easier for some plants and/or animals to live and grow." (Lesson 9, Teacher Guide)
- Lesson 9, Synthesize, Step 4, "Prompts to use: What can people do to make it easier for some plants and animals to meet their need? What possible solutions did we figure out?" (Lesson 9, Teacher Guide)
- Lesson 10, Connect, Step 3: "Motivate the need to create a Communication Checklist. Ask students how they could make sure they share all parts of the solution during the gallery tour and how the solution can make it easier for animals and plants to live and grow. Look and listen for ideas that they could create a checklist to make sure they include each part of the problem and solution when sharing during the gallery tour. Co-create a Communication Checklist. Engage the class in co-creating a checklist (refer to slide C) that will help them share their solutions during the gallery tour. Use the following prompts to create a checklist on chart paper or in a shared digital space. Explain that using pictures for each step will help us to remember what to do in each part of our presentations (see *Communication Checklist* Images reference for prepared images)." (Lesson 10, Teacher Guide)

LS1.C: Organization for Matter and Energy Flow in Organisms

Claimed Element: **LS1.C-P1: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.**

Claimed in Lessons 1, 2, 5, and 6. Evidence was found in all claimed lessons. Examples include:

- Lesson 1, Synthesize, Step 5: "Facilitate an Initial Ideas Discussion to add questions to the Notice and Wonder chart. Use the prompts in the table below to facilitate an Initial Ideas Discussion about birds in the places they live with and without people. Through this discussion, students first review and add to their noticings, then generate ideas and ask questions that you can record on the "Wonder" side of the Notice and Wonder chart. Prompts to use: We shared a lot of observations of what birds were doing (refer to observations recorded on the model and "Notice" side of the Notice and Wonder chart). What are some of the things we noticed? Why do you think the birds were

_____ (observation from "Notice" side of the Notice and Wonder chart)? Why do you think birds were around these places?" (Lesson 1, Teacher Guide)

- Lesson 1, K.4 SEP-DCI-CCC-ELA-Math-Matrix: "In this first lesson of the unit, students begin to figure out that birds need food and other things to live and grow, through their observations of birds and people feeding birds. While students have opportunities to share personal experiences with other animals, this lesson will not formally address the needs of other animals or people. This lesson will not address plants and their needs (beyond observations of birds eating plants). Both the needs of plants and other animals will be motivated and addressed in the remainder of the unit; see the unit front matter for more details."
- Lesson 2, Explore, Step 4: "Navigate to the Connect. Make sure to emphasize and leverage any uncertainty that students may have about how what the birds are doing relates to their needs, for example, different ideas of what is in their mouths being related to kind of food they eat or ideas about nest and home, to motivate finding out more about bird needs" (Lesson 2, Teacher Guide)
- Lesson 2, Synthesize, Step 6: "Complete the "What did we figure out" column of the chart. Invite students to turn and talk with a partner about what we figured out about what birds need to live" (Lesson 2, Teacher Guide)
- Lesson 5, Connect, Step 6: "Obtain information from infographics. Read each infographic one at a time, pausing to use questions like the following in obtaining information about what each of the animals needs. According to the infographic, what does the ____ need to live and grow? Feel free to use words, the infographics, or act out your ideas. What kind of food does ____ eat? Where do _____ get water they need? What kind of shelters do ____ use?" (Lesson 5, Teacher Guide)
- Lesson 6, Connect, Step 5: "Engage students in the interactive read aloud. Read the Plant Care Cards. Pause at the indicated places in the book to have students answer the questions, as well as the prompts connecting to their own observations. Prompts to use: Page 1: What do plants need to live and grow? How is this similar to what we have observed? … Page 15: How does this book help us answer our question about how plants get what they need to live and grow?" (Lesson 6, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- Ensure that "[s]tudents are supported to develop deep competence in specific elements such that they could be applied to more than one context" (Detailed Guidance, p. 10)
  - Consider increasing the number of opportunities for students to engage with the plant portion of ESS2.E-P1.

Rating for Criterion: CCC **EXTENSIVE**

iii. Provides opportunities to *develop and use* specific elements of the CCC(s).

The reviewers found **extensive** evidence that the materials provide opportunities for students to develop and use most of the CCC elements listed as key learning objectives in the service of making sense of phenomena or designing solutions to problems.

Students have multiple opportunities to build the following crosscutting concepts:

PAT: Patterns

- Claimed Element: **PAT: P1 Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.**

CE: Cause and Effect

- Claimed Element: **CE: P1 Events have causes that generate observable patterns.**

SYS: Systems and System Models

- Claimed Element: **SYS: P2 Systems in the natural and designed world have parts that work together.**

PAT: Patterns

Claimed Element: **PAT: P1 Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.**

Claimed that "students practice observing patterns" in Lessons 2, 3, 5, and 6. Evidence was found in all claimed lessons. Examples include:

- Lesson 2, Explore, Step 4: "Facilitate a discussion to share patterns of bird observations. Use the prompts like the following to have groups share their observations and thinking about what the birds are doing in the Bird Cards. While facilitating the discussion, use a class copy of Bird Card Observations to record the class' thinking by using a document camera, recording responses directly onto the image of the handout on slide I, or other preferred method of representing the class data." (Lesson 2, Teacher Guide)
- Lesson 2, Explore, Step 4, Patterns sidebar: "If students have experienced the Unit K.1: Why do some surfaces get hot and how can we make them less hot? unit, they will be familiar with patterns from identifying patterns of surfaces that feel hot and less hot. Students who have experienced Unit K.2: How can we be prepared for the weather? will have also observed patterns in local weather. Students have opportunities to build on those experiences here as they observe patterns in their observations of birds and later in this lesson, patterns in the needs of birds. As the unit progresses, students will have opportunities to observe patterns in what animals need and what plants need" (Lesson 2, Teacher Guide)
- Lesson 3, Explore, Step 2, Patterns sidebar: "Scientists look across many observations to describe patterns in the natural and designed worlds. In this discussion, students use observations of multiple birds across different Bird Environment Cards (many data points) to identify patterns of how birds live in places that have things they can use to meet their needs to live and grow. This builds on students' observations in Lesson 2 from similar data to describe the patterns of what birds need to live" (Lesson 3, Teacher Guide)

- Lesson 3, Explore, Step 2: "Lead a discussion to identify patterns. Remind students that scientists share and compare their observations to identify patterns they can use as evidence to answer their lesson question. Explain that they will share their observations of what the birds were using and what they were doing with those things on the Bird Environment Cards to possibly meet their needs, in order to try and identify patterns across all of the birds on the Bird Environment Cards. Then use the following prompts to guide the discussion, making sure to hear from students in each needs group" (Lesson 3, Teacher Guide)
- Lesson 5, Connect, Step 6: "Continue the discussion to describe patterns. Once the class has discussed each infographic, continue the discussion to use this information to describe patterns of animal needs" (Lesson 5, Teacher Guide)
- Lesson 6, Explore, Step 4: "Facilitate a class discussion to describe patterns. Have students come back together and use the prompts below to lead a discussion to make sense of what they figured out. During the discussion, encourage student-to-student discussion and their use of evidence from patterns of their plant observations as documented on their handouts in order to come to an agreement about the evidence we have and how that supports the claims we have made about what plants need" (Lesson 6, Teacher Guide)

CE: Cause and Effect

Claimed Element: **CE: P1 Events have causes that generate observable patterns.**

Claimed "students use the following element in more complex ways as the unit goes on" in Lessons 8, 9, and 10. Evidence was found in all claimed lessons. Examples include:

- Lesson 8, Explore, Step 4, Cause and Effect sidebar: "In this discussion, students figure out that the things people do to get natural resources to meet their needs (and everything else they do) can cause changes to the environment. This builds on previous lessons where students figured out how birds, other animals, and plants can change their environments to get resources to meet their needs. This discussion supports students in figuring out that people's actions cause events that can lead to observable patterns (changes in the environment). Students will expand on these cause and effect relationships in Lessons 9 and 10 when figuring out the impact of people's actions on the environment and the animals and plants in it, as well as ways to reduce people's impact on the environment" (Lesson 8, Teacher Guide)
- Lesson 8, Explore, Step 4: "Hand out the Environment Observations 1 and Environment Observations 2 handouts and have students begin working. Hand out the Environment Observations 1 handout to half of the students and the Environment Observations 2 handout to the other half of students, as well as a writing utensil to each student. Have students begin working on observing what happened to the environment after people got the natural resource. While students are working, circulate the room and ask the following questions to help guide their thinking: What natural resource is this picture showing? How might people use it? Where does that natural resource come from? What happened to the environment after people got that natural resource? What did people do to get that natural resource?" (Lesson 8, Teacher Guide) While students use cause and effect when answering these questions, there is no evidence answering these questions would lead to generating observable patterns.
- Lesson 9, Explore, Step 2, Cause and Effect sidebar: "In Lesson 8, students connected to this crosscutting concept when they gathered evidence of how people can cause changes to the environment (effect) when they get natural resources that they use to meet their needs and for everything else they do. Here, students build on these ideas as they discuss possible effects on plants and animals and how it may be harder for them to meet their needs. Understanding these effects will support students later in the lesson when they make sense of how choices people can make around their resource use (causes) can reduce their impact on some plants and/or animals (effects)" (Lesson 9, Teacher Guide). While students discuss possible effects, there is no evidence discussing these effects would lead to generating observable patterns.

- Lesson 9, Explore, Step 2: "Recall what we have already figured out about people using natural resources. Use the following prompts to facilitate a brief class discussion to recall what the class has already figured out about people's impact of using natural resources on the environment. Encourage students to use materials around the classroom to express their ideas. Prompts to use: What happens to the environment when people use trees? What happens to the environment when people use water?" (Lesson 9, Teacher Guide) While students use cause and effect to describe what happens, there is no evidence discussing what happens would lead to generating observable patterns.
- Lesson 10, Connect, Step 3: "Engage in a class gallery tour. Begin the gallery tour. As students move about the room, circulate and use the following prompts to support them in gathering information from each others' presentations in order to identify ways people can make it easier (cause) for some animals and/or plants to live and grow (effect). What solution did you find? How could that solution make it easier for some plants and/or animals to live and grow?" (Lesson 10, Teacher Guide) While students use cause and effect to solutions, there is no evidence discussing what happens would lead to generating observable patterns.
- Lesson 10, Synthesize, Step 4, Cause and Effect sidebar: "In this discussion, students build from their researching problems and solutions in Lesson 9 to discuss how the choices people make can affect the environment where plants and animals live. They continue by discussing solutions that people can do (causes), which can make it easier for some plants and/or animals to meet their needs to live and grow (effect). Students discuss how this generates observable patterns in the effects of people's actions to reduce their impact on some plants and/or animals and the environment" (Lesson 10, Teacher Guide)
- Lesson 10, Synthesize, Step 4: "Facilitate a Consensus Discussion about the causes of people's actions leading to effects, which are observed patterns. The purpose of this Consensus Discussion is to support students in recognizing that people using natural resources causes changes to the environment that can make it harder (problem) or easier (solution) for some animals and/or plants to live and grow (effect), which can generate patterns in the impacts on the environment" (Lesson 10, Teacher Guide)

SYS: Systems and System Models

Claimed Element: **SYS: P2 Systems in the natural and designed world have parts that work together.**

Claimed "students use the following element in more complex ways as the unit goes on" in Lessons 1, 3, 4, 5, 6, 7, and 8. Evidence was found in all claimed lessons. Examples include:

- Lesson 1, Explore, Step 4, Systems and System Models sidebar: "Over the course of this unit, students will identify that a bird's environment is a system made of parts that work together. While students will not explicitly use the word system in this lesson or unit, their collective observations of different parts of a bird's environment (i.e., trees, seeds, worms, people, water) serve to begin identifying parts of a system. In later lessons, students will consider how these parts work together" (Lesson 1, Teacher Guide)
- Lesson 1, Explore, Step 4: "Suggest that the class use a model to show our observations of birds outside of our school. The model can answer the question:"What did we observe in the places birds live?" … "Develop an initial class model. Display slide J. Use the following prompts to support students in collectively developing a model. Consider using the following strategies to support all students in participating in the model's collaborative co-development. Start the conversation by having students share some of the observations they made that were similar to their partner's (during the earlier turn-and-talk). As time and space permit, have students come up to directly add a sticky note with a word or drawing to represent their observation to the model, share one after another, or talk to a partner about their ideas before sharing with the class. Ask students for a symbol or image idea that could help us represent their idea" (Lesson 1, Teacher Guide)

- Lesson 3, Explore, Step 2, Systems and Systems Models sidebar: "Scientists use evidence from systems to explain how the parts of different systems work together. In these discussions, students describe parts of systems (environments) noted as checkmarks on the Bird Environment Cards. Though students may not yet fully identify how the parts of the system work together, it is important for young children to first identify what the parts are in a system. They begin to consider how parts work together when they connect something within the environment to how it contributes to a bird meeting a need. Students will build on their use of this concept in Lesson 4 when they use a model to represent how the birds are connected to the different parts of their environment to meet their needs (how the parts of the system work together)" (Lesson 3, Teacher Guide)
- Lesson 3, Explore, Step 2: "Work with a partner to observe birds' actions and the things they use. Partner students and give each set of partners one of the cards from the Bird Environment Cards and a dry-erase marker. As partners are observing the bird on their bird card, use the following prompts while circulating to partners: What is the bird doing? What need might the bird be trying to meet? What is the bird using to possibly meet its need? Have you had any experiences seeing birds doing this? When? What were they doing?" (Lesson 3, Teacher Guide)
- Lesson 4, Synthesize, Step 2, Systems and System Models sidebar: "In this discussion, you are supporting students with this cross-cutting concept as they recall parts of birds environments (system) and how birds meet their needs to live and grow within their environment (parts of the system working together). While students have begun to consider how parts of the system work together in previous lessons, the model provides an opportunity for students to explicitly communicate about and show these relationships" (Lesson 4, Teacher Guide)
- Lesson 4, Synthesize, Step 2: "Facilitate a Consensus Discussion to collaboratively add to the Bird Model from Lesson 1. Have students turn and talk to their partner about what we should add or change to our class model. After students have discussed with their partner, bring students back together and use the following prompts to guide the discussion for revising the class model to explain how birds live in their environment...Prompts to use: Let's look back at our model. What parts did we include in Lesson 1? What did we figure out about what birds need to live and grow? Can you point to or tell what is already on the model that birds need? What do we still need to add?" (Lesson 4, Teacher Guide)
- Lesson 5, Explore, Step 4, Systems and System Models sidebar: "In this discussion, you are supporting students with this cross cutting concept as they draw and discuss various parts of the environment and how animals are using and changing the environment to meet a need (parts of a system working together). Students previously did this with birds and here they build on that use by considering new animals in new environments with more independence." (Lesson 5, Teacher Guide)
- Lesson 5, Explore, Step 4: "Make observations. Give students time to view the video in their small groups. As students watch (and rewatch) their videos, circulate to groups to listen for student ideas and pose the following questions, helping students to think more deeply about what the animals may be doing and why. Prompts to Use: What does it look like where this animal lives? What parts of the environment do you notice?" (Lesson 5, Teacher Guide)
- Lesson 6, Explore, Step 3: "Explain plant exploration. Agree with students that looking at many of the Plant Care Cards could help them figure out what different plants need. Display slide E. Use the slide and Plant Needs handout to explain each step for how we can do this: Step 1: In groups, circulate to each of the plant stations to observe the image of the plant and information about what that plant needs to live and grow on each Plant Care Cards. Step 2: For each plant, students will circle what the plant needs on the handout. For water, count the number of droplets on the card. On the handout, there are three categories to choose from for both amount of water and amount of sunlight: no, some, and a lot. Step 3: After going to all the stations, answer the question at the bottom, What do plants need to live and grow?" (Lesson 6, Teacher Guide)
- Lesson 7, Synthesize, Step 2: "Select an animal and a plant to add to the class model. Suggest to students that we choose one animal and one plant to add to the class model as a way of representing all the animals explored, since it would be too much to add all the animals we investigated to the model. Also, the animals we investigated all have the

same needs (just met by using different things) so the animal we choose to add can then represent the many animals we investigated. For example, if the class chooses to add a turtle to the model, invite a student to add an image printed from Printable Chart Images or draw an image of a turtle before using prompts like the one below to elicit ideas about how to show other parts of the environment and relationships between parts of the environment on the model (e.g., lines connecting an animal/plant to something it needs within the environment or a label)" (Lesson 7, Teacher Guide)

- Lesson 8, Explore, Step 2: "Lead a discussion about observations and associated human needs. After the class returns from the school tour, display slide G and gather in a Scientists Circle to share those observations. Have students briefly share with a partner one observation and the possible need associated with that observation. Then use the following prompts to facilitate a discussion about the class' observations. If students share new observations, you can record them on the School Tour Observations. This discussion is also a great opportunity for students to share their ideas in multiple modes—for example, by pointing to their needs cards, acting out what they observed, using gestures, referencing objects they noticed on the tour" (Lesson 8, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- Ensure that "[s]tudents are supported to develop deep competence in specific elements such that they could be applied to more than one context" (Detailed Guidance, p. 10)
  - Consider increasing the number of opportunities for students to engage in recognizing/generating observable patterns (CE: P1 Events have causes that generate observable patterns).

I.C. Integrating the Three Dimensions

EXTENSIVE

Student sense-making of phenomena and/or designing of solutions requires student performances that integrate elements of the SEPs, CCCs, and DCIs.

The reviewers found **extensive** evidence that student sense-making of how birds, plants, and other animals can live with or without help from people requires student performances that integrate elements of the SEPs, CCCs, and DCIs. In the unit, there are numerous events in which students are expected to figure something out (a phenomenon) or solve part of a problem in a way that requires a grade-appropriate element from each of the three dimensions working together. The three dimensions are not used in isolation because they are generally learned in tandem, with each dimension supporting understanding of the others.

In most activities in the unit, students are expected to figure out something that requires the use of three dimensions working together at grade level.

Learning is integrated to support student sense-making over time

Throughout the unit, students engage in three-dimensional tasks to help explain phenomena.

- Lesson 2, Explore, Step 4: "Facilitate a discussion to share patterns of bird observations. Use the prompts like the following to have groups share their observations and thinking about what the birds are doing in the Bird Cards. While facilitating the discussion, use a class copy of Bird Card Observations to record the class' thinking by using a document camera, recording responses directly onto the image of the handout on slide I, or other preferred method

of representing the class data. Save the class copy so it can be used later in the Synthesize. Prompts to use: Which birds did you put together in a group? Feel free to use your handout, bird cards, and/or bodies to share your idea" (Lesson 2, Teacher Guide)

  - **CCC PAT: P1 Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence**
  - **DCI LS1.C-P1: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.** and
  - **SEP DATA: P3 Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.**

- Lesson 4, Synthesize, Step 2: "Facilitate a Consensus Discussion to collaboratively add to the Bird Model from Lesson 1. Have students turn and talk to their partner about what we should add or change to our class model. After students have discussed with their partner, bring students back together and use the following prompts to guide the discussion for revising the class model to explain how birds live in their environment. Consider using the following strategies to support all students in participating in the model's collaborative co-development" (Lesson 4, Teacher Guide)
  - **CCC SYS: P2 Systems in the natural and designed world have parts that work together.**
  - **DCI ESS3.A-P1 Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.**
  - **SEP MOD: P3 Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller) and/or patterns in the natural and designed world(s).**
- Lesson 7, Synthesize, Step 3: "Transition to partners to plan arguments. Display slide E and have students meet with a partner to discuss how they would answer that question now that we have gathered evidence about the ways birds, other animals, and plants can meet their needs and live in their environments. Use the directions on the slide to explain directions. 1. Have each partner share their claim and supporting evidence for animals and plants from the model with a partner. Some strategies students can use to share their evidence are verbally sharing their evidence, acting out how the plant and/or animal lives in their environment, and/or pointing to evidence from the model they plan to use. 2. Discuss whether the evidence shared fits with the claim the sharing partner wants to make. 3. Work together to make suggestions for evidence from the model that could work with their arguments. Listen in and check in with partners who may need help selecting new evidence or adjusting their claims prior to writing"
  - **CCC SYS: P2 Systems in the natural and designed world have parts that work together**.
  - **DCI ESS3.A Living things need water, air, and resources from the land, and they live in places that have the things they need.**
  - **SEP ARG: P6 Construct an argument with evidence to support a claim.**
- In Lesson 10, Connection, Step 2: students integrate the use of the elements when they communicate their solutions: "Prompts to use: What could we do to help our classmates notice how the solution we drew and wrote about can make it easier for some animals and plants to live and grow? Ideas to look and listen for: We should share why our solution makes it easier for some animals and/or plants to live in the environment. We should share how our solution helps the animals and/or plants" Lesson 10, Synthesize, Step 4, Cause and Effect sidebar: "In this discussion, students build from their researching problems and solutions in Lesson 9 to discuss how the choices people make can affect the environment where plants and animals live. They continue by discussing solutions that people can do (causes), which can make it easier for some plants and/or animals to meet their needs to live and grow (effect). Students

discuss how this generates observable patterns in the effects of people's actions to reduce their impact on some plants and/or animals and the environment" (Lesson 10, Teacher Guide)

- **CE-P1: Events have causes that generate observable patterns.**
- **ETS1.B-P1: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. ESS3.A-P1: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.**
- **INFO-P4: Obtain Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.**

Criterion-Based Suggestions for Improvement: N/A

I. D Unit Coherence

EXTENSIVE

Lessons fit together to target a set of performance expectations.

i. Each lesson builds on prior lessons by addressing questions raised in those lessons, cultivating new questions that build on what students figured out, or cultivating new questions from related phenomena, problems, and prior student experiences.

ii. The lessons help students develop toward proficiency in a targeted set of performance expectations.

The reviewers found **extensive** evidence that the lessons fit together coherently to target a set of performance expectations, as each lesson builds directly on prior lessons and makes the links between lessons explicit to students. This includes:

- As students move through the unit, part of what they figure out is used as the next question(s) to pursue.
- Students have regular opportunities to engage in asking questions based on what they have learned so far in the unit and to revisit their questions in subsequent lessons.

The lessons work together to provide sufficient opportunities for students to build proficiency in all of the targeted learning (e.g., targeted NGSS PEs) for all three dimensions:

- K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.
- K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
- K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.
- K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

i. Each lesson builds on prior lessons by addressing questions raised in those lessons, cultivating new questions that build on what students figured out, or cultivating new questions from related phenomena, problems, and prior student experiences.

- Lesson 1, Navigate, Step 7: "Discuss what to investigate next. Display slide N and facilitate a brief turn and talk discussion about what students could investigate next based on their observations and questions. Begin by restating the unit question we are investigating, "Do birds, other animals, and plants need our help to live?" and then ask students what we could do to figure out whether or not they need help from people. Look and listen for students to suggest we need to observe more birds, we need to know what birds need, we need to see other animals/plants, etc. Use these ideas to suggest that we can start by focusing on birds" (Lesson 1, Teacher Guide)
- Lesson 2, Connect, Step 2: "Add new questions. Use the students' stories to return to the Notice and Wonder chart (refer to slide C), connecting observations they made of birds (with or without people) to ones that they made in Lesson 1. Ask students if they have any new questions about birds and how they live with or without people now that we have shared more observations and experiences" (Lesson 2, Teacher Guide)
- Lesson 3, Navigate, Step 1: "Recall the questions we wanted to investigate together. Use the Notice and Wonder chart to highlight questions relating to how birds get what they need to live and grow. Have students turn and talk with a partner about any questions they may have about how birds get what they need to live and grow. After a minute or two, have a few students share their questions" (Lesson 3, Teacher Guide)
- Lesson 4, Navigate, Step 1: "Recall what we figured out in the previous lessons. Gather in a Scientists Circle and display slide A. Have students do a brief turn and talk about what they investigated in the previous lessons about what birds need and how they get what they need. Bring students back together and revisit the Our Growing Ideas chart to guide a whole class discussion using the following prompts on what they figured out in the previous lessons" (Lesson 4, Teacher Guide)
- Lesson 5, Navigate, Step 8: "Revisit the Notice and Wonder Chart. Work with students to check off any questions they have answered (likely about animals meeting their needs) and review unanswered questions, especially about plants and people. Take this time to add new questions students may have about people and plants" (Lesson 5, Teacher Guide)
- Lesson 6, Navigate, Step 7: "Take stock of what we figured out. Revisit the class Notice and Wonder chart (refer to slide J) and the updated Bird Model from Lesson 4. Review that we used our observations, patterns in our class data and what we read in our book to make claims and support them with evidence about what plants need and how they get those things. Ask students what questions they can now answer based on what they figured out today and check these off on the chart. Take stock of what we figured out. Revisit the class Notice and Wonder chart (refer to slide J) and the updated Bird Model from Lesson 4. Review that we used our observations, patterns in our class data and what we read in our book to make claims and support them with evidence about what plants need and how they get those things. Ask students what questions they can now answer based on what they figured out today and check these off on the chart" (Lesson 6, Teacher Guide)
- Lesson 7, Navigate, Step 1: "Recall what we figured out in the previous lessons. Display Our Growing Ideas chart (refer to slide A). Use the following prompts to guide a class discussion on what the class figured out in the previous lessons about what plants and other animals need and how they meet those needs. Consider using a turn-and-talk where students can change partners between questions or an inside-outside circle discussion structure to give students opportunities to move around and share with multiple partners before a few volunteers share with the whole class" (Lesson 7, Teacher Guide)
- Lesson 8, Navigate, Step 1: "Use Our Growing Ideas chart to recall where we left off. Gather students in a scientists circle. Use Our Growing Ideas chart (refer to slide A) to have students recall what we did in the last lesson. Use the following prompts to have students turn and talk with a partner and share as a whole class their ideas of what they want to figure out next" (Lesson 8, Teacher Guide)

- Lesson 9, Navigate, Step 5: "Take stock of what we figured out. Revisit the class Notice and Wonder chart (refer to slide F). Ask students what questions they can now answer based on what they figured out today. Review what they have figured out about solutions to help plants and animals" (Lesson 9, Teacher Guide)
- Lesson 10, Synthesize, Step 4: "Transition to the next component while connecting back to the unit question. Direct students to the class' version of the unit question on Our Growing Ideas chart. Read the unit question aloud for the class and ask how the solutions we researched and shared can help us to continue thinking about that question. Use these ideas to motivate revisiting our arguments now that we have gathered more evidence and answered many of our questions about people and the environment" (Lesson 10, Teacher Guide)

ii. The lessons help students develop toward proficiency in a targeted set of performance expectations.

The lessons help students develop toward proficiency in a targeted set of performance expectations. Target Performance Expectations are K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

- K.4 Unit Front Matter, "Do birds, other animals, and plants need people to help them live?"
  - Lesson 1 "We wonder about how birds get food where they live, so we make observations of birds in our schoolyard and use a model to show what we observed. We gather our questions, including wondering what birds (as well as other animals plants) need to live and if that includes help from people"
  - Lesson 2 "We notice that birds do a lot of different things where they live, so we use those observations to form initial ideas about what birds need. We think we notice patterns so we use a book to gather information about what birds need to live and grow"

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

- K.4 Unit Front Matter, "Do birds, other animals, and plants need people to help them live?"
  - Lesson 3 "We still have questions about how birds get what they need so we make more observations of birds meeting their needs. We gather evidence to make claims that birds change the environment to meet their needs. We are ready to explain what we figured out about birds"
  - Lesson 4 "We add to our model to explain how birds live in their environment by getting what they need and changing the environment. We use this new evidence to make arguments for whether birds, other animals, and plants need people to help them live. We still have some questions to answer about other animals and plants"
  - Lesson 7 We are ready to return to our arguments. We begin by adding ideas about plants and animals to our class model and use our new evidence to add to or change our arguments about whether animals and plants need help from people to live. We still have questions about people, who also live in the same environments as plants and animals"

K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

- K.4 Unit Front Matter, "Do birds, other animals, and plants need people to help them live?"
  - Lessons 5-6 "We make observations of new animals and plants to notice patterns that different animals need similar things from where they live and different plants need similar things where they live. We also gather evidence that supports arguments that both plants and animals can change their environments to meet their needs"

  - Lesson 8 "To figure out more about people's needs, we go on a tour of our school to see how we meet our needs everyday. We read a book to figure out that everything we do to meet our needs, and live our everyday lives, uses natural resources from the environment and using resources can change the environment"

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

- K.4 Unit Front Matter, "Do birds, other animals, and plants need people to help them live?"
  - Lessons 9-10 "We use a website to find out how people using resources and changing the environment affects plants and animals. We then research and communicate ways that people can make choices so that it is easier for plants and animals to live and grow, even when sharing the environment with people"

Criterion-Based Suggestions for Improvement: N/A

I.E. Multiple Science Domains

EXTENSIVE

When appropriate, links are made across the science domains of life science, physical science, and Earth and space science.

i. Disciplinary core ideas from different disciplines are used together to explain phenomena.

ii. The usefulness of crosscutting concepts to make sense of phenomena or design solutions to problems across science domains is highlighted.

The reviewers found **extensive** evidence that links are made across science domains when appropriate because the unit focuses on more than one science domain. The phenomenon of how birds, other animals, and plants can live with or without help from people can be fully addressed within the Life Science and Earth and Space Science Domains. There is significant overlap between the science ideas described in the targeted ESS and LS DCI elements. Though the materials focus on more than one science domain, because of this overlap, there is no evidence that students recognize that ideas from multiple domains are needed to explain the phenomenon. The usefulness of crosscutting concepts for making sense of phenomena or designing solutions to problems across science domains is highlighted in teacher sidebars.

i. Disciplinary core ideas from different disciplines are used together to explain phenomena.

DCI links

ESS2.E-P1: Plants and animals can change their environment.

ESS3.A-P1: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

ESS3.C-P1: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.

LS1.C-P1: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

- Lesson 3, Synthesize, Step 4: "Prompts to use: What did we figure out about our lesson question, How do birds get what they need to live and grow? What claim can we make?" Ideas to look and listen for: Birds can get things from their environments to meet their needs for food, water, air, and shelter" **ESS3.A-P1 Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. LS1.C-P1 All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.**

- Lesson 5, Connect, Step 6: "Prompts to use: What kind of food does ____ eat? Ideas to look and listen for: Bees eat food from plants. Beavers eat trees and water plants Deer eat plants, leaves, twigs, nuts, fruits Turtles eat plants, animals, bugs, fish" **ESS3.A-P1 Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. LS1.C-P1 All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.**

- Lesson 5, Connect, Step 6: "Obtain information from infographics. Read each infographic one at a time, pausing to use questions like the following in obtaining information about what each of the animals needs. Prompts to use: According to the infographic, what does the ____ need to live and grow? Feel free to use words, the infographics, or act out your ideas. What kind of food does ____ eat? Where do _____ get water they need? What kind of shelters do ____ use? Now that we have found out what these animals need, why do you think each changed their environment? Does this new evidence support your claim or a different one?" (Lesson 5, Teacher Guide) **ESS3.A-P1 Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. ESS2.E-P1 Plants and animals can change their environment. LS1.C-P1 All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.**

- Lesson 6, Connect, Step 5: "Engage students in the interactive read aloud. Read the Plant Care Cards. Pause at the indicated places in the book to have students answer the questions, as well as the prompts connecting to their own observations. Prompts to use: Page 1: What do plants need to live and grow? How is this similar to what we have observed? Page 6: What changed about where the beans were growing? Why did that change happen? Page 9: What did the bench look like before the plant grew? What about after? Page 9: Why did the plant break through the bench? Page 12: What is different about the sidewalk? Page 15: How does this book help us answer our question about how plants get what they need to live and grow?" **LS1.C-P1 All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. ESS2.E-P1 Plants and animals can change their environment.**

- Lesson 9, Explore, Step 2: "Recall what we have already figured out about people using natural resources. Use the following prompts to facilitate a brief class discussion to recall what the class has already figured out about people's impact of using natural resources on the environment. Encourage students to use materials around the classroom to express their ideas" **ESS3.C-P1: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. LS1.C-P1: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.**

- Lesson 10, Connect, Step 2: "Motivate the need to create a Communication Checklist. Ask students how they could make sure they share all parts of the solution during the gallery tour and how the solution can make it easier for animals and plants to live and grow. Look and listen for ideas that they could create a checklist to make sure they include each part of the problem and solution when sharing during the gallery tour" **ESS3.A-P1 Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. ESS3.C-P1: Things that people do to live comfortably can**

affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. LS1.C-P1: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

ii. The usefulness of crosscutting concepts to make sense of phenomena or design solutions to problems across science domains is highlighted.

CCC links

Students look for patterns (PAT) across the needs of plants, animals, and humans. There is evidence that the usefulness of looking for patterns across domains is highlighted in sidebars for the teacher.

- Lesson 2, Explore, Step 4, Patterns sidebar: "If students have experienced Unit K.1: Why do some surfaces get hot and how can we make them less hot? unit, they will be familiar with patterns from identifying patterns of surfaces that feel hot and less hot. Students who have experienced Unit K.2: How can we be prepared for the weather? will also have observed patterns in local weather. Students have opportunities to build on those experiences here as they observe patterns in their observations of birds and later in this lesson, patterns in the needs of birds. As the unit progresses, students will have opportunities to observe patterns in what animals need and what plants need" (Lesson 2, Teacher Guide)
- Lesson 3, Explore, Step 2: "Remind students that scientists share and compare their observations to identify patterns they can use as evidence to answer their lesson question. Explain that they will share their observations of what the birds were using and what they were doing with those things on the Bird Environment Cards to possibly meet their needs, in order to try and identify patterns across all of the birds on the Bird Environment Cards. Then use the following prompts to guide the discussion, making sure to hear from students in each needs group...Prompts to use: What foods do different birds seem to eat?...Where might that food come from?...What is similar about where all of the birds are getting their food?...What did the birds appear to do to the things around them to get the food?..." (Lesson 3, Teacher Guide,).
- Lesson 3, Explore, Step 2: "Emphasize that the class has made many observations and that they seem to have noticed patterns in what birds might be using and what they might be doing with those things to possibly meet their needs. Remind students that a pattern is something that happens over and over again and can help us know what will happen next...Have students turn and talk with their partner about what birds use to possibly meet their needs to live and grow and a pattern of where they get those things. Have a few students share in order to come to a class agreement that the things birds use to possibly meet their needs are in the places they live and that they are able to live there because they can meet their needs. To give an example of this, ask students to give a thumbs up, down, or to the side as to whether a bird that only eats fish could live in a place without fish...Reiterate that they figured out a pattern across the many birds on the Bird Environment Cards that birds live in places where they can get what they need to live and grow and that they use things in the places they live to possibly meet their needs" (Lesson 3, Teacher Guide, pp19-20).
- Lesson 6, Explore, Step 4: "Have students come back together and use the prompts below to lead a discussion to make sense of what they figured out. During the discussion, encourage student-to-student discussion and their use of evidence from patterns of their plant observations as documented on their handouts in order to come to an agreement about the evidence we have and how that supports the claims we have made about what plants need. Prompts to use: Looking at our class data (point to class example Plant Needs handout), what was similar about what all these plants needed?...What pattern are we starting to notice?...What was different about what the plants needed? What did you notice about the amount of water needed? What about the amount of sunlight?...What other patterns are we starting to notice about the water and sunlight plants need?" (Lesson 6, Teacher Guide).

- Lesson 6, Synthesize, Step 6: "Remind students of the unit question, Do birds, other animals, and plants need people to help them live? Ask students to turn and talk about how today's work - observing patterns of what plants need and how they meet those needs - relates to the unit question. Consider using prompts like the following to facilitate this brief discussion. Prompts to use: What things do plants need to live?...Did we gather evidence of plants getting these things from people or somewhere else?" (Lesson 6, Teacher Guide).

Criterion-Based Suggestions for Improvement: N/A

I.F. Math and ELA

EXTENSIVE

Provides grade-appropriate connection(s) to the Common Core State Standards in Mathematics and/or English Language Arts & Literacy in History/Social Studies, Science and Technical Subjects.

The reviewers found **extensive** evidence that the materials provide grade-appropriate connections to the Common Core State Standards in Mathematics and/or English Language Arts & Literacy in History/Social Studies, Science and Technical Subjects because the materials explicitly state the mathematics and ELA standards that are used in the unit and support students to see the connections between content areas.

ELA

Reading: Information Text

CCSS.ELA-LITERACY.RI.K.2 With prompting and support, identify the main topic and retell key details of a text. Claimed in Lessons 1, 4, and 8. Examples include:

- Lesson 1, Connect, Step 2, Literacy Supports sidebar: "Many of the strategies used to engage students in an interactive read-aloud in ELA can also be used in science time. Pausing to ask the prompts in the text encourages engagement, helps students identify main ideas and key details in the text, and prepares students for the observations they will make later in the lesson (RI.K.2)" (Lesson 1, Teacher Guide)
- Lesson 4, Connect, Step 3, Literacy Supports sidebar: "By answering questions during and after reading, students are gaining practice identifying the main topic and retelling key details of a text. Students use the main topic and details of a text to help them make sense of argumentation and how kindergartners can apply this scientific practice to their own work within this unit (RI.K.2)" (Lesson 4, Teacher Guide)
- Lesson 8, Connect, Step 3: "Engage students in the interactive read-aloud. Read the Natural Resources book. Pause at the indicated places in the book to help students find out that people use things from the environment for everything they do, including meeting their needs. Use the final questions in the following table to lead a brief sensemaking discussion after reading the book. Pause to use gestures, point to illustrations, and allow students to discuss ideas with a partner in their preferred language to offer multiple means of engagement and support deeper understanding" (Lesson 8, Teacher Guide)

CCSS-ELA-LITERACY.RI.K.7 With prompting and support, describe the relationship between illustrations and the text in which they appear (e.g., what person, place, thing, or idea in the text an illustration depicts). Claimed in Lessons 6 and 9.

- Lesson 6, Connect, Step 5, Literacy Supports sidebar: "While reading, encourage students to make connections between the images and words in the text. This supports RI.K.7 and provides students additional practice with describing the relationship between images and the text in which they appear. In this moment students will describe the relationship between ideas about plants changing their environment to meet their needs with images in the text" (Lesson 6, Teacher Guide)
- Lesson 9, Connect, Step 3, Literacy Supports sidebar: "The website includes text, images, and audio to ensure that all learners can access the content. Encourage students to use the audio clips, words, and images to support students' access to the content and describe how images and words are related in a digital text. This ensures that whether a student is reading at, above, or below grade-level, their understanding of the website content is supported. Students can use icons to find a website page (e.g., the water droplet icon will take them to the water page). Or students can use their phonemic awareness skills (e.g., the /h/ sound is the first sound in the word 'home'). This supports RI.K.7 and helps students independently navigate the website as they engage in research to answer their lesson question" (Lesson 9, Teacher Guide)

CCSS-ELA-LITERACY.RI.K.8 With prompting and support, identify the reasons an author gives to support points in a text. Claimed in Lesson 7.

- Lesson 7, Connect, Step 5, Literacy Supports sidebar: "The prompts from the We are all Animals! book repeatedly asks students to explain how children in different communities meet their needs. Consider explaining to students prior to reading that they will need to notice key details in the text to answer questions while the book is read. Students will use words and images from the text to identify the reasons and evidence the author provides for answering this question for each community in the book (RI.K.8)" (Lesson 7, Teacher Guide)

Writing

CCSS-ELA-LITERACY.W.K.5 With guidance and support from adults, respond to questions and suggestions from peers and add details to strengthen writing as needed. Claimed in Lesson 7.

- Lesson 7, Synthesize, Step 3, Literacy Supports sidebar: "Remind students that talking about what they plan to write in their argument is an important practice in ELA and in science. Partners will respond to each other's questions and suggestions about the claims and evidence they plan to use in their argument which will organize their thinking so they are better prepared to construct an argument supported by evidence (W.K.5)" (Lesson 7, Teacher Guide)

CCSS-ELA-LITERACY.W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). Claimed in Lesson 9.

- Lesson 9, Connect, Step 3: "Obtain information from the website. Give time for students to obtain information from the website. As students work together, circulate to listen for student ideas and pose the following questions, helping pairs think more deeply about the information on the website and how to record it" (Lesson 9, Teacher Guide)

Speaking and Listening

CCSS-ELA-LITERACY.SL.K.1A Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion). Claimed in Lessons 1, 3, 6 and 10. Examples include:

- Lesson 1, Synthesize, Step 5, Literacy Supports sidebar: "Support students in speaking audibly to express their thoughts and ideas clearly. Students can also be supported in communicating their ideas slowly and clearly, whether they choose to share their thoughts out loud or via gestures. Remind students that Scientists Circle discussions are an opportunity to practice being a good listener, paying attention to the speaker, and taking turns in a discussion. This connects with SL.K.1A and SL.K.6" (Lesson 1, Teacher Guide)
- Lesson 3, Synthesize, Step 4, Literacy Supports sidebar: "Reminding students that their classroom agreements provide an opportunity for students to develop and follow agreed-upon rules for discussion. Students' use of the classroom agreements, specifically as they listen to others with care and speak one at a time about the topics and texts under discussion, supports students in understanding pragmatic rules for discussion and how to communicate in large and small group settings. (SL.K.1A)" (Lesson 3, Teacher Guide)
- Lesson 6, Synthesize, Step 6, Literacy Supports sidebar: "A Building Understandings Discussion offers students the opportunity to practice their speaking and listening skills. Reiterate for students the importance of following agreed-upon rules for discussion (e.g., listening, turn-taking) and speaking at an appropriate rate, audibly, and clearly so that our class community can understand everyone's science ideas (SL.K.1A, SL.K.6)" (Lesson 6, Teacher Guide)
- Lesson 10, Connect, Step 3, Literacy Supports sidebar: "The Gallery Tour offers students the opportunity to practice their speaking and listening skills. Reiterate for students the importance of following agreed-upon rules for discussion (e.g., listening, turn-taking) and speaking at an appropriate rate, audibly, and clearly so that our class community can understand everyone's science ideas (SL.K.1A, SL.K.6)" (Lesson 10, Teacher Guide)

CCSS-ELA-LITERACY.SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail. Claimed in Lessons 1, 2, and 4. Examples include:

- Lesson 1, Explore, Step 3: "Summarize the directions for exploring outside. Display slide G and explain to students that they will 1) look and listen for birds outside, 2) draw/write in a box on their Birdwatching Observations handout, and 3) share what they notice with their partner" (Lesson 1, Teacher Guide)
- Lesson 2, Explore, Step 3: "Then, prompt students to individually record how they sorted the cards using words and/or drawing on the Bird Card Observations handout (refer to the image on slide H or consider projecting a copy of the handout). Show students how they can use the line to write the activity the birds in the group is doing and/or draw a picture of that activity. Students can add boxes to the back if they make more than four groups" (Lesson 2, Teacher Guide)
- Lesson 4, Synthesize, Step 2: "Invite students to the model to add drawings, printed images, words, labels, and/or other representations that have shared meaning for the class…How can we show how birds get those things they need? Feel free to use words, drawings on your handouts, or act it out to share your ideas" (Lesson 4, Teacher Guide)

CCSS-ELA-LITERACY.SL.K.6 Speak audibly and express thoughts, feelings, and ideas clearly. Claimed in Lessons 1, 5, 6, and 10. Examples include:

- Lesson 1, Synthesize, Step 5, Literacy Supports sidebar: "Support students in speaking audibly to express their thoughts and ideas clearly. Students can also be supported in communicating their ideas slowly and clearly, whether they choose to share their thoughts out loud or via gestures. Remind students that Scientists Circle discussions are an opportunity to practice being a good listener, paying attention to the speaker, and taking turns in a discussion. This connects with SL.K.1A and SL.K.6" (Lesson 1, Teacher Guide)
- Lesson 5, Explore, Step 3, Literacy Supports sidebar: "Encourage students to practice speaking loudly and clearly to convey their observations from the animal in the video. Continue to scaffold this support later in the lesson when students view more videos in small groups. This supports SL.K.6 and ensures that everyone's science ideas are understood" (Lesson 5, Teacher Guide)

- Lesson 6, Synthesize, Step 6, Literacy Supports sidebar: "A Building Understandings Discussion offers students the opportunity to practice their speaking and listening skills. Reiterate for students the importance of following agreed-upon rules for discussion (e.g., listening, turn-taking) and speaking at an appropriate rate, audibly, and clearly so that our class community can understand everyone's science ideas (SL.K.1A, SL.K.6)." (Lesson 6, Teacher Guide)
- Lesson 10, Connect, Step 3, Literacy Supports sidebar: "The Gallery Tour offers students the opportunity to practice their speaking and listening skills. Reiterate for students the importance of following agreed-upon rules for discussion (e.g., listening, turn-taking) and speaking at an appropriate rate, audibly, and clearly so that our class community can understand everyone's science ideas (SL.K.1A, SL.K.6)" (Lesson 10, Teacher Guide)

Language

CCSS-ELA-LITERACY.L.K.1B Use frequently occurring nouns and verbs. Claimed in Lesson 5.

- Lesson 5, Connect, Step 6, Literacy Supports sidebar: "As students share the information they gather from the Animal Infographics, consider naming that many of the needs of the animals in the text can be described using frequently occurring nouns and verbs (e.g., bee, food, eat, build). This supports L.K.1B and helps students think about the language they use to share their science ideas and make explicit connections between their language and different parts of speech" (Lesson 5, Teacher Guide)

CCSS-ELA-LITERACY.L.K.1E Use the most frequently occurring prepositions (e.g., to, from, in, out, on, off, for, of, by, with). Claimed in Lesson 3.

- Lesson 3, Explore, Step 2, Literacy Supports sidebar: "As students work with partners to compare the actions birds are taking to possibly meet their needs as observed on the Bird Environment Cards, prompt and support them to extend their oral language to include an action (verb) and a description of how the action might meets the bird's needs (prepositional phrase). Consider modeling a sentence stem like 'The bird is ____-ing to, for, by, with _____' to ensure students share their thoughts in complete, expanded sentences using a prepositional phrase (L.K.1E, L.K.1F)" (Lesson 3, Teacher Guide)

CCSS-ELA-LITERACY.L.K.1F Produce and expand complete sentences in shared language activities. Claimed in Lesson 3.

- Lesson 3, Literacy Supports: "As students work with partners to compare the actions birds are taking to possibly meet their needs as observed on the Bird Environment Cards, prompt and support them to extend their oral language to include an action (verb) and a description of how the action might meets the bird's needs (prepositional phrase). Consider modeling a sentence stem like "The bird is ____-ing to, for, by, with _____" to ensure students share their thoughts in complete, expanded sentences using a prepositional phrase (L.K.1E, L.K.1F)"

Mathematics

Standards for Mathematical Practices

CCSS-MATH-Practice.MP2 Reason abstractly and quantitatively. Claimed in Lesson 6.

- Lesson 6, Explore, Step 3, Math Supports sidebar: "Each Plant Care Card uses symbols to display how much water and sunlight a plant needs to live and grow, ranging from no water/sunlight to a lot of water/sunlight. Students will use these cards to reason both abstractly and quantitatively about the amount of water and sunlight each plant needs (MP2) by classifying into categories of water and sunlight (part of K.MD.B.3). Have students count the amount of droplets on the card to determine which of the three categories best represents the amount of water the plant needs" (Lesson 6, Teacher Guide)

CCSS-MATH-Practice.MP3 Construct viable arguments and critique the reasoning of others. Claimed in Lesson 6.

- Lesson 6, Explore, Step 3, Math Supports sidebar: "When students are asked "What do you notice about the amount of water needed for the different plants?," prompt them to support their claims using observations about the number of droplets shown on the Plant Care Cards (MP3)" (Lesson 6, Teacher Guide)

Counting and Cardinality

CCSS-MATH-K.CC.C.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.* (*Include groups with up to ten objects.) Claimed in Lessons 4 and 7.

- Lesson 4, Navigate, Step 6, Math Supports sidebar: "To help students compare the number of "yes", "no", and "maybe" votes from the Vote with Your Body data collected in lesson 1 and this lesson, ask students to explain how their comparisons of more or less votes connect to the number of tally marks and the written numeral (K.CC.C.6 and K.CC.C.7). Additionally, students can use stacked unifix cubes to represent the vote counts and visually compare the quantities" (Lesson 4, Teacher Guide)
- Lesson 6, Math Supports: "When students are asked 'What do you notice about the amount of water needed for the different plants?,' prompt them to support their claims using observations about the number of droplets shown on the Plant Care Cards (MP3)" This lesson has not been claimed, but students may be doing this standard when comparing the number of droplets on the plant care cards.
- Lesson 7, Synthesize, Step 4: "Count votes. As a class, count the number of students in each group. Record the totals using both tallies and numerals and support students in comparing today's totals to those in Lesson 4. Discuss changing thinking over time. Remind students of the classroom agreement, "We let our ideas grow and change." Use questions like the following to engage the class in a brief discussion about how the class' thinking may have changed over the course of the unit based on the number of students who made each claim in this lesson and lesson 4. How many of us thought plants and animals (including birds) needed help from people in Lesson 4? How about today? Do more or less of us think that now? What evidence did we have today that might have changed our thinking? How many of us thought plants and animals (including birds) did not need help from people in Lesson 4? How about today? Do more or less of us think that now? What evidence did we have today that might have changed our thinking? How many of us thought plants and animals (including birds) might/sometimes need help from people in Lesson 4? How about today? Do more or less of us think that now? What evidence did we have today that might have changed our thinking?" (Lesson 7, Teacher Guide)

CCSS-MATH-K.CC.C.7 Compare two numbers between 1 and 10 presented as written numerals. Claimed in Lessons 4 and 7.

- Lesson 4, Navigate, Step 6, Math Supports sidebar: "To help students compare the number of "yes", "no", and "maybe" votes from the Vote with Your Body data collected in lesson 1 and this lesson, ask students to explain how their comparisons of more or less votes connect to the number of tally marks and the written numeral (K.CC.C.6 and K.CC.C.7). Additionally, students can use stacked unifix cubes to represent the vote counts and visually compare the quantities" (Lesson 4, Teacher Guide)
- Lesson 4, Navigate, Step 6: "Count votes. As a class, count how many students voted for yes, no and maybe. Record the number for each using tallies or numbers. Also display the totals from Lesson 1. Use the tallies and/or numbers to compare how the class's thinking has changed from their initial voting opportunity in Lesson 1 to today" (Lesson 4, Teacher Guide)
- Lesson 7, Synthesize, Step 4: "Count votes. As a class, count the number of students in each group. Record the totals using both tallies and numerals and support students in comparing today's totals to those in Lesson 4. Discuss

changing thinking over time. Remind students of the classroom agreement, "We let our ideas grow and change." Use questions like the following to engage the class in a brief discussion about how the class' thinking may have changed over the course of the unit based on the number of students who made each claim in this lesson and lesson 4" (Lesson 7, Teacher Guide)

Measurement and Data

CCSS-MATH-K.MD.B.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.* (*Limit category counts to be less than or equal to 10.) Claimed in Lessons 1, 2, 3, 4, 6, 7, and 10.

- Lesson 1, Synthesize, Step 6, Math Supports sidebar: "Once students have made their final decisions about how to answer the question (Do birds, other animals, and plants need our help to live?), have them count how many students are in each group (part of K.MD.B.3). Some options for supporting counting include counting each student one by one and having them sit down once they have been counted, choral counting, or using manipulatives, such as cubes, to help keep track of the number of students in each group" (Lesson 1, Teacher Guide)
- Lesson 2, Explore, Step 3, Math Supports sidebar: "As students classify the cards into categories (e.g. eating, drinking, flying) to make sense of what birds are doing in their natural environments, ask groups to explain their thinking for the categories (part of K.MD.B.3)" (Lesson 2, Teacher Guide)
- Lesson 3, Explore, Step 2, Math Supports sidebar: "As students classify and sort cards into a category (food, water, shelter, air) based on the birds' needs, have them place cards in the same category in vertical or horizontal lines to help them organize the data clearly by categories (part of K.MD.B.3)" (Lesson 3, Teacher Guide) Students sort the cards into categories here, but the teacher isn't prompted to ask students to count the number of objects or sort categories by count.
- Lesson 4, Navigate, Step 6, Math Supports sidebar: "Similar to lesson 1, students will choose a location in the room to represent their vote. Once students have made their final decisions about how to answer the question (*Do birds, other animals, and plants need people to help them live?*), have them count how many students are in each group (part of K.MD.B.3). Some options for supporting counting include counting each student one by one and having them sit down once they have been counted, choral counting, or using manipulatives, such as cubes, to help keep track of the number of students in each group" (Lesson 4, Teacher Guide) There is little evidence that students are sorting categories by count.
- Lesson 6, Explore, Step 3, Math Supports sidebar: "Each Plant Care Card uses symbols to display how much water and sunlight a plant needs to live and grow, ranging from no water/sunlight to a lot of water/sunlight. Students will use these cards to reason both abstractly and quantitatively about the amount of water and sunlight each plant needs (MP2) by classifying into categories of water and sunlight (part of K.MD.B.3). Have students count the amount of droplets on the card to determine which of the three categories best represents the amount of water the plant needs" (lesson 6, Teacher Guide)
- Lesson 7, Synthesize, Step 4: Math Supports sidebar "Similar to previous lessons, students will choose a location in the room to represent their vote. Once students have made their final decisions about how to answer the question (*Do birds, other animals, and plants need our help?*), have them count how many students are in each group (part of K.MD.B.3). Some options for supporting counting include counting each student one by one and having them sit down once they have been counted, choral counting, or using manipulatives, such as cubes, to help keep track of the number of students in each group" (Lesson 7, Teacher Guide)
- Lesson 10, Synthesize, Step 5, Math Supports sidebar: "Similar to previous lessons, students will choose a location in the room to represent their vote. Once students have made their final decisions about how to answer the question (*Do birds, other animals, and plants need people to help them live?*), have them count how many students are in each

group (part of K.MD.B.3). Some options for supporting counting include counting each student one by one and having them sit down once they have been counted, choral counting, or using manipulatives, such as cubes, to help keep track of the number of students in each group" (Lesson 10, Teacher Guide) There is limited evidence that students are sorting categories by count.

Criterion-Based Suggestions for Improvement: N/A

CATEGORY II

NGSS Instructional Supports

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II.A. Relevance and Authenticity

EXTENSIVE

Engages students in authentic and meaningful scenarios that reflect the practice of science and engineering as experienced in the real world.

i. Students experience phenomena or design problems as directly as possible (firsthand or through media representations).

ii. Includes suggestions for how to connect instruction to the students' home, neighborhood, community and/or culture as appropriate.

iii. Provides opportunities for students to connect their explanation of a phenomenon and/or their design solution to a problem to questions from their own experience.

The reviewers found **extensive** evidence that the materials engage students in authentic and meaningful scenarios that reflect the practice of science and engineering as experienced in the real world. Students can relate to the phenomenon, problem, and activities. Students experience phenomena or design problems as directly as possible by observing birds in their local environment and using the media and website to solve problems related to how people can use natural resources to help animals and plants live. The materials include suggestions for connecting instruction to students' experiences. The materials do provide opportunities for students to connect their explanation of a phenomenon and/or their design solution to questions from their own experiences when students share their own stories of how birds, other animals, and plants need people's help or don't need people's help to live.

i. Students experience phenomena or design problems as directly as possible (firsthand or through media representations)

- Lesson 1, Let's Go Birdwatching Book Slides "Start by looking outside. You can look out of a window or you can go outdoors." (Lesson 1, Let's Go Birdwatching, slide 12)
- Lesson 1, Explore, Step 3 "Summarize the directions for exploring outside. Display slide G and explain to students that they will 1) look and listen for birds outside, 2) draw/write in a box on their Birdwatching Observations handout, and 3) share what they notice with their partner." (Lesson 1, Teacher Guide)
- Lesson 2, Connect, Step 5 "Facilitate an interactive read-aloud. Read the book aloud and pause on the indicated pages for students to discuss the following prompts that will support building understanding of what birds need to live." (Lesson 2, Teacher Guide)
- Lesson 5, Explore, Step 2 "Make observations. Give students time to view the video in their small groups. As students watch (and rewatch) their videos, circulate to groups to listen for student ideas and pose the following questions, helping students to think more deeply about what the animals may be doing and why." (Lesson 5, Teacher Guide)
- Lesson 8, Explore, Step 2 "Explain directions for the school tour. Display slide D and explain that they should 1) Tour our school to find people doing something to possibly meet a need to live and grow. 2.) Hold up the Needs Cards that best fits with what need they think the observation connects with. 3.) Observe what people are using to meet that need." (Lesson 9, Teacher Guide)
- Lesson 9, Connect, Step 3 "Obtain information from the website. Give time for students to obtain information from the website. As students work together, circulate to listen for student ideas and pose the following questions, helping pairs think more deeply about the information on the website and how to record it." (Lesson 9, Teacher Guide)

ii. Includes suggestions for how to connect instruction to the students' home, neighborhood, community, and/or culture as appropriate.

- Lesson 1, Navigate, Step 7: "Go over the Birds Near Me page with students and explain how they can use it to document stories and/or observations in their communities. Tell students that you are excited to hear their home stories. Communicate with students and their caregivers about when and how to return the Community Connection pages for the next science lesson. If you have not yet sent home the Welcome Letter for this unit, also do that today" (Lesson 1, Teacher Guide).
- Lesson 2, Connect, Step 2: "...remind students that they asked their friends and families for ideas, stories, and observations to help us find out more about birds. Tell students that you are excited to hear their home stories. Prompt students who chose to return their Birds Near Me community connection from Lesson 1 to bring it as they gather into the Scientist's Circle. If students do not have the handout, encourage them to recall a story or observation that they want to share about birds from their community" (Lesson 2, Teacher Guide).
- Lesson 4, Navigate, Step 6: "Remind students how it was helpful in previous lessons about birds by sharing their own observations and stories, and how these experiences outside of school are important for us to have evidence for how animals meet their needs. Send home Plants and Animals Near Me Community Connection so that students can have it for Lesson 5 and Lesson 6. Let students know that they can observe both plants and animals in their community or they can choose to do one or the other" (Lesson 4, Teacher Guide).
- Lesson 5, Explore, Step 3, Community Connections sidebar: "Many cultures (which may or may not be represented by students in your class) have unique connections to the animals the class will observe (e.g., some Indigenous creation stories include deer and/or turtles). Consider leveraging these connections to help deepen and broaden students' understanding of the animals explored, including honoring how we connect to these animals, using different names to share how we talk about them, including honoring the students' home languages as well as the indigenous languages for the animals studied" (Lesson 5, Teacher Guide).
- Lesson 7, Connect, Step 5, Community Connections sidebar: "Students and their families might have different ideas and experiences of what people need to live or how these needs are met. For instance, housing can look different for people (e.g., car, trailer, tarp) just like different animals/bird homes look different. As students share and listen to examples of people's needs related to food and shelter, various types of emotions might emerge. The Teacher Handbook resource suggests strategies you can use to support students when they experience these emotions using a three-step routine: Be curious, Validate, and Thank the student. You can also find unit-specific strategies in the Unit Overview" (Lesson 7, Teacher Guide).
- Lesson 9, Synthesize, Step 4, Community Connections sidebar: "In addition to the ways students researched to reduce impact, invite students to share stories about other reasons plants or animals might need our help or the bonds that people have with certain plants or animals. Many Indigenous communities have stories about the relationships of reciprocity and symbiosis that people have with nature. For example, how we need agricultural plants and they need us to take care of them (e.g., corn/maize needs people to tend to them and help them grow/propagate.) You might also invite students to share or learn about local relationships with the land—for example, how families care for plants used for food, medicine, or ceremony. These stories can open space for students to see care, gratitude, and responsibility as forms of scientific relationship-building, not just resource use" (Lesson 9, Teacher Guide).

iii. Provides opportunities for students to connect their explanation of a phenomenon and/or their design solution to a problem to questions from their own experience.

- Lesson 2, Connect, Step 2 "Prepare to share community connections. Display slide B and remind students that they asked their friends and families for ideas, stories, and observations to help us find out more about birds. Tell students that you are excited to hear their home stories. Prompt students who chose to return their Birds Near Me community

connection from Lesson 1 to bring it as they gather into the Scientist's Circle. If students do not have the handout, encourage them to recall a story or observation that they want to share about birds from their community. Share about community birds with a partner. With a partner next to them in the circle, direct them to briefly share their story, drawing, or observations about birds and where they live. Encourage students to practice close listening as peers share, and be prepared to share common themes between their stories and observations and their own. As time allows, have students turn to share with another partner." (Lesson 2, Teacher Guide)

- Lesson 5, Connect, Step 2 "Facilitate a class discussion about community connections. Lead a class discussion to share community examples. Display the Community Examples chart (refer to slide Slide C). Lead a whole class discussion to share stories and observations to see if we can start to identify what animals need to live. Some ways to facilitate this discussion include: As students share, chart their responses on the Community Examples chart, using a combination of words and images. Check with students about the words and images you are using to make sure you are accurately representing their ideas. The previous example is a sample of how this chart could look. Then elicit if students have a similar story or observation, and show this with a hand signal (i.e., thumbs up). Prompt additional volunteers to share different stories and/or observations so the chart has a variety of examples. Use questions like the following to guide students' discussion about their community examples: Where have you seen animals outside of school? What was the animal like? Have you ever taken care of an animal? How did you take care of the animal? What did the animal need?" (Lesson 5, Teacher Guide)
- Lesson 10, Synthesize, Step 5, "Close out the unit. Celebrate all that students figured out about the unit question, *Do birds, other animals, and plants need people to help them live?*. Display slide H and work with students to revisit the Notice and Wonder chart and check off any questions students have answered through their work in this final lesson. Explain that scientists continue to figure out more as they observe more and continue trying to answer their questions, so it is ok if there are still some questions left. Encourage students to continue to observe plants and animals in their communities and to recognize how people can do things to make it easier for some plants and/or animals to get the food, water, air, and shelter that they need to live and grow. Celebrate the thoughtful science students and allow students to store their My Solution assessments in a safe place to take home to share with others."

Criterion-Based Suggestions for Improvement: N/A

II.B. Student Ideas

EXTENSIVE

Student Ideas: Provides opportunities for students to express, clarify, justify, interpret, and represent their ideas and respond to peer and teacher feedback orally and/or in written form as appropriate.

The reviewers found **extensive** evidence that the materials provide students with opportunities to communicate their ideas in ways that are meaningful to them and respectful of their cultures, including but not limited to using multiple modes of discourse. The materials provide regular opportunities for partner and whole-group discussion for all students. Class artifacts do show evidence of students' reasoning and changes in their thinking over time. There are some teacher-to-student and peer-to-peer feedback opportunities, primarily through follow-up questions and responses, to help students communicate their ideas.

Student ideas are clarified, justified, and built upon

- Lesson 2, Navigate, Step 7 "Review the questions we have asked. Re-read some questions from our Notice and Wonder chart to check in on whether we have made progress on any of them (refer to slide L). Connect that we have

started to get a better understanding of what birds need to live. Ask students if there are questions they can now answer based on observations of birds (e.g., What do birds eat? What do birds need?). Add questions to the Notice and Wonder chart. Re-read questions on the Notice and Wonder chart that we are still wondering about. Observe that we still have questions about how birds get the things they need and if they need help from people or can get them in other ways. Invite students to add additional questions they may have about birds and getting the things they need." (Lesson 2, Teacher Guide)

- Lesson 3, Navigate, Step 1 "Develop today's lesson question with students. Building on students' shared questions, co-construct the lesson question with students. The lesson question should be something like, "*How do birds get what they need to live and grow?*" but be sure to use wording your students have been using. Add the lesson question to the next row of Our Growing Ideas chart to continue to keep track of what we figure out." (Lesson 3, Teacher Guide)
- Lesson 3, Navigate, Step 1, Broadening Access Sidebar "Navigation moves help students see connections from one lesson to another. They also help students understand the purpose or goal of the lesson. They promote expectations and beliefs that optimize motivation by making salient what students want to figure out, and support planning and strategy development by guiding appropriate goal setting." (Lesson 3, Teacher Guide)
- Lesson 5, Synthesize, Step 7 "Prepare to update Our Growing Ideas chart. Display Our Growing Ideas chart for (refer to slide M) and ask students to remain in the Scientist's Circle for a Building Understanding Discussion. Remind students that we are using this chart to keep track of all that we are doing and figuring out throughout the unit, so we want to add the ideas we figured out to answer our lesson question about what other animals need to live and grow and how do they get those things (point to the Lesson 5 question on the chart)." (Lesson 5, Teacher Guide)
- Lesson 7, Synthesize, Step 4: "...If there is disagreement, encourage students to ask each other for clarification (can you tell me more about your thinking? But what about_____?) and ask students to consider all of the evidence (What evidence supports that idea? How do you know? Feel free to tell about or point to evidence on our class model)" (Lesson 7, Teacher Guide).
- Lesson 8, Synthesize, Step 5 "Lead a discussion about students' claims. Remind students of the lesson question, How do people get what they need to live and grow? As students share ideas, add them to the column titled "What did we figure out?" Remind students that a claim is an answer to a science question. As students share ideas, continue to support them in responding to and building off one another's ideas, you may consider posting the Discussion Supports handout with sentence starters students can use. Make sure to look for movements and gestures, as well as what students verbalize as they share their ideas." (Lesson 8, Teacher Guide)
- Lesson 10, Synthesize, Step 4 "Facilitate a Consensus Discussion about the causes of people's actions leading to effects, which are observed patterns. The purpose of this Consensus Discussion is to support students in recognizing that people using natural resources causes changes to the environment that can make it harder (problem) or easier (solution) for some animals and/or plants to live and grow (effect), which can generate patterns in the impacts on the environment. Facilitate this discussion as a Think-Pair-Share to allow all students to take stock of what they found out during the gallery tour. Read the first prompts below and direct students to think first, then talk with a partner, and finally share with the group. Continue this process with the remaining prompts." (Lesson 10, Teacher Guide)

Artifacts show evidence of students' reasoning and changes in their thinking over time

- Lesson 4, K.4 Lesson 4 Teacher Reference Agreements Lesson 4, Navigate, Step 1 "Briefly reflect on a recent idea students figured out. Refer to the work students did most recently where they documented a key idea they'd figured out (slide B). Summarize what the class had previously thought or wondered about that and point out that this is a great example of one of our classroom agreements: our ideas changed and/or grew. Motivate revisiting other times our ideas changed and grew. Use these prompts to navigate toward reviewing other things we've figured out this year, in order to deepen our understanding of this agreement." (Lesson 4, Teacher Reference Agreements Guide)

- Lesson 4, Synthesize, Step 4 "Transition to synthesize. Emphasize that our votes have shown that the class still may not be in agreement and that is ok! Share that students will now get a chance to write an argument to capture their current thinking about our unit question." (Lesson 4, Teacher Guide)
- Lesson 4, Synthesize, Step 5: "Distribute the Birds Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to share more evidence for how the bird gets what it needs from their environment with or without people, to support their claim. As students work, circulate and provide support using the following prompts as needed. Prompts to use: How does this (points picture student drew on handout) evidence fit (or support) your claim?...Is there any evidence you want to add or change that better supports or matches your claim?...After students have had 5-10 minutes to work on their arguments, pause their writing and display slide G. Support students to engage in self-reflection around their argument and next steps by reading through each question on the slide. For each question, give students time to view their work and decide if that is something they have completed or if it is something they still need to work on. Emphasize that students can always add more detail to their writing or drawing, even if they noted all parts were done" (Lesson 4, Teacher Guide, pp26-28).
- Lesson 7, Synthesize, Step 3: "...Listen in and check in with partners who may need help selecting new evidence or adjusting their claims prior to writing...Distribute the Plant and Animal Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to use information from their partners and share more evidence for how plants and other animals get what they need from their environment with or without people, to support their claim. As students work, circulate to check in with students and provide support using prompts like the following. Prompts to use: How does this (points picture student drew on handout) evidence fit (or support) your claim?...Is there any evidence you want to add or change that better supports or matches the claim you circled?..." (Lesson 7, Teacher Guide).
- Lesson 7, Synthesize, Step 4 "Discuss changing thinking over time. Remind students of the classroom agreement, "We let our ideas grow and change." Use questions like the following to engage the class in a brief discussion about how the class' thinking may have changed over the course of the unit based on the number of students who made each claim in this lesson and lesson 4.How many of us thought plants and animals (including birds) needed help from people in Lesson 4? How about today? Do more or less of us think that now? What evidence did we have today that might have changed our thinking? How many of us thought plants and animals (including birds) did not need help from people in Lesson 4? How about today? Do more or less of us think that now? What evidence did we have today that might have changed our thinking? How many of us thought plants and animals (including birds) might/ sometimes need help from people in Lesson 4? How about today? Do more or less of us think that now? What evidence did we have today that might have changed our thinking?" There is limited evidence for all students' ideas during this whole class discussion.
- Lesson 10, Synthesize, Step 5 "Transition to making arguments. Summarize student's ideas to affirm how we have been using arguments to answer our unit question throughout our unit. Remind students that scientists often change their mind when they have new evidence, and that they can too, now that they have new evidence. As needed, remind students that their new evidence (from books we have read, images we have looked at, the Plants, Animals, and Me Website website) is represented on their My Solution assessments and Our Growing Ideas chart. We can use evidence (observations, data, or information that helps answer a scientific question) to support our claims (an answer to a science question) as we answer the unit question today." (Lesson 10, Teacher Guide)

Students receive feedback and revise their thinking accordingly.

- Lesson 6, Explore, Step 4, Teaching Tip Sidebar "This discussion is an opportunity for students to engage in conversations together to support each other in making sense of the data they gathered. You might find it helpful to use the Discussion Type Prompts teacher reference during the discussion. This document provides teacher prompts that you could use to elicit and elevate student interactions (student to student discussion) as they make sense

of what they figured out about what plants need to live and grow. You may also display the Discussion Supports handout to provide additional sentence starters for student to student discussion to use as needed throughout the discussion." (Lesson 6, Teacher Guide) The discussion supports provide opportunities for feedback, but there are no specific steps of the lesson focused on feedback. K.4 Lesson 1 Handout 2 Discussion Supports "We observed something different: _____. We observed something different: _____. I agree with that idea because _____. I disagree with that idea because _____. I think _____ because _____." (K.4 Lesson 1 Handout 2 Discussion Supports)

- Lesson 7, Synthesize, Step 3 "Transition to partners to plan arguments. Display slide E and have students meet with a partner to discuss how they would answer that question now that we have gathered evidence about the ways birds, other animals, and plants can meet their needs and live in their environments. Use the directions on the slide to explain directions. Have each partner share their claim and supporting evidence for animals and plants from the model with a partner. Some strategies students can use to share their evidence are verbally sharing their evidence, acting out how the plant and/or animal lives in their environment, and/or pointing to evidence from the model they plan to use. 1. 1. Discuss whether the evidence shared fits with the claim the sharing partner wants to make. 2. Work together to make suggestions for evidence from the model that could work with their arguments. Listen in and check in with partners who may need help selecting new evidence or adjusting their claims prior to writing." (Lesson 7, Teacher Guide)
- Lesson 7, Synthesize, Step 3 "Construct an argument supported by evidence. Display slide F Distribute the Plant and Animal Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to use information from their partners and share more evidence for how plants and other animals get what they need from their environment with or without people, to support their claim. As students work, circulate to check in with students and provide support using prompts like the following. Prompts to use: How does this (points picture student drew on handout) evidence fit (or support) your claim? What suggestions/ideas did you talk about with your partner? What other evidence did we add to the model about how animals live in their environment? How did we show them getting food/water/shelter/air? Feel free to use words, pictures, or our model to share your ideas." (Lesson 7, Teacher Guide)
- Lesson 8, Lesson Assessment Guidance, How can I use this assessment information? "See the Following Student Sensemaking 2 tool for additional guidance on giving feedback to students" (Lesson 8, Teacher Guide, p8). It is not clear how or when educators would provide feedback to students during instruction. Nor is it explicit that students will have the opportunity to reflect on and respond to the feedback they receive during instruction.
  - K.4 Lesson 8 Teacher Assessment Tool Following Student Sensemaking 2, Students might write/draw in Lesson 8, pp3-4
  - "Possible feedback: Tell me about what you observed. Can you say more about why you wrote 'tubes'? How does that show a change? Let's work together to add more details to your writing"
  - "Possible Feedback: Tell me about what you observed. I can see you circled where the trees are cut down in the 'After' picture and wrote, 'the trees are gone.' These will help you remember what you observed when we share with our classmates"
- Lesson 10, Connect, Step 3, Broadening Access sidebar: "...This practice space also allows students to receive feedback from the teacher about how to improve their presentation on both content and communication modes".
  - "Possible follow-up responses" are provided as support to guide in-the-moment constructive feedback to students from the educator. The feedback is based on displayed student thinking related to the classroom task. Students are regularly encouraged to use multiple modalities to respond to the follow-up response prompts.
  - The students are supported to communicate their ideas in ways that are meaningful to them and respectful of their cultures, including but not limited to multiple modes of discourse. (Lesson 10, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- Ensure "[s]upports are provided to guide constructive feedback to students from both the teacher and peers. The feedback is based on displayed student thinking related to the classroom task and is framed to support improvement in how students reason about the phenomenon or problem." (Detailed Guidance, p. 22)
  - Consider providing teachers with guidance on when, within an instructional sequence, they might provide students with individual feedback.
- Ensure "[s]tudents have opportunities to reflect on and respond to the feedback they receive, when appropriate, using multiple modalities of expression." (Detailed Guidance, p. 22)
  - Consider increasing the opportunities for peers to give feedback, receive feedback, and revise their thinking accordingly.

II.C. Building Progressions

ADEQUATE

Identifies and builds on students' prior learning in all three dimensions, including providing the following support to teachers:

i. Explicitly identifying prior student learning expected for all three dimensions

ii. Clearly explaining how the prior learning will be built upon.

The reviewers found **adequate** evidence that the materials identify and build upon students' prior learning in all three dimensions because the K.4 Unit Overview identifies prior learning and describes how that learning will be built upon in the unit. The materials do explicitly identify prior learning expected for all three dimensions, but not at the element level for all dimensions. The supports to teachers clearly explain how the prior learning will be built upon. The materials do provide some explicit support to teachers to clarify why certain terminology is used in the unit and the boundaries of the science ideas for Kindergarten. There was no evidence found of alternate conceptions students may have during the unit

i. Explicitly identifying prior student learning expected for all three dimensions

Disciplinary Core Ideas:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "**Needs of Plants and Animals:** Students come to school with many experiences related to animals and plants, especially taking care of their needs- whether directly, such as pets or houseplants, or indirectly by observing birds and other organisms at parks or zoos." This prior learning relates to the needs of animals and plants, but does not identify the DCI at the element level: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (LS1.C-P1).
- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "**Plants and Animals Changing Environments:** Young children spend much of their lives observing the world around them, which includes the animals and plants in their local environments. In doing so, they may have observed animals changing their environments (e.g., ants gathering food, squirrels digging holes to bury acorns, and plants breaking

sidewalks). Students also may have experiences from their own pets changing their environments (e.g., dogs digging holes) or even people doing so (e.g., cutting down trees and building structures)." This prior learning is related to animals changing their environments, but does not identify the DCI at the element level: Plants and animals can change their environment. (ESS2/E-P1).

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "**Human Impact:** Building from students' experiences with plants and animals (including people) changing their environments, they can come to school with experiences about people's impact on the environment. These experiences can relate to both positive and negative impacts that people can have, such as cutting down trees to build structures or planting pollinator gardens to support the environment. Often students have these experiences but may not be aware of why people made certain choices that affect the natural world. down trees and building structures)." This prior learning is related to people's impact on the environment, but does not identify the DCI at the element level: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (ESS3.C-P1)
- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "**Natural Resources** Students have many different experiences using natural resources for many aspects of their lives. These can include using water to drink, brush their teeth, or play on warm days, or to get food from grocery stores or growing a vegetable garden. At the same time, students' experiences with other resources are frequently but not necessarily evident to young children. For example, the use of trees as natural resources for building structures, furniture, toys, or even making paper, may not be as clear to young children." This prior learning is related to people's use of natural resources, but does not identify the DCI at the element level: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (ESS3.A-P1)
- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "**Solving Problems**: Young children come to school having many experiences of solving everyday problems. For example, they may solve problems related to sharing (e.g., what to do when they want a toy that a friend is using), communicating (e.g., how to respond when someone's feelings are hurt), or physical needs (e.g., they are getting dressed and cannot find their socks). Many of their everyday problems may not be engineering problems or problems solved using the engineering design process, but they still focus on the importance of solving a relatable problem." This prior learning is related to solving problems, but does not identify the DCI at the element level: ETS1.B-P1: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (ETS1.B-P1)

Science and Engineering Practices:

DATA:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "Students' with prior experiences with OpenSciEd units have had many opportunities to analyze data in multiple kindergarten units. For example, students use observations to identify patterns in Unit K.1: Why do some surfaces get hot and how can we make them less hot? about the Sun warming Earth's surfaces, in Unit K.2: How can we be prepared for the weather? students observe weather data to identify patterns in their local weather, and in Unit K.3: How can we move things to where we want them to go? students use observations to describe relationships between the force of an object and how it moves, as well as how their design solutions function to move a marble through a game course." This prior learning is related to analyzing and interpreting data, but does not identify the practice at the element level: Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems (DATA-P3).

MOD:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "Students with prior experience with OpenSciEd units may have practice developing and using models in multiple kindergarten units. For example, students develop models in Unit K.1: Why do some surfaces get hot and how can we make them less hot? when they create science drawings to explain why some surfaces are hot and others are less hot and when they draw designs for their solutions to the hot blacktop problem. Similarly, students draw models of their engineering designs in Unit K.3: How can we move things to where we want them to go?. These drawings are not called models, but students build ideas that scientists can draw to explain." This prior learning is related to developing and using models, but does not identify the practice at the element level: Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s). (MOD-P3).

ARG:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "Students likely have encountered the term "argument" in negative ways, as something that siblings or friends do when they disagree." This prior learning is related to argumentation, but does not describe prior learning students may have related to ARG at the element level:
  - **ARG: P1 Identify arguments that are supported by evidence.**
  - **ARG: P2 Distinguish between explanations that account for all gathered evidence and those that do not.**
  - **ARG: P5 Listen actively to arguments to indicate agreement or disagreement based on evidence, and/or to retell the main points of the argument.**

INFO:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "Most students will have experience using language to communicate information. Students will be able to take turns in a conversation to share information by making comments and asking and answering questions. Throughout kindergarten, students will leverage their prior experiences to build their skills obtaining information from books, observations, and conversations." This prior learning is related to obtaining and communicating information, but does not describe prior learning students may have related to INFO at the element level:
  - **INFO: P1 Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).**
  - **INFO: P3 Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.**
  - **INFO: P4 Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.**

Crosscutting Concepts:

PAT:

- K.4 Unit Front Matter, CCC table, "Students practice observing patterns of animal needs in Lessons 2, 5, and 8 and plant needs in Lesson 6. They also use these patterns of needs as evidence for how birds meet their needs. This crosscutting concept is intentionally developed in kindergarten units Unit K.1: Why do some surfaces get hot and how can we make them less hot?, Unit K.2: How can we be prepared for the weather?, and Unit K.3: How can we move things to where we want them to go?"
- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "Students bring with them everyday experiences with patterns - something that happens over and over again. Students are familiar with recurring visual patterns in nature, on clothing, and/or with math manipulatives and toys. If you taught Unit K.1: Why do some surfaces get hot and how can we make them less hot?, students have experiences identifying the pattern that surfaces in shady places are less hot compared with surfaces in sunny places. Also, in Unit K.2: How can we be prepared for the weather?, students used patterns they identify in their observations of daily weather to find consensus observations to record, and they found patterns over time to describe what their local weather is usually like." This prior learning is related to patterns, but does not describe prior learning students may have related to at the element level: **Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.** (PAT-P1)

CE:

- K.4 Unit Front Matter CCC table, "This crosscutting concept will also be developed in kindergarten units Unit K.1: Why do some surfaces get hot and how can we make them less hot?, Unit K.2: How can we be prepared for the weather?, and Unit K.3: How can we move things to where we want them to go?."
- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "Almost as soon as children can talk, they begin to ask "why?" Prior to entering kindergarten, children will have already noticed patterns in their world and sought explanations for why they happen. Sometimes those explanations will be imaginative and sometimes they will be based on experiences (single or multiple). Leverage children' s natural curiosity for finding out "why," as well as prior experiences in Unit K.1: Why do some surfaces get hot and how can we make them less hot? This prior learning is related to cause and effect, but does not describe prior learning students may have related to CE at the element level: **Events have causes that generate observable patterns.**

SYS:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "While systems and system models can be complex for young children, the current unit builds on students' own experiences connecting with people, animals, and plants within their own local communities (e.g., animals getting food from their environments; plants getting water from rain in their environment) as ways to bridge the divide between school and home in order to figure out how animals (including people) and plants connect to parts of their ecological systems (e.g., robins eat worms for food)." This prior learning is related to systems and system models, but does not describe prior learning students may have related to SYS-P2: **SYS: P2 Systems in the natural and designed world have parts that work together.**

There is guidance on what a teacher should expect a student's prior experience to be upon arrival and how to further develop their use of the SEPs, CCCs, and DCIs. This information addresses the three dimensions but does not provide information about expected prior learning for all elements.

ii. Clearly explaining how the prior learning will be built upon.

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?," **Needs of Plants and Animals:** The unit has specific opportunities, including through the anchoring phenomenon, built in to elicit and leverage students' related community experiences, and highlight these as important sources of scientific data. While students' own experiences can lead to varied ideas about what animals and plants need to live and grow, these are leveraged in the unit during students identifying patterns in observable data that animals need food, water, air, and shelter, and plants need sunlight and water to live."
- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "**Plants and Animals Changing Environments:** The unit leverages these ideas through the examples provided for students to observe and obtain information from in order to figure out that animals and plants can change their environments to get what they need to live and grow."
- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "**Human Impact** The unit builds on these experiences to focus on the cause and effect relationships as to why certain choices people make can make it easier or harder for some animals and/or plants to live and grow."
- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "**Natural Resources** In the unit, students obtain information about many different natural resources that people use in our everyday lives to help students figure out why people use different natural resources and that we use them for everything we do. The unit continues to provide opportunities for students to obtain information for how people's use of natural resources can impact some animals and/or plants and the environments they live in."
- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "**Solving Problems:** Students have opportunities to build on previous kindergarten experiences by focusing on how drawing/art is a helpful way for scientists to communicate solutions to problems. While this unit does not explicitly define problems with students, the problem of people's impact on the environment when getting natural resources (e.g., trees and water) is discussed in order to focus on supporting students' drawn solutions that can reduce human impact."

DATA:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "The current unit builds on these prior experiences to engage students in using observations of birds, animals, and plants to figure out that animals (including birds) need food, water, air, and shelter, and that plants need sunlight and water to live and grow."

MOD:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "In this unit, the scientific drawings developed for the purpose of explaining phenomenon the class develops are explicitly named as models. As students engage in co-constructing the models in this unit, they can connect to prior experiences and you can leverage experiences students may have with including detail within their drawings and use labels and/or words as additional ways to represent their ideas."

ARG:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "The unit continues to expand on students' engagement in argumentation in later lessons as they construct claims supported by evidence of how other animals and plants get what they need to live and grow, and whether animals and plants

need people to help them live. This is an important reframe of an everyday practice (arguments), to focus on the scientific importance of aligned evidence from data to support claims about animals and plants and how they live in their environments."

INFO:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "They communicate solutions related to reducing human impact using drawings, artistic representations, and writing to support their oral and physical presentations."

PAT:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "In the current unit, students identify patterns from observations of birds, other animals, and plants to figure out what they need to live and grow. Observing different animals and plants, students are able to identify the patterns of shared needs in order to predict possible needs of people in a later lesson when they figure out that people are also animals."

CE:

- K.4 Unit Front Matter, What ideas and experiences will students bring that can help them in this unit?, "Leverage children' s natural curiosity for finding out "why," as well as prior experiences in Unit K.1: Why do some surfaces get hot and how can we make them less hot?, in this unit. Emphasize how the information students obtain can inform findings about how people's choices (causes) can lead to reduced impact on the natural world (effect) and that this is an observable pattern across multiple choices people can make to reduce their impact. This builds on what students figure out in Unit K.1: Why do some surfaces get hot and how can we make them less hot? about cause and effect, which is where this is defined and emphasized through a cause and effect card sort. The experiences students bring will help them deepen their understanding of this crosscutting concept. Encourage students to share with their classmates about their own similar or connected experiences in order to support them in identifying patterns we can observe from these relationships (e.g. "When that happens, what is usually the effect?")."

SYS:

"While systems and system models can be complex for young children, the current unit builds on students' own experiences connecting with people, animals, and plants within their own local communities (e.g., animals getting food from their environments; plants getting water from rain in their environment) as ways to bridge the divide between school and home in order to figure out how animals (including people) and plants connect to parts of their ecological systems (e.g., robins eat worms for food)."

The evidence below show instances from the Teacher Guide Teaching Tip Sidebars, and Assessment Opportunity Call-Out Boxes that explain how prior learning will be built upon in the unit:

- Lesson 1, Explore, Step 1, Teaching Tip sidebar: "...This unit will focus on birds, plants, and animals in their natural environments that may or may not include people; these animals do not 'need' people to meet their needs...If ideas about animals needing people arise in future lessons, support students in comparing/contrasting how animals in designed environments have similar needs as those in natural environments, which students investigate in this unit, but meet those needs differently..." (Lesson 1, Teacher Guide).

- Lesson 1, Explore, Step 4, Developing and Using Models sidebar: "...The class will gather evidence about how these components work together during the next several lessons and use this evidence to add representations of relationships when they revisit the model in Lesson 4" (Lesson 1, Teacher Guide).
- Lesson 1, Synthesize, Step 6, Assessment Opportunity call-out box: "This discussion and sharing of initial arguments (even though not named as arguments yet for the students) provide an opportunity to gather evidence about Learning Goal 1.B, with the purpose of determining support students may need in upcoming lessons they gather evidence to construct an argument and make a claim in Lesson 4. Students will continue to develop these ideas and practices throughout this unit" (Lesson 1, Teacher Guide).
- Lesson 1, Synthesize, Step 6, Engaging in Argument from Evidence sidebar: "During this activity, students are making initial arguments using evidence from their experiences and observations to support their claim of yes, no, or maybe. In Lesson 4, students will build on their use of this practice when they read an informational text about how scientists make arguments and use new evidence from data they collect in Lessons 2-3 to make individual arguments with evidence to support a claim about whether birds need people to help them live" (Lesson 1, Teacher Guide).
- Lesson 2, Explore, Step 3, Analyzing and Interpreting Data sidebar: "Scientists distill many, many observations into patterns. In this Explore, students will make observations of new birds, adding to their growing set of bird observations (first-hand observations in Lesson 1 and community examples in the opening Connect). In this lesson, they will use this growing set of observations to identify patterns in bird actions and eventually bird needs" (Lesson 2, Teacher Guide).
- Lesson 2, Connect, Step 5, Teaching Tip sidebar: "...As students explore bird shelters in this lesson and other animal shelters in Lesson 5, support them in comparing and contrasting these examples, emphasizing that while shelters may look different, be made of different materials, or used for different amounts of time, animals need shelter to live" (Lesson 2, Teacher Guide).
- Lesson 4, Synthesize, Step 4, Engaging in Argument from Evidence sidebar: "...Here, they build on that use by supporting their claim with evidence represented on the Bird Model and Our Growing Ideas chart. The use of sticky notes provides a visual support for students to use evidence when transitioning to their written arguments later in this lesson" (Lesson 4, Teacher Guide).
- Lesson 6, Explore, Step 3, Analyzing and Interpreting Data sidebar: "In this Explore, students are using observations to describe patterns about what plants need. Students previously used observations to describe patterns in lessons 2, 3, and 5 working in small groups with a smaller set of data before considering all of the data as a class. Here, they build on that use by discussing observations in small groups but organizing their data and recording ideas about patterns based on multiple points of data individually on their handout" (Lesson 6, Teacher Guide).

There is limited guidance to clarify adult understanding of the potential alternate conceptions that they, or their students, may have during the unit. The examples below show guidance for why particular phrasing was selected to support student understanding or boundaries of the science ideas in the unit, but there were no examples found of alternative conceptions students may hold.

- K.4 About the Science, "Animals need air to survive. In this unit, students figure out that animals need air to survive (referred to as "live and grow" in the unit - see below). While students figure out that animals need air, they are not expected to know what is in air or why animals need air to survive. In later grades, students figure out the role of different resources, and in middle and high school they figure out the role of the atmosphere, its importance for sustaining life, and human impacts on the atmosphere."

- K.4 About the Science, "Phrasing for key concepts and terms. Throughout the unit, students refer to "animals" and "plants." According to the NGSS DCIs, it is not necessary to identify plants and animals as "living things." Doing so can lead to binary notions of living versus non-living things, which are actually biologically more complicated, especially from Indigenous perspectives that often recognize "living" in more complex, non-binary ways than Western science. It is for these reasons that the unit uses the words "plants" and "animals" instead of the broader term, "living things."
- K.4 About the Science, "Lastly, the NGSS Performance Expectation and related DCIs refer to "human impact." While students do figure out how people can impact the environment by changing the environment to get natural resources for living comfortably, the use of "impact" and "living comfortably" is not in student-facing language within the unit due to the abstract nature of such language. Also, what it means to "live comfortably" can vary from person to person and can be challenging for students with varying accessibility and access to resources. Instead, the student-facing language focuses on how people change the environment to get natural resources for everything they do and how those changes can make it harder or easier for animals and plants to live and grow."
- K.4 About the Science, "Plant and animals' "environment" compared with "habitat" or "ecosystem". In this unit, students build the idea of "environment" by figuring out how plants and animals meet their needs to live and grow. Students will first look for evidence of birds in their schoolyard or other nearby natural areas and develop an initial class model of the birds and things in their environments (not named yet). Then, in Lesson 3, students figure out that birds can change the places where they live to get what they need (e.g., food, shelter) to live and grow. In this Lesson, students have observed changes to the environment and are ready to name the "environment". They build on this understanding in subsequent lessons to expand to other animals, plants, and people, for how they live in places where they can get resources and how they can change the environment to get those resources. Students will figure out more about habitats and biodiversity of natural systems in 2nd grade and expand on these to include food webs and ecosystems in 5th grade."

Criterion-Based Suggestions for Improvement:

- Ensure "[m]aterials explicitly state the expected level of prior proficiency students should have with individual elements of all three dimensions for the core learning of the materials." [Detailed Guidance, p. 24]
- Ensure "[e]xplicit support is provided to teachers to clarify adult understanding of the potential alternate conceptions that they, or their students, may have while building toward students' three-dimensional learning, along with guidance for how to help students negotiate their understandings" [Detailed Guidance p. 25]
    - Consider enhancing guidance in the K.4 Plants, Animals, & Their Environments About the Science section and/or other resources to further clarify adult understanding of the potential alternate conceptions that they, or their students, may have while building toward students' three-dimensional learning for the Disciplinary Core Ideas, Science and Engineering Practices and Crosscutting concepts.

II.D. Scientific Accuracy

EXTENSIVE

Scientific Accuracy: Uses scientifically accurate and grade-appropriate scientific information, phenomena, and representations to support students' three-dimensional learning.

The reviewers found **extensive** evidence that students do use scientifically accurate and grade-appropriate scientific information, phenomena, and representations to support students' three-dimensional learning. However, there are some slight inaccuracies in the student books used in Lessons 2 and 6 .

- Lesson 2, K.4 Lesson 2 Book What Every Bird Needs provides clear photographs and grade-appropriate scientific information about birds to support student learning.
- K.4 Lesson 2 Book What Every Bird Needs: "Even though there are lots of different kinds of birds in the world, every bird needs the same things to live and to help baby birds grow" (Slide 7, page 2). This statement is worded in a way that the broad generalization may create misconceptions. Some birds can and do meet their hydration needs almost exclusively through their food, which would not be considered "drinking."
- K.4 Lesson 2 Book What Every Bird Needs: "All birds need to drink water. Some birds, like Albatrosses, spend most of their lives living near water" (Slide 9, page 4).
- K.4 Lesson 2 Book What Every Bird Needs: "Other birds, like Quails, do not spend a lot of their lives near water, but they still need water to drink" (Slide 10, page 5). K.4 Lesson 2 Book What Every Bird Needs: "Every bird needs to drink water so they can live" (Slide 11, page 6).
- Lesson 3 videos (Bird Making Nest, Woodpecker Getting Food) are high-quality videos that enable students to see how birds can change the environment. These videos are sped up to show nest construction and related activities in less time.
- Lesson 6, Lesson Materials and Preparation, Teaching Tip "Responding to broad curiosities: Students may suggest that plants need air and food as well, especially following the lessons 2-5, where students figure out that birds and other animals need air and food (among other things) to live. In Unit 5.1: How does a nurse log help other things live and grow?, students will build on what they figure out about plant needs in this unit to figure out that plants do not need soil, but they do need air (with more details on photosynthesis addressed in the Middle School grade band). If students raise questions in this lesson about whether plants need air or food, honor those questions by adding them to the Notice and Wonder chart, and see the Teacher Handbook for guidance about what to do with not-yet-answered questions at the end of the unit." (lesson 6, Teacher Guide)
- K.4 Lesson 6 Book Plants Growing in Our Communities: "...Last spring, Sara and Kellan planted bean plants and tomato plants in the garden" (Slide 7, page 3) "...In the summertime, Sara and Kellan enjoyed watching the plants grow" (Slide 8, page 4). Images of planting seeds in spring and images of those seeds sprouting in summertime (3-ish months later) are inaccurate. Seeds typically sprout in a few weeks, not a few months.
- K.4 Lesson 7 Book We are all Animals! makes the connection between animal and human needs, showing a variety of types of dwellings for shelter, and different types of food and water sources.
- K.4 Plants, Animals and Me Website provides grade-appropriate text and photos to show how people's use of resources can make it easier for plants and animals to live and grow. (K.4 Plants, Animals and Me Website, Lesson 9)

Criterion-Based Suggestions for Improvement:

- Ensure "[a]ll science ideas and representations included in the materials — including content related to all three dimensions as well as content that is not included in the three dimensions of the standards — are accurate" (Detailed Guidance, p. 26)

II.E. Differentiated Instruction

EXTENSIVE

Provides guidance for teachers to support differentiated instruction by including:

i. Supportive ways to access instruction, including appropriate linguistic, visual, and kinesthetic engagement opportunities that are essential for effective science and engineering learning and particularly beneficial for multilingual learners and students with disabilities.

ii. Extra support (e.g., phenomena, representations, tasks) for students who are struggling to meet the targeted expectations.

iii. Extensions for students with high interest or who have already met the performance expectations to develop deeper understanding of the practices, disciplinary core ideas, and crosscutting concepts.

The reviewers found **extensive** evidence for teachers to support differentiated instruction by including regular guidance in the lesson sidebars, with suggestions for how to include appropriate linguistic, visual, and kinesthetic engagement opportunities that are effective for all learners, particularly for multilingual learners.

i. Supportive ways to access instruction, including appropriate linguistic, visual, and kinesthetic engagement opportunities are essential for effective science and engineering learning and particularly beneficial for multilingual learners and students with disabilities.

- K.4 Unit Front Matter, "What unit-specific strategies are important for supporting equitable science learning in this unit?, "We also acknowledge that you, the teacher, will still need to find ways to accommodate activities in the materials to better recognize and leverage your particular students' assets, and better address student learning needs or the needs and resources in your classroom. There are many ways differentiation occurs in classroom settings. You can address students' diverse learning needs in terms of student readiness, interest, and special learning needs and can make adjustments in terms of the content, the learning processes, and the student products that result from a learning experience. All Teacher Guides include UDL and differentiation guidance via callouts titled Broadening Access, Community Connections, Teaching Tips, and Literacy and Math Supports. Many other strategies to support differentiation are more fully described in these sections of the Teacher Handbook: Building an equitable classroom culture for science Integrating literacy (has support for readers and writers and word development) Using math to support science sensemaking, Incorporating trauma-informed approaches, University Design for Learning (UDL) Supporting multilingual students" Strategies for working with students with particular struggles or disabilities are not included.

- Draft Elementary Teacher Handbook, Universal Design for Learning (UDL) "The Universal Design for Learning (UDL) Guidelines are a tool that can be used to design learning environments that are accessible and challenging for all learners (CAST, 2018). The framework embraces curriculum development that works for everyone--not with a single, one-size-fits-all approach, but one that considers the strengths and needs of the broadest possible range of learners from the beginning. CAST founders adopted the term *universal design for learning* because UDL guides educators in designing learning spaces that not only are accessible for a range of different abilities, strengths, and

needs, but also actively engage learners, activate thinking, and scaffold deep understanding. OpenSciEd units and lessons are designed with three guiding principles to provide multiple pathways for student learning, by using: (1) multiple means of engagement, (2) representation (presentation), and (3) action and expression, to reach and engage more learners. OpenSciEd units offer built-in supports for teachers to highlight student assets and agency and to address potential barriers to learning for their local student population. You may also want to review the strategies described in the Additional Accessibility Resources document." (Draft Elementary Teacher Handbook)

- K.4 Additional Accessibility Resources, "OpenSciEd elementary lessons have been designed in a way to allow for students to provide multiple ways to engage, represent, and communicate their learning. While these opportunities exist within the current materials, there may be needs in your classroom that will require additional customized adaptation to make them more accessible for learner needs. It is not uncommon for elementary students who require adaptations to get pulled from their science classes for interventions. However, we hope that these guidelines will give you ideas for how to include all of your students meaningfully in your science lessons. In fact, many of these strategies will just be good teaching strategies for all of your students." The provided strategies are general strategies.
- K.4 Front Matter, Vocabulary Guidance, "This table lists the vocabulary words that will be introduced and used in this unit. It is important not to teach this vocabulary all at once before starting the unit because children's understanding of word meanings will build as they engage in the unit. Rather, teach vocabulary during the lessons as described in the Teacher Guides. For more details about the ways that vocabulary is taught in OpenSciEd, please see the Teacher Handbook."
- Lesson 1, Explore, Step 1 "Connect our experiences. Display slide C. Have students turn and talk and then invite a few students to share their related experiences feeding or helping birds (or other animals) in their communities using prompts like the following and encourage students to use their words, bodies, and/or drawings to express their ideas during this brief discussion." (Lesson 1, Teacher Guide)
- Lesson 4, Synthesize, Step 2 "Consider using the following strategies to support all students in participating in the model's collaborative co-development. Use discussion formats like turn and talk or think, pair, share before having students offer ideas to the group. Invite students to the model to add drawings, printed images, words, labels, and/or other representations that have shared meaning for the class. For ideas that students share, elicit agreement or disagreement from the rest of the class, using a "thumb scale" to show agreement (thumb up), disagreement (thumb down), or not sure (thumb to the side). For ideas where the class disagrees or is not sure, add a question mark to the model. To build in more movement, consider designating a side of the model/board/screen for agreement and the other for disagreement." (Lesson 4, Teacher Guide)
- Lesson 5, Connect, Step 6 "According to the infographic, what does the ____ need to live and grow? Feel free to use words, the infographics, or act out your ideas." (Lesson 5, Teacher Guide)
- Lesson 6, Connect, Step 2, Broadening Access Sidebar "To provide options for language and expression when adding to the Community Examples chart and/or checking with students for accuracy about the words they used to express their ideas, you could ask: "What different words did you use or hear being shared by classmates that described similar ideas around plants?"; "What is another word/phrase or language you use in which that same idea could be expressed?"; "Does anyone else know another word for ___?". This can inspire curiosity and frame multilingual discussions as the norm in the classroom community for both multilingual and monolingual students where all students feel their full language repertoires can be used and shared with others for sensemaking." (Lesson 6, Teacher Guide)
- Lesson 7, Synthesize, Step 2, Broadening Access Sidebar "To support equitable discussions for all learners, encourage students to share their thinking in a variety of ways. Validate and invite all the ways we communicate our ideas, such as with gestures or body movements, pointing at the photos, drawings, models, and words from any languages your students use." (Lesson 7, Teacher Guide)

- Lesson 10, Connect, Step 2, Broadening Access Sidebar "Provide multiple means of engagement by offering students the choice and autonomy to choose the way they present their solution. For example, making an artistic representation of what they recorded on their My Solution assessment, acting out their solution, or using other presentation tools available in your classroom." (Lesson 10, Teacher Guide)
- Lesson 10, Synthesize, Step 5, Broadening Access Sidebar "Provide opportunities for students to communicate their evidence and reasoning in multiple ways, such as gesturing toward visuals, using drawings or models, or sharing explanations in any of the languages they use." (Lesson 10, Teacher Guide)

Differentiation strategies address the needs of students when an obvious need arises: Emerging multilingual students learning English

- Lesson 8, Connect, Step 3, Broadening Access Sidebar "Provide options for physical action to support students' needs for movement and engagement. Consider offering enactment or embodied opportunities throughout reading the book to interactively move and gesture (e.g., move the way water does, grow like a food plant does before we eat it, and thank our trees before gesturing to cut them down to make a wood and brick apartment.)" (Lesson 8, Teacher Guide)
- Lesson 9, Synthesize, Step 4, Broadening Access Sidebar "To provide options for language and expression when checking with students for accuracy about the words they used to express their ideas, you could ask: "What different words did you use or hear being shared by classmates that described similar ideas?"; "What is another word/phrase or language you use in which that same idea could be expressed?"; "Does anyone else know another word for ___?". This can frame multilingual discussions as the norm in the classroom community for both multilingual and monolingual students where all students feel their full language repertoires can be used and shared with others for sensemaking." (Lesson 9, Teacher Guide)
- Lesson 10, Connect, Step 3, Broadening Access Sidebar "If the audience is multilingual, this is an opportunity for students to practice in their home languages or use translanguaging. Teachers can frame being multilingual as valuable to the community, because the ideas for solutions can be applicable to many different people. This practice space also allows students to receive feedback from the teacher about how to improve their presentation on both content and communication modes." (Lesson 10, Teacher Guide)
- Draft Elementary Teacher Handbook "How does OpenSciEd Elementary support multilingual students? There are numerous ways that OpenSciEd Elementary materials support multilingual students. Some of these supports are embedded within the curricular design and pedagogy that are at the heart of this program's instructional model. Other supports are evident through educative features included in the teacher guides; these features are educative in that they address teacher learning (Davis & Krajcik, 2005), in this case around ways to best teach science with multilingual students.." (Draft Elementary Teacher Handbook)

Learners with special needs (visual impairments, tactile engagement, etc.)

- Lesson 1, Teacher Guide, Preparation Checklist "In preparation for Vote with your Body Identify three areas around the room that represent "yes", "no", and "maybe". Make sure the areas selected and paths to those areas are accessible for students with mobility impairments." (Lesson 1, Teacher Guide)
- Lesson 4, Synthesize, Step 4, Broadening Access Sidebar "As an option for students with very limited mobility, students can point to yes/no/maybe cards on a desk or have partner-assisted movement to a chosen area for full-body participation." (Lesson 4, Teacher Guide)
- Lesson 8, Explore, Step 2, Broadening Access Sidebar "Before taking students around the school to observe how people and things help meet human needs, plan your route in advance. Ensure there is enough space and accessible

pathways so all students, including those with mobility challenges, can move comfortably and fully participate in making and sharing observations. Choose locations where students can safely stop and hold up their Needs Cards, giving multiple means of engagement and representation for all learners." (Lesson 8, Teacher Guide)

- Lesson 9, Explore, Step 2 Broadening Access Sidebar "To minimize threats and distractions, especially for students with visual impairments, provide accommodations following students' IEP or 504 plans, or work with case managers as needed. Features that can support access to text and images on the website include using alt-text, adjusting screen contrast, zooming in/enlarging text, and/or using a screen reader." (Lesson 9, Teacher Guide)

Learners reading below grade level

- Elementary Teacher Handbook, "Scaffolds for Independent Reading" section has suggestions for how teachers might respond when they observe students showing signs of struggles listed in the table. The table includes sections for use Prior to Reading and During Reading. (Elementary Teacher Handbook)
- Elementary Teacher Handbook, "Scaffolds for Read Alouds" section has suggestions for how teachers might respond when they observe students showing signs of struggles listed in the table. The table includes sections for use Prior to Reading and During Reading. There is also another table labeled "Asking and Answering Questions" that may be helpful during discussions. (Elementary Teacher Handbook)
- No evidence was found in the body of the Teacher Guides.

ii. Extra support (e.g., phenomena, representations, tasks) for students who are struggling to meet the targeted expectations.

- Lesson 2, Connect, Step 5, Teaching Tip "Extension Opportunity: Consider taking students back outside to make additional observations of birds in your local area. Encourage students to focus their observations on the actions of birds and prompt them to consider how those actions relate to birds meeting their needs. Students might observe birds eating food, drinking water, roosting in trees, building nests. Support students in connecting new observations to patterns in birds' actions and needs they observed in this lesson." (Lesson 2, Teacher Guide) While not specifically targeted for students who need extra support, it provides students with additional opportunities to connect observations to needs.
- Lesson 3, Extension Opportunity Sidebar, "Extension Opportunity: Consider taking students back outside to make additional observations of birds in your local area. Encourage students to focus their observations on the actions of birds and prompt them to consider how those actions relate to birds meeting their needs. Students might observe birds eating food, drinking water, roosting in trees, building nests. Support students in connecting new observations to patterns in birds' actions and needs they observed in this lesson." While not specifically targeted for students who need extra support, it provides students with additional opportunities to connect needs to patterns.
- Lesson 3, Extension Opportunity Sidebar, "If you have time, this would be a good opportunity to take students back outside to observe birds in the environment. They can use their binoculars again to observe what birds are doing in their environments. These can be another set of observations that students can use to identify patterns in how birds use things from their environments to get what they need to live and grow."While not specifically targeted for students who need extra support, it provides students with additional opportunities to connect needs to patterns.
- Lesson 5, Extension Opportunity Sidebar, "During this discussion, students may request going outside to observe animals. If time allows for your class to do this, focus observations on what animals are doing that could be related to meeting needs like students did with birds in Lesson 2. Further, you may consider supplementing with age-appropriate books/other resources that can help connect observations to the specific needs of the animals that

students observe. This work can help reinforce the ways students make and use observations, obtain information, and observe patterns of animal needs in this unit.

- There was no evidence of extension opportunities for extra support for lessons 1, 4, 6, 7, 8, 9, or 10.

iii. Extensions for students with high interest or who have already met the performance expectations to develop deeper understanding of the practices, disciplinary core ideas, and crosscutting concepts.

- Lesson 5, Explore, Step 4, Teaching Tip "Extension Opportunity: There are four kinds of animals explored in the videos. To support student access and recruitment of student interest, consider inviting students to share other plants and animals beyond the four animals provided that they might be interested in observing. This invitation also supports students' ongoing investment in investigating plants and animals by having individual choice and autonomy in deciding what they observe and having their ideas validated. If needed, consider creating and supplying resources for the additional animals for students to observe." (Lesson 5, Teacher Guide)
- Lesson 8, Explore, Step 2 "If students are reasonably recognizing how people change the environment, challenge them to consider different ways people use the resource to think more deeply about why people make these changes to the environment." (Lesson 8, Teacher Guide) While not specifically targeted for students with high interest or who have already met the performance expectations, it provides students with a new challenge about how and why people change the environment to get resources.
- There was no evidence of extension opportunities for students with high interest or who have already met the performance expectations in lessons 1, 2, 3, 4, 6, 7, 9, or 10.

Criterion-Based Suggestions for Improvement:

- Consider including extra support and extension opportunities with "alternate phenomena and opportunities to represent thinking through a variety of modalities" [Detailed Guidance, p. 27]
- Ensure supports for "[s]tudents who have already met the performance expectation[s] or who have high interest in the subject matter and are ready to develop deeper understanding in any of the three dimensions could include applying learning in new contexts [e.g., transfer phenomena] or through the lenses of different CCC elements, could include extending to learning from the next grade level, such as the next level SEP element in a learning progression [e.g., grade five students extending to prioritize criteria]." [Detailed Guidance, p. 28]
  - Consider specifically referencing the practices, disciplinary core ideas, and crosscutting concepts that extensions are designed to target or extend by adding color coding.
- Consider providing additional unit-specific strategies for learners with a variety of special needs.

II.F. Teacher Support for Unit Coherence

EXTENSIVE

Supports teachers in facilitating coherent student learning experiences over time by:

i. Providing strategies for linking student engagement across lessons (e.g. cultivating new student questions at the end of a lesson in a way that leads to future lessons, helping students connect related problems and phenomena across lessons, etc.).

ii. Providing strategies for ensuring student sense-making and/or problem-solving is linked to learning in all three dimensions.

The reviewers found **extensive** evidence of teacher support for unit coherence. The materials support teachers in facilitating coherent learning experiences over time by providing guidance on recognizing what students figure out in a lesson, what questions remain unanswered, and what new questions could be addressed in the next investigation. Frequent guidance or tools are provided to teachers to support linking student engagement across lessons. For example, guidance is provided to help educators gather and gently push for student questions that will be answered in subsequent lessons; support navigation routines that help make the connections between lessons explicit to students; and modify the discussion at the beginning of an activity to ensure that students see how it connects to what they just figured out in the previous activity. Strategies for ensuring coherent student sense-making over-time from the students' perspective are facilitated by using an "Our Growing Ideas Chart". This serves as a public artifact of student thinking as it evolves.

i. Providing strategies for linking student engagement across lessons (e.g. cultivating new student questions at the end of a lesson in a way that leads to future lessons, helping students connect related problems and phenomena across lessons, etc.).

- Lesson 1, K.4 Lesson 1 Teacher Reference Unit Class Charts This document shows completed sample charts for teacher reference including the initial Notice/Wonder Chart, Our Growing Ideas Chart (added to lesson by lesson), Initial Models and Revisions, Community Examples Charts and Communication Checklists. These charts link student engagement and learning throughout the unit. (Lesson 1, Teacher Reference Unit Class Charts)
- Lesson 2, Navigate, Step 1 "Use the Notice and Wonder chart to recall where we left off. Gather in a shared meeting space and display the Notice and Wonder chart (refer to slide A). Use prompts like the following to facilitate a brief discussion about what the class did in Lesson 1 to begin this science unit. Invite students to use the images and words on the Notice and Wonder chart to support their sensemaking as they talk with their peers." (Lesson 2, Teacher Guide)
- Lesson 3, Navigate, Step 1 "Develop today's lesson question with students. Building on students' shared questions, co-construct the lesson question with students. The lesson question should be something like, "*How do birds get what they need to live and grow?*" but be sure to use wording your students have been using. Add the lesson question to the next row of Our Growing Ideas chart to continue to keep track of what we figure out." (Lesson 3, Teacher Guide)
- Lesson 4, Synthesize, Step 2, Developing and Using Models Sidebar "One important element of this practice is representing relationships. As students develop their models, support them in considering how they can represent the relationship between the environment and the needs birds meet there, using evidence from previous investigations. While elements of the birds' environment and what the birds needed may have appeared in the initial models, students should be encouraged to make the relationships explicit. Students will build on this practice when they revisit the Bird Model in Lesson 7 to add ideas about how other plants and animals meet their needs in the same environment and represent these relationships in more complex ways." (Lesson 4, Teacher Guide)

- Lesson 5, Navigate, Step 8 "Take stock of what we figured out. Revisit the class Notice and Wonder chart (refer to slide N). Point out that students have gathered information about and figured out what birds and other animals need to live and grow. Ask students what questions they can now answer based on what they figured out today and check these off on the chart. Revisit the Notice and Wonder Chart. Work with students to check off any questions they have answered (likely about animals meeting their needs) and review unanswered questions, especially about plants and people. Take this time to add new questions students may have about people and plants." (Lesson 5, Teacher Guide)
- Lesson 6, Synthesize, Step 6 "Connect to the anchoring phenomenon and Unit Question. Remind students of the unit question, Do birds, other animals, and plants need people to help them live? Ask students to turn and talk about how today's work - observing patterns of what plants need and how they meet those needs - relates to the unit question." (Lesson 6, Teacher Guide)
- Lesson 7, Synthesize, Step 2, Teaching Tip "There is not a formal discussion in the Lesson to add to Our Growing Ideas chart, because the class model is the summative charted artifact for what students figure out in this lesson. However, for consistency, you may choose to add the lesson question to the Lesson 7 row of Our Growing Ideas chart at this point in the lesson. An image of the class model can be added to this row of the chart prior to the next lesson. See the unit charts slides for an example." (Lesson 7, Teacher Guide)
- Lesson 8, Navigate, Step 1 "Use Our Growing Ideas chart to recall where we left off. Gather students in a scientists circle. Use Our Growing Ideas chart (refer to slide A) to have students recall what we did in the last lesson. Use the following prompts to have students turn and talk with a partner and share as a whole class their ideas of what they want to figure out next." (Lesson 8, Teacher Guide)
- Lesson 9, Navigate, Step 5 "Navigate to the next lesson. Use the ideas that students documented on the My Solution assessment to highlight that we each figured out different solutions and did not all research the same thing. Ask students what we might do next so we can all learn about these solutions, listening for ideas related to sharing what we figured out with each other/others. Collect students' My Solution assessment pages so they can use them again in Lesson 10." (Lesson 9, Teacher Guide)
- Lesson 10, Navigate, Step 1 "Revisit the unit question to motivate the need to gather information during the gallery tour. Gather students in a Scientists Circle and display Our Growing Ideas chart (refer to slide A). Remind students of the unit question, Do birds, other animals, and plants need people to help them live? Explain to students that they have found out about how people can change the environment in the past few lessons and so they should make new arguments that answer that question later in the lesson. Use the following prompts to lead a discussion to recall what they did last time and support students in realizing they need to gather further information from each others' solutions in order to make an argument answering the unit question again. You can refer to Our Growing Ideas chart to support students during this discussion." (Lesson 10, Teacher Guide)

ii. Providing strategies for ensuring student sense-making and/or problem-solving is linked to learning in all three dimensions.

Unit Materials include the following educator-facing resources that provide a "big picture" view of the unit and how each individual lesson connects:

- Unit Overview that identifies the target learning elements of each dimension and how they are used throughout the unit, as well as a storyline section that provides a snapshot of each lesson.
- K.4 Plants, Animals, & Their Environments SEP-DCI-CCC-ELA-Math-Matrixwhich outlines each learning target at the element level, identifies the lessons in which the element is used and/or developed, and provides a description for how students are engaged with the element.

- Assessment System Overview that includes a Lesson-by-Lesson Assessment Opportunities chart that lists assessment opportunities for the three-dimensional learning targets in each lesson.
- The first page of each lesson's Teacher Guide includes a "In the previous lesson…" statement as well as a "In the next lesson…" statement.
- Each lesson has one or two three-dimensional learning goals with corresponding lesson assessment guidance that includes "where to check for understanding" and three-dimension color-coded "what to look and listen for" statements.

There is a clear pattern of strategies that ensure sensemaking is linked to learning in all three dimensions in the Synthesize Section in each lesson:

- Lesson 1, Synthesize, Step 6 "Make initial arguments."
- Lesson 2, Synthesize, Step 6 "Begin our Growing Ideas Chart."
- Lesson 3, Synthesize, Step 4 "Update our Growing Ideas Chart."
- Lesson 4, Synthesize, Step 4 "Make an argument."
- Lesson 5, Synthesize, Step 7 "Update our Growing Ideas Chart."
- Lesson 6, Synthesize, Step 6 "Update our Growing Ideas Chart."
- Lesson 7, Synthesize, Step 3 "Construct an argument."
- Lesson 8, Synthesize, Step 5 "Update our Growing Ideas Chart."
- Lesson 9, Synthesize, Step 4 "Update our Growing Ideas Chart."
- Lesson 10, Synthesize,Step 4 "Update our Growing Ideas Chart and Step 5 Argue from Evidence."

Criterion-Based Suggestions for Improvement: N/A

II.G. Scaffolded differentiation over time

EXTENSIVE

Provides supports to help students engage in the practices as needed and gradually adjusts supports over time so that students are increasingly responsible for making sense of phenomena and/or designing solutions to problems.

The reviewers found **extensive** evidence that supports are provided to help students engage in the practices as needed and gradually adjust supports over time so that students are increasingly responsible for making sense of phenomena and/or designing solutions to problems for both of the intentionally developed SEP elements. Students are provided support to grow in the elements MOD P3 and ARG P6. Scaffolding is reduced over time for student use of the element, and teacher guidance for reducing support over time is provided in the teacher guide lesson sidebars.

MOD: Developing and Using Models

MOD: P3: Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).

K.4 Unit Front Matter, "In Lesson 1 when they use outdoor observations to collaboratively develop an initial model that represents birds and different aspects of the birds' environment. As this is students first experience with using models to explain scientific phenomena in Kindergarten, the work of developing the model is done collaboratively and focuses on recognizing what components to include prior to considering how to represent relationships. The class revisits the model in Lesson 4 and adds to the model to show the relationship between the needs of birds and the birds' environment to answer the question *How do birds live in their environment?* Through discussion, students are supported in recalling ideas about relationships between the components in the model using evidence gathered in Lessons 2 and 3. They also collaboratively make decisions about how the model can represent those relationships through words and pictures. In Lesson 7, students have a final opportunity to use the model to represent relationships in more complex ways when they add ideas about how other plants and animals meet their needs in the environment. While the class develops the model collaboratively throughout the unit, it becomes more complex as the class considers the relationships between more components of the model as they explain their ideas. Also, students use the model with more independence in Lesson 7 when using the model as evidence to support their arguments about whether birds, other animals, and plants need people to help them live."

- Lesson 1, Explore, Step 4 "Prepare to develop a model. Explain to students how scientists can *draw to explain their ideas about something they observe in the world*, and this drawing is called a model. If this is not the first OpenSciEd unit of the year, connect to the models that students have done in previous science units, which have previously only been named as "drawing and explaining". Suggest that the class use a model to show our observations of birds outside of our school. The model can answer the question:"What did we observe in the places birds live?"... "Develop an initial class model. Display slide J. Use the following prompts to support students in collectively developing a model. Consider using the following strategies to support all students in participating in the model's collaborative co-development. Start the conversation by having students share some of the observations they made that were similar to their partner's (during the earlier turn-and-talk) As time and space permit, have students come up to directly add a sticky note with a word or drawing to represent their observation to the model, share one after another, or talk to a partner about their ideas before sharing with the class. Ask students for a symbol or image idea that could help us represent their idea." (Lesson 1, Teacher Guide)
- Lesson 1, Explore, Step 4, Developing and Using Models Sidebar "In kindergarten, students have engaged in developing models in the context of engineering and have called these models "drawing and explaining." This unit is the first in which students are using models to explain relationships. In this first experience, the class adds components to the model based on observations of birds in their environment. The class will gather evidence about how these components work together during the next several lessons and use this evidence to add representations of relationships when they revisit the model in Lesson 4." (Lesson 1, Teacher Guide)
- Lesson 4, Synthesize, Step 2 "Facilitate a Consensus Discussion to collaboratively add to the Bird Model from Lesson 1. Have students turn and talk to their partner about what we should add or change to our class model. After students have discussed with their partner, bring students back together and use the following prompts to guide the discussion for revising the class model to explain how birds live in their environment." (Lesson 4, Teacher Guide)
- Lesson 4, Synthesize, Step 2, Developing and Using Models Sidebar "One important element of this practice is representing relationships. As students develop their models, support them in considering how they can represent the relationship between the environment and the needs birds meet there, using evidence from previous investigations. While elements of the birds' environment and what the birds needed may have appeared in the initial models, students should be encouraged to make the relationships explicit. Students will build on this practice when they revisit the Bird Model in Lesson 7 to add ideas about how other plants and animals meet their needs in the same environment and represent these relationships in more complex ways." (Lesson 4, Teacher Guide)

- Lesson 4, Synthesize, Step 4 "Support claims with evidence. Ask students to look over Our Growing Ideas chart and the updated Bird Model for their evidence for why they voted the way they did. Allow students time to turn to a partner to share what their evidence is for their claim. After students have shared, let students know they will be showing what their evidence is by adding a sticky note to the Our Growing Ideas chart and to the class model." (Lesson 4, Teacher Guide)
- Lesson 7, Synthesize, Step 2 "Facilitate a discussion to collaboratively add to the class model. Use prompts like the following to facilitate a class discussion to add to the class model. Consider using the following strategies to support all students in participating in the model's collaborative co-development. Use discussion formats like turn and talk or think, pair, share before having students offer ideas to the group. Invite students to the model to add drawings, printed images, words, labels, and/or other representations that have shared meaning for the class. For ideas that students share, elicit agreement or disagreement from the rest of the class, using a "thumbs scale" to show agreement (thumb up), disagreement (thumb down), or not sure (thumb to the side). For ideas where the class disagrees or is not sure, add a question mark to the model. To build in more movement, consider designating a side of the model/board/screen for agreement and the other for disagreement." (Lesson 7, Teacher Guide)
- Lesson 7, Synthesize, Step 2, Developing and Using Models Sidebar "Scientists use models to represent relationships and patterns. In the context of this unit, students are using the class model to represent the relationship between the needs of the plants and animals and the environment in which the organisms live. To represent these relationships without overcomplicating the model, the class model will include one new plant and one new animal within the environment. Support students in recalling the pattern that all plants have the same needs and all animals have the same needs and recognizing that the new to the model plant and new to the model animal are representative of this pattern." (Teacher Guide, Lesson 7)

ARG: P6: Construct an argument with evidence to support a claim.

In Lesson 1 when they make initial arguments to support a claim about whether birds, other animals, and plants need people to live. In lesson 2 and 3, students continue to construct arguments collaboratively during whole group discussion using the Our Growing Ideas Chart. In lesson 5 students use the practice with more complexity when they independently draw/write about their claims on the Introduce the Animal Needs handout. In Lesson 7, students then have another individual opportunity to construct an argument with evidence about whether birds, plants, and animals need help from people to live. In lessons 8-10 students continue to co-construct claims supported by evidence. (K.4 Unit Front Matter)

- Lesson 1, Synthesize, Step 6 "Make initial arguments. Display slide M. In order to help students see that we have work to do to figure this out, tell the students that they will now get to choose where their thinking is about the question Do birds, other animals, and plants need help from people to live?. Reassure students that we do not expect to know the answer right now, but scientists like to try to explain why things happen. Share that they will choose yes, no, or maybe using a Vote with Your Body protocol. This is where students use their bodies to move to different areas of the room to vote for yes, no, or maybe to a given question using the following steps. 1. Identify the three areas around the room that represent yes, no, maybe. Make sure the areas selected and paths to those areas are accessible for students with mobility impairments. Alternatively, for students with very limited mobility, students can point to yes/no/maybe cards on a desk or have partner-assisted movement to a chosen area for full-body participation. 2. Then instruct students to stand up and move to the answer they agree with most. 3. Once students have selected their answer, give students a few moments to discuss why they chose that answer with their group. 4. After groups have discussed, ask for a few volunteers to share the group's discussions. 5. Then, after each group has shared, give students the opportunity to change locations if they have changed their mind. 6. Once students have stopped moving, have the class count how many students are in each group. Record how many students answered yes, no, and maybe, as we will return to our ideas in Lesson 4." (Lesson 1, Teacher Guide)

- Lesson 1, Synthesize, Step 6, Engaging in Argument from Evidence Sidebar "During this activity, students are making initial arguments using evidence from their experiences and observations to support their claim of yes, no, or maybe. In Lesson 4, students will build on their use of this practice when they read an informational text about how scientists make arguments and use new evidence from data they collect in Lessons 2-3 to make individual arguments with evidence to support a claim about whether birds need people to help them live." (Lesson 1, Teacher Guide)
- Lesson 2, Synthesize, Step 6 "Use evidence to support our ideas. Remind students (or explain) that scientists use their observations as evidence to answer their scientific questions. Evidence is the observations or information that help answer a scientific question. Using the observations and stories they shared in class and the sorts they did of the bird cards, ask a few students to explain how what we did helped us figure what birds need to live. As students share, support them in responding to and building off of one another's ideas. Then, add photos and artifacts to the column titled, "How did we figure it out?" Teachers should add the class copy of Bird Card Observations to the Our Growing Ideas Chart." (Lesson 2, Teacher Guide) A "few students" are asked to explain. Not all would be participating.
- Lesson 2, Synthesize, Step 6, Engaging in Argument from Evidence Sidebar "This Building Understanding discussion is the first time in this unit that students explicitly engage in the practice of making claims and using evidence to support those claims. They learn the difference between claims and evidence. Support students as they make claims to answer the lesson question, What do birds need to live?. Emphasize the importance of using evidence to support their claims. By participating in these types of Building Understanding discussions, students learn how claims and evidence work together to answer a question by forming a scientific argument." (Lesson 2, Teacher Guide) While the sidebar claims that this is the first time students make claims and use evidence to support them, the text of the teacher guide calls for "a few students" to be called upon to share claims.
- Lesson 3, Synthesize, Step 4 "Lead a discussion about students' claims. Co-construct our current understanding of what we have figured out using the prompts below. As students share ideas, add them to the column titled "What did we figure out?" Remind students of the lesson question, *How do birds get what they need to live and grow?* Remind students that a claim is an *answer to a science question*. As students share ideas, continue to support them in responding to and building off one another's ideas. Make sure to look for movements and gestures, as well as what students verbalize as they share their ideas." (Lesson 3, Teacher Guide) There is limited evidence that all students would have opportunities to participate in the discussion.
- Lesson 3, Synthesize, Step 4, Engaging in Argument from Evidence Sidebar "In Lesson 2, students began to consider how scientists use argumentation through discussions of various claims and evidence while adding to Our Growing Ideas chart. The separate prompts for sharing claims and evidence are done purposefully to support students in identifying the difference between claims and evidence, and how discussing each supports scientific argumentation. As students continue to engage in science discussions, they will work towards simultaneously sharing their claims and evidence. Students will explicitly name what a scientific argument is in Lesson 4 and construct an argument in response to the unit question." (Lesson 3, Teacher Guide)
- Lesson 4, Synthesize, Step 4 "Vote with our bodies. Show students the three areas around the room that represent yes, no, maybe. Make sure the areas selected and paths to those areas are accessible for students with mobility impairments. Ask students to stand up and move to the answer they agree with most, based on what we have figured out so far. Support claims with evidence. Ask students to look over Our Growing Ideas chart and the updated Bird Model for their evidence for why they voted the way they did. Allow students time to turn to a partner to share what their evidence is for their claim. After students have shared, let students know they will be showing what their evidence is by adding a sticky note to the Our Growing Ideas chart and to the class model." (Lesson 4, Teacher Guide)

- Lesson 4, Synthesize, Step 4, Engaging in Argument from Evidence Sidebar "Students previously constructed an initial argument when they voted with their bodies, drawing from their prior experiences and observations in Lesson 1 to make a claim. Here, they build on that use by supporting their claim with evidence represented on the Bird Model and Our Growing Ideas chart. The use of sticky notes provides a visual support for students to use evidence when transitioning to their written arguments later in this lesson." (Lesson 4, Teacher Guide)
- Lesson 5, Explore, Step 3 "Introduce the Animal Needs handout. Display slide E and suggest using drawing and writing to show others evidence we gathered about each animal. Explain to students that you have a handout that we can use. Review with the class the information they can record on their Animal Needs handout. Noting that they will 1. Circle the animal they are observing 2. Draw what the environment looks like before and after the animal the animal does something to possibly meet one of its needs. 3. Write a sentence to make a claim about what need the animal could be meeting and why you think so." (Lesson 5, Teacher Guide)
- Lesson 5, Explore, Step 5, Engaging in Argument from Evidence Sidebar "In this part of the lesson students will share scientific arguments for how an animal changes its environment to meet a need. Follow-up prompts like "What is your evidence" support students in using their observations to support claims and questions like "Why do you think so?" serve to push students to explain their reasoning." (Lesson 5, Teacher Guide)
- Lesson 6, Synthesize, Step 6 "Lead a discussion about students' claims. Co-construct our current understanding of what we have figured out using the prompts below. As students share ideas, add them to the column titled "What did we figure out?" Remind students that a claim is an *answer to a science question*. As students share ideas, continue to support them in responding to and building off one another's ideas." ... "Continue the discussion about students' evidence. Remind students that in science, we use evidence to support what we have figured out. Evidence is the observations, data, or information that helps answer our scientific question. Add students' ideas using words, photos, and artifacts to the column titled, "How did we figure it out?" Allow students to refer to investigation materials and artifacts and attach images to the chart." (Lesson 6, Teacher Guide) There is limited evidence that all students would have opportunities to participate in the discussion.
- Lesson 7, Synthesize, Step 3, Engaging in Argument from Evidence Sidebar "Students have had previous experiences independently constructing arguments in Lesson 4 and had collective opportunities to make claims supported by evidence while adding to Our Growing Ideas chart in each lesson. If students need additional support around using evidence to support a claim, consider revisiting the Scientists Make Arguments book, use a class support like adding sticky note evidence to the model, like students did as a class in Lesson 4, or have students consider evidence first and select a claim that fits." (Lesson 6, Teacher Guide)
- Lesson 7, K.4 Lesson 7 Student Assessment 1 Plant and Animal "1. Circle a claim to answer this scientific question: Do animals and plants need people to help them live? YES NO MAYBE 2. Use the box and lines below to draw or write your evidence." (Lesson 7, K.4 Lesson 7 Student Assessment 1 Plant and Animal)
- Lesson 8, "Lead a discussion about students' claims. Remind students of the lesson question, How do people get what they need to live and grow? As students share ideas, add them to the column titled "What did we figure out?" Remind students that a claim is an answer to a science question. As students share ideas, continue to support them in responding to and building off one another's ideas, you may consider posting the Discussion Supports handout with sentence starters students can use. Make sure to look for movements and gestures, as well as what students verbalize as they share their ideas. Continue the discussion about students' evidence. Remind students that in science we use evidence to support what we have figured out. Evidence is the observations, data, or information that helps answer our scientific question. Add students' ideas using words, photos, and artifacts to the column titled, "How did we figure it out?" Allow students to refer to investigation materials and artifacts and attach images to the chart." (Lesson 8, Teacher Guide) It is unclear how many students would be participating in the discussion and sharing their ideas.

- Lesson 9, Synthesize, Step 3 "Continue the discussion about students' claims. Co-construct our current understanding of what we have figured out using the prompts below. As students share ideas, add them to the column titled "What did we figure out?" Remind students of the lesson question, What happens when people, plants, and animals with similar needs live in the same place and what can people do about it?" ... "Prompts to use: How can we answer our lesson question, What happens to plants and animals when we use natural resources and what can we do about it? What claims can we make?" (Lesson 9, Teacher Guide) It is unclear how many students would be participating in the discussion and sharing their ideas.
- Lesson 10, Synthesize, Step 5 "Revisit how to make arguments about whether or not plants and animals need people to help them live. Display slide G and tell the students that in a moment they will choose one of the following: yes, plants and animals need people to help them live, no, plants and animals do not need people to help them live, maybe/not sure if plants and animals might need people to help them live.To help facilitate this choice, remind students that we used the Vote with Your Body process before and we can do that again here. Vote with our bodies to answer the unit question. Instruct students to move to the answer (claim) they think best answers the unit question." ..."Discuss the evidence supporting their claim for yes, no, or maybe answering the unit question." (Lesson 10, Teacher Guide)
- Lesson 10, Synthesize, Step 5, Broadening Access Sidebar "To foster collaboration and community during argumentation, revisit the classroom agreements before students share their final claims. Focus on how these agreements connect to using evidence in science. Emphasize that using evidence is not just about being "right," but about making sense together. Reinforce that everyone's contributions can offer valuable evidence or perspectives. Agreements like "We let our ideas grow and change" can remind students that argumentation is a collaborative process of figuring out, not a debate." (Lesson 10, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- Ensure "[e]ngaging in the practice as a class or assigning specific roles in small groups in early lessons while transitioning to independent use of the practice in later lessons" [Detailed Guidance, p. 33]
  - Consider including more opportunities for turn and talks and partner sharing during whole group discussions to ensure all students transition to independent use of ARG-6.

CATEGORY III

Monitoring NGSS Student Progress

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III.A. Monitoring 3D Student Performance

EXTENSIVE

Elicits direct, observable evidence of three-dimensional learning; students are using practices with core ideas and crosscutting concepts to make sense of phenomena and/or to design solutions.

The reviewers found **extensive** evidence that materials elicit direct, observable evidence of three-dimensional learning and that students are using practices with core ideas and crosscutting concepts to make sense of phenomena and/or to design solutions. In lesson 4, students construct a Bird Argument to demonstrate assessment statement 1. In lesson 7, students develop an argument about plants and animals. In lesson 8, students use their observations of how environments change after people use natural resources to determine solutions to reduce environmental impact in lessons 9 and 10.

Formal tasks in the materials are driven by well-crafted phenomena- and problem-based scenarios that can elicit rich student performances.

- Lesson 7, Synthesize, Step 3 "Construct an argument supported by evidence. Display slide F Distribute the *Plant and Animal Argument* assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to use information from their partners and share more evidence for how plants and other animals get what they need from their environment with or without people, to support their claim. As students work, circulate to check in with students and provide support using prompts like the following." (Lesson 7, Teacher Guide)
- Lesson 8, Explore, Step 4 "Hand out the *Environment Observations 1* and *Environment Observations 2* handouts and have students begin working. Hand out the Environment Observations 1 handout to half of the students and the Environment Observations 2 handout to the other half of students, as well as a writing utensil to each student. Have students begin working on observing what happened to the environment after people got the natural resource. While students are working, circulate the room and ask the following questions to help guide their thinking:What natural resource is this picture showing? How might people use it? Where does that natural resource come from? What happened to the environment after people got that natural resource? What did people do to get that natural resource?" (Lesson 8, Teacher Guide)
- Lesson 9, Connect, Step 3 "Prepare to gather information from a website. Assign student pairs and set expectations and tips for pairs working together on one device. Also remind students of classroom, school, and/or district technology use and safety policies. Display slide D and use it as a reference for what students will be doing in their partnerships (1. read/listen to the website and look at the pictures, 2. Discuss 3. Write). If beginning research on a new day or a different time of day, be sure to take extra time to review and clarify any directions related to the task. Distribute materials. Give each pair a device and each student a My Solution student assessment as well as writing utensils and a clipboard if needed." (Lesson 9, Teacher Guide)
- Lesson 10, Connect, Step 4 "Discuss directions for a class gallery tour. Explain that half of the class will be presenters with their My Solution assessments while the other half of the class will move around the room and listen to their classmates share about their solutions." (Lesson 10, Teacher Guide)

Student performances produce artifacts of integrating the three dimensions in service of sense-making or problem-solving.

Lesson 4: Three-dimensional Learning Goal 4.B **Construct an initial argument (based on observations)** for **whether or not birds** need help from people **to get what they need when living in the same places (system).**

- Where to check for understanding: In the third Synthesis, on the Birds Argument student assessment (slide F) and when students self-reflect (slide G)
- What to look and listen for:
- **A claim** that **birds do, do not, or may need** help from people.
- **Evidence of birds meeting their needs/living through interactions with parts of their environment (parts of the system working together),** such as **birds eating plants or animals from the environment; birds using and changing parts of the environment (e.g., nesting in a tree, moving twigs to make a nest); getting food (and other needs?) from people in the environment.**
- Lesson 4, Synthesize, Step 5: "Give directions for the Birds Argument student assessment. Display slide F and show students where they will circle their claim. Read the directions aloud. Review with students that a claim is an answer to a scientific question. Ensure that the Our Growing Ideas chart and the class model are visible for students and encourage students to use them as places to identify evidence from their observations in prior lessons about how birds get what they need to live. Distribute the Birds Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to share more evidence for how the bird gets what it needs from their environment with or without people, to support their claim. As students work, circulate and provide support using the following prompts as needed...After students have had 5-10 minutes to work on their arguments, pause their writing and display slide G. Support students to engage in self-reflection around their argument and next steps..." (Lesson 4, Teacher Guide, pp25-27).
- K.4 Lesson 4 Student Assessment 1 Birds Argument: "1. Circle a claim to answer this scientific question: Do birds need people to help them live? Yes. Maybe. No. 2. Use the box and lines below to draw or write your evidence"

Lesson 5: Three-dimensional Learning Goal 5.A **Construct an argument for how animals can change their environment to meet their needs.**

- Where to check for understanding: In the Explore, on the Animal Needs handout (slide G) and the surrounding discussion (slide H).
- What to look and listen for: Evidence of students' ideas may be expressed in words, drawings, written or spoken descriptions, movement, and/or gestures about: **A claim for how an animal changes their environment to meet a need (food, water, shelter, air); Using written/drawn observations of animals changing the environment to support their claim about the need being met.**
- Lesson 5, Explore, Step 3: "Introduce the Animal Needs handout. Display slide E and suggest using drawing and writing to show others evidence we gathered about each animal. Explain to students that you have a handout that we can use. Review with the class the information they can record on their Animal Needs handout. Noting that they will 1. Circle the animal they are observing. 2. Draw what the environment looks like before and after the animal the animal does something to possibly meet one of its needs. 3. Write a sentence to make a claim about what need the animal could be meeting and why you think so...Pass out one Animal Needs handout and writing utensil to each student and a device to small groups of students. There may be multiple small groups watching the same video" (Lesson 5, Teacher Guide, pp18-21).

- K.4 Lesson 5 Handout 1 Animal Needs handout: "1. Circle the animal you observed. Bee. Deer. Turtle. Beaver. 2. In the boxes, draw and/or write what the environment looks like before the animal does something and after the animal does something to meet a need"

Lesson 7: Three-dimensional Learning Goal 7.B **Construct an argument** for **whether animals and plants** need help from people **to live, using evidence for how plants and animals meet their needs from their environment.**

- Where to check for understanding: In the second Synthesize during partner discussions (slide E) for peer feedback and on students' Plant and Animal Argument assessment (slide F) and the surrounding discussions of their claims and evidence for summative assessment.
- What to look and listen for: See the Summative Guidance 1 teacher assessment tool to support your evaluation of students' assessments
- **A claim** that **animals and plants do, do not, or may need** help from people.
- **Evidence of plants and animals meeting their needs/living through interactions with parts of their environment (parts of the system working together),** such as: **animals eating plants or animals from the environment; plants using sunlight and/or water from the natural environment; Animals and/or plants using and/or changing parts of the environment (e.g., using natural or human-designed objects to build homes, digging to get food, plants breaking through the ground to get sunlight).**
- Lesson 7, Synthesize, Step 3: "...show students how they will share their claim and evidence for plants and animals using the Plant and Animal Argument...Distribute the Plant and Animal Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to use information from their partners and share more evidence for how plants and other animals get what they need from their environment with or without people, to support their claim..." (Lesson 7, Teacher Guide, pp22-24).
- Lesson 7, Student Assessment, Plant and Animal Argument: "1. Circle a claim to answer this scientific question: Do animals and plants need people to help them live? Yes, Maybe, No. 2. Use the box and lines below to draw or write your evidence. Animal. Plant."

Lesson 9: Three-dimensional Learning Goal(s)

- 9.A **Obtain information using a website with various text, text features, and media about how people doing things to meet their needs and live comfortably uses natural resources** and can **affect the world around them.**
- Where to check for understanding: During the class discussion in the Explore (slide B) and on the My Solution student assessment and the surrounding discussion in the Connect (slide D).
- What to look and listen for:
  - **Indicating (moving their body to a part of the room, circling, describing, pointing to information on the website) plants, animals, or both are affected by people using natural resources for everyday comforts like cleaning or play (cause).**
  - **Gesturing to a part of the website or describing how people use water or trees to meet their needs or for everything else they do (cause)** and how it **affects how some plants and animals can meet (or not as easily meet) their needs using those resources.**
- 9.B **Obtain information using a website with various text, text features, and media about how people can reduce their impacts (cause) so animals and plants can meet their needs to live and grow (effect).**

- Where to check for understanding: On the My Solution student assessment and the surrounding discussing in the Connect (slide D).
- What to look and listen for: **Using information (text/images) from the website to indicate solutions (e.g., using less water, planting trees, using less paper) that can reduce impact (effects) on the environment, plants, and/or animals; Describing how a solution** can **cause there to be less impact/make it easier for some plants and/or animals to live and grow (effect);** e.g., **Using less paper (cause) can leave more trees for some animals to use for food and shelter (effect).**
- Lesson 9, Student Assessment, My Solution: "1. Circle the resource you researched. 2. Circle who could be affected when people use that resource. 3. Draw and/or write about one solution and how it could make it easier for some plants and/or animals to live and grow. There is no evidence that students demonstrate the entire targeted CC element: Events have causes that generate observable patterns. (CE-P1)

Lesson 10: Three-dimensional Learning Goal 10. **Communicate solutions for how people can reduce their impact on plants and animals and the places they live.**

- Where to check for understanding: On students My Solution assessment in the Connect during the gallery tour (slide D), and in the second Synthesize during the Consensus Discussion (slide E).
- What to look and listen for: **Communicating solutions (e.g., using less water, planting trees, using less paper) that can reduce impact (effects) on the environment, plants, and/or animals; Communicating how a solution** can **cause there to be less impact/make it easier for some plants and/or animals to live and grow (effect);** e.g., **Using less paper (cause) can leave more trees for some animals to use for food and shelter (effect)**
- Lesson 10, Synthesize, Step 4, "Facilitate a Consensus Discussion about the causes of people's actions leading to effects, which are observed patterns. The purpose of this Consensus Discussion is to support students in recognizing that people using natural resources causes changes to the environment that can make it harder (problem) or easier (solution) for some animals and/or plants to live and grow (effect), which can generate patterns in the impacts on the environment. Facilitate this discussion as a Think-Pair-Share to allow all students to take stock of what they found out during the gallery tour." (Lesson 10, Teacher Guide)
- Lesson 10 Summative Guidance *Lesson 9 Instructional Guidance Link, "Secure:* The student recorded information about a resource people use (trees) and who using trees could affect (animals). The drawing and writing show the solution to plant more trees and the sentence tells how deer can use trees for homes (shelter)." There is no evidence that students demonstrate the entire targeted CC element: Events have causes that generate observable patterns. (CE-P1)

Students routinely produce artifacts with evidence of using the grade-appropriate elements of SEPs, CCCs, and DCIs that are targeted as learning objectives

- The assessment system contains multiple assessments in each lesson. There are three preassessments in Lesson 1, multiple formative assessments and key formative assessments in Lessons 2-6, summative assessments in Lesson 7, formative and key formative in Lessons 8 and 9, and summative assessments in Lesson 10. These assessments target three dimensional learning goals that are clearly stated in the Lesson Assessment Guidance in the front matter of the lesson.
- K.4 Plants, Animals, & Their Environments Assessment System Overview "In Lesson 7, use the evidence you have gathered on the Following Student Sensemaking 1 tool from Lessons 1-7 to make a summative claim about students' understanding of Assessment Statement 1. If you have not checked off all boxes for certain students, make sure to talk individually with those students about their Plant and Animal Argument so they have an opportunity to explain

their thinking and inform your summative assessment of their progress. See the guidance about students' arguments in the [EE.L7.TAT1, 1] tool, and use it as a guide for what to look for and ask about as you provide feedback and evaluate the ideas students explain in and about their arguments." (K.4 Plants, Animals, & Their Environments Assessment System Overview)

- K.4 Plants, Animals, & Their Environments Assessment System Overview "In Lesson 10, use the evidence you have gathered on the Following Student Sensemaking 2 tool from Lessons 8-10 to make a summative claim about students' understanding of Assessment Statement 2. If you have not yet checked off all boxes for certain students, make sure to talk individually with those students about their My Solution assessment/presentation in Lesson 10 so they have an opportunity to explain their thinking and inform your summative assessment of their progress. See the range of student samples shown in the [EE.L9.TAT1, 1] tool, and use the annotations to guide what to look for and ask about as you provide feedback and evaluate the ideas students explain in and about their presentations." (K.4 Plants, Animals, & Their Environments Assessment System Overview)

Criterion-Based Suggestions for Improvement:

- Ensure "[t]here's a close match between SEP, CCC, and DCI elements that are intended to be assessed in each item and the evidence of those elements being required to respond to each prompt posed to students" [Detailed Guidance, p. 36]
  - Ensure that lesson 9 and 10 individual student artifacts provide evidence of the entire CE element: Events have causes that generate observable patterns. [CE-P1]

III.B. Formative

EXTENSIVE

Embeds formative assessment processes throughout that evaluate student learning to inform instruction.

The reviewers found **extensive** evidence that formative assessment processes evaluate student learning to inform instruction. There are opportunities in every lesson to gather, record, and use formative assessment information to inform future instruction.

Materials include explicit, frequent, and varied supports for formative assessment processes.

- Ongoing formative assessment opportunities related to class discussions, handouts, and other student work are described in the front matter of each lesson and noted in the teacher guide with a yellow "Assessment Opportunity" box where they happen in the lesson. Lesson 2 contains two formative assessments, Lesson 3 contains two formative assessments, Lesson 4 contains a formative assessment and a key formative assessment, Lesson 5 contains two formative assessments, Lesson 6 contains three formative assessments, Lesson 8 contains two formative assessments, Lesson 9 contains two key formative assessments.
- Lesson 6, Explore, Step 3 "Explore plant stations. Support students as they circulate to each plant station, directing them to be sure to record the needs of each plant. Additional questions to ask while circulating include: What are you noticing about the plants?What is similar about what these (gesture to multiple rows on the handout) need? What is different? How do these plants' needs connect to the experiences we shared earlier? How do you think these plants are getting what they need? Motivate discussing our data as a class. Once students have visited all of

the stations, briefly have students turn and talk with a partner about what they observed from the data on the Plant Care Cards about what plants need. Ask students to give a thumbs up/down to share if they gathered the same data for each plant. Ask students if they think everyone will have the same observations for each plant. If not teaching these components back-to-back, collect student handouts and have them ready to pass back out in the next Explore." (Lesson 6, Teacher Guide)

- Lesson 8, Connect, Step 3, Assessment Opportunity "Formative assessment: This discussion provides an opportunity to gather evidence about Learning Goal 8.A (aligned to Assessment Statement 1), with the purpose of determining any support students may need in upcoming lessons as they refine their ideas about how people use natural resources from different parts of the environment for everything they do, including to meet their needs to live and grow. Use the Following Student Sensemaking 2 to record evidence of students' developing sensemaking. If students are not identifying what natural resources people use from the environment, have them refer to the Natural Resources book, point to a picture, and share what natural resource it is. You can prompt them for how people might use that natural resource in their lives. If students need more support identifying how people use different natural resources, you can have students share what needs they have and what they use to meet those needs. You can then have students share where things come from that meet those needs, by possibly referring to the Natural Resources book or the School Tour Observations reference." (Lesson 7, Teacher Guide)
- Lesson 9, Explore, Step 2 "Explore the homepage Show the class the main webpage." … "Introduce the My Solution handout. Return to the lesson slides and display slide C. Use it to show students the My Solution student assessment, reading all the directions out loud to show students where they can record information from the website. Depending on students' previous experiences with research, it may be helpful to toggle back to the website to help students visualize and discuss where they can find the different information for each prompt on the handout." … "Plan to research in pairs. Let students know that they will work with a partner to use the website to read about one of the two resources (trees or water) and that each student can pick the solution they are most interested in to write about. Transition to gathering information from the website. Give students an opportunity to ask clarifying questions about obtaining information from the website and any classroom-specific expectations. Then, prepare to transition to students using the website in pairs." (Lesson 9, Teacher Guide)
- Lesson 9, Connect, Step 3 "Prepare to gather information from a website. Assign student pairs and set expectations and tips for pairs working together on one device. Also remind students of classroom, school, and/or district technology use and safety policies. Display slide D and use it as a reference for what students will be doing in their partnerships (1. read/listen to the website and look at the pictures, 2. Discuss 3. Write). If beginning research on a new day or a different time of day, be sure to take extra time to review and clarify any directions related to the task. Distribute materials. Give each pair a device and each student a My Solution student assessment as well as writing utensils and a clipboard if needed." (Lesson 9, Teacher Guide)

Formative assessment processes routinely provide varied support for student thinking across all three dimensions.

- Lesson 2, Assessment Opportunity, "Formative assessment: The bird card sort and discussion that follows provide an opportunity to gather evidence about Learning Goal 2. Look and listen for students' sensemaking with the purpose of providing feedback and supporting students in clarifying and communicating their initial ideas about what birds need to live, based on their observations and emerging patterns." 3-D Learning Objective: **Use observations to describe patterns** about what **birds need to live and grow.**
- Lesson 3, Assessment Opportunity, "Formative assessment: This discussion provides an opportunity to gather evidence about Learning Goal 3.B with the purpose of providing feedback and supporting students in using their observations as evidence in order to construct an argument that birds can change their environments to meet their

needs. Look and listen for what students say about how the birds' environments (system) changed when the bird did something to meet its need." 3-D Learning Objective: 3.B **Construct an argument for how birds can change their environments to meet their needs.**

- Lesson 4, Assessment Opportunity, "Key formative assessment: Students' Birds Argument assessments and the surrounding discussion provide an opportunity to gather evidence about Learning Goal 4.B (aligned to Assessment Statement 1), with the purpose of providing feedback to students and guiding instruction in upcoming lessons." 3-D Learning Objective: **Construct an initial argument (based on observations)** for **whether or not birds** need help from people **to get what they need when living in the same places (system).**
- Lesson 5, Assessment Opportunity, "Formative assessment: The following student discussion provides an opportunity to gather evidence about Learning Goal 5.B, with the purpose of feedback and supporting students in obtaining information to describe patterns" 3-D Learning Objective: **Obtain information from infographics** to **determine patterns** in what **animals need to live and grow** and how **can get what they need from where they live.** Teachers are not prompted to collect evidence of obtaining information from all students.
- Lesson 6, Assessment Opportunity, "Formative assessment: The Plant Needs handout and surrounding discussion with students provides an opportunity to gather evidence about Learning Goal 6.A, with the purpose of providing feedback and supporting students in using observations as evidence that plants need sunlight and water to live and grow." 3-D Learning Objective: **Use observations (firsthand and from media)** to **identify patterns of evidence** that **plants need water and light to live and grow**.
- Lesson 8, Assessment Opportunity, "Formative assessment: This discussion provides an opportunity to gather evidence about Learning Goal 8.A (aligned to Assessment Statement 1), with the purpose of determining any support students may need in upcoming lessons as they refine their ideas about how people use natural resources from different parts of the environment for everything they do, including to meet their needs to live and grow." 3-D Learning Objective: **Read a grade appropriate text to obtain information about how people use natural resources from different parts of their environment for everything they do, including meeting their needs. There is a mismatch between the discussion purpose and the 3-D learning Objective.**
- Lesson 9, Assessment Opportunity, "Key formative assessment: Students' *My Solution* assessment and the following class discussion provides an opportunity to gather evidence about Learning Goals 9.A and 9.B, with the purpose of providing feedback to students and guiding instruction in upcoming lessons." 3-D Learning Objective: 9.A **Obtain information using a website with various text, text features, and media about how people doing things to meet their needs and live comfortably uses natural resources** and can **affect the world around them. Obtain information using a website with various text, text features, and media about how people can reduce their impacts (cause) so animals and plants can meet their needs to live and grow (effect).**

Formative assessment processes routinely attend to multiple aspects of student equity.

- K.4 Lesson 2 Teacher Assessment Tool Following Student Sensemaking "Possible evidence of student sensemaking: Remember that students are often using multiple means of communication to express their sensemaking. As you are looking for evidence that students have a secure grasp of the assessment statement, look and listen for these examples. Students might say... Students might gesture/manipulate..." (K.4 Lesson 2 Teacher Assessment Tool Following Student Sensemaking)
- Lesson 4, Synthesize, Step 2 "Facilitate a Consensus Discussion to collaboratively add to the Bird Model from Lesson 1. Have students turn and talk to their partner about what we should add or change to our class model. After students have discussed with their partner, bring students back together and use the following prompts to guide the discussion for revising the class model to explain how birds live in their environment. Consider using the following strategies to support all students in participating in the model's collaborative co-development. Use discussion

formats like turn and talk or think, pair, share before having students offer ideas to the group. Invite students to the model to add drawings, printed images, words, labels, and/or other representations that have shared meaning for the class. For ideas that students share, elicit agreement or disagreement from the rest of the class, using a "thumb scale" to show agreement (thumb up), disagreement (thumb down), or not sure (thumb to the side). For ideas where the class disagrees or is not sure, add a question mark to the model. To build in more movement, consider designating a side of the model/board/screen for agreement and the other for disagreement." (Lesson 4, Teacher Guide)

- K.4 Lesson 4 Teacher Assessment Tool Lesson 4 Instructional Guidance "The following examples represent possible ways students could construct their written and/or drawn arguments on the Birds Argument. Remember that students will demonstrate their understanding through drawing, writing, verbal expression, and/or using gestures. Use the suggestions from the examples in this document along with the prompts in the teacher guide to elicit and notice the expansive ways students express their sensemaking. Note that there is not an intended "correct" claim (yes, no, maybe); rather, take note of how students select evidence and explain their reasoning using ideas about how animals and plants meet their needs in their environments when making their argument and record evidence of students' sensemaking on the Following Student Sensemaking 1 tool." (K.4 Lesson 4 Teacher Assessment Tool Lesson 4)
- K.4 Lesson 9 Teacher Assessment Tool Lesson 9 Instructional Guidance "The following examples represent possible ways students could communicate information through drawing and/or writing on the My Solution student assessment. Remember that students will demonstrate their understanding through drawing, writing, verbal expression, and/or using gestures. Use the suggestions from the examples in this document along with the prompts in the teacher guide to elicit and notice the expansive ways students express their sensemaking." (K.4 Lesson 9 Teacher Assessment Tool Lesson 9 Instructional Guidance)

Criterion-Based Suggestions for Improvement: N/A

III.C. Scoring Guidance

ADEQUATE

Includes aligned rubrics and scoring guidelines that provide guidance for interpreting student performance along the three dimensions to support teachers in (a) planning instruction and (b) providing ongoing feedback to students.

The reviewers found **adequate** evidence that the materials include scoring guidelines that provide guidance for interpreting student performance along the three dimensions to support teachers in (a) planning instruction and (b) providing ongoing feedback to students. There is limited evidence that the "[a]ssessment targets — for grade-appropriate elements of all dimensions being assessed and their use together — are incorporated into the scoring guidance" (Detailed Guidance, p. 40).

Support for planning instruction

- Lesson 2 Following Student Sensemaking 1, Provides a checklist for what to look for in lessons 2, 3, 4, 5, 6 and 7, possible evidence of student sensemaking and two artifact samples from Lesson 2 Bird Card Observations, Lesson 3 Bird Environment Observations, and Lesson 5 Animal Needs. Guidance for teachers to interpret student progress in relation to the elements, parts of elements, or learning performances targeted as learning objectives is not provided in the possible evidence of student sensemaking table.

- K.4 Lesson 4 Teacher Assessment Tool Lesson 4 Instructional Guidance This document shows two examples with annotation and possible feedback for each progress level: not secure, secure with promoting and secure related to assessment statement 1.
- Lesson 4 Teacher Assessment Tool Lesson 4 Instructional Guidance "If you notice… Students are making claims, but not yet using evidence from the model, or if the evidence used does not match their claim. Possible next steps… If this applies to most or all of your class: Before Lesson 7, reread and discuss the examples from the Scientists Make Arguments book. During the first Explore in Lesson 5, plan to spend extra time collaboratively demonstrating how to make an argument using the class example before students do so independently. Invite students to use sentence frames like "I think _____ because _____" and "My evidence is _____" for additional whole class practice. Prompt the class to work together to consider how specific evidence from the video supports their claim/s. During Lesson 7, when students plan their arguments in the Synthesize, consider having students work in small groups to choose evidence from the class model for each claim using sticky notes before writing their individual arguments like the class did in Lesson 4. If this applies to a few students in your class: Check in with these students in the Lesson 5 Explore when students individually make an argument about what need an animal might be meeting when it changes its environment. Support students in using evidence from their Animal Needs handout to form a matching claim. During the second Synthesize of Lesson 7, provide students with a sentence starter that prompts them to use evidence. Plants and animals do/do not/maybe need help because _____. My evidence for plants is _____. My evidence for animals is _____. Refer them to class examples, such as the claims and evidence on Our Growing Ideas chart to discuss examples of evidence that support claims." (Lesson 4 Teacher Assessment Tool Lesson 4 Instructional Guidance) Guidance for teachers on interpreting student progress in relation to the elements, parts of elements, or learning performances targeted as learning objectives for the Bird Argument Assessment is not provided.
- Lesson 7 Teacher Assessment Tool Summative Guidance 1 Four noticings for instructional guidance are provided with possible next steps. It is not clear how the noticings related to the targeted three dimensions.
  - Lesson 7 Teacher Assessment Tool Summative Guidance 1 "If you notice… Students need additional practice identifying patterns in the needs of plants and animals. Possible next steps… Students will have opportunities to describe patterns in the needs of plants and animals during Lessons 8-10 of this unit. While students investigate how people meet their needs in Lesson 8, consider using questions that ask students to compare the needs of people to other animals and plants, like, "How are the needs of people similar/different to those of other animals? Of plants? What observations support that idea?" Students will also have opportunities to consider the needs of plants and animals when discussing the impact of people's actions on the ability for plants and other animals to meet their needs in Lessons 9 and 10." (Lesson 7 Teacher Assessment Tool Summative Guidance 1)
- Lesson 8 Following Student Sensemaking 2, Provides a checklist for what to look for in lessons 8-10, possible evidence of student sensemaking and an artifact samples from Lesson 8 Environment Observations 1 and Environmental Observations 2. Guidance for teachers on interpreting student progress in relation to the elements, parts of elements, or learning performances targeted as learning objectives is not provided in the possible evidence of student sensemaking table.
- K.4 Lesson 9 Teacher Assessment Tool Lesson 9 Instructional Guidance This document shows one example with annotation and possible feedback for each progress level: not secure, secure with promoting and secure related to assessment statement 2. Guidance for teachers to interpret student progress in relation to the elements, parts of elements, or learning performances that are targeted as learning objectives for the My Solution Assessment is not provided.
- Lesson 9 Teacher Assessment Tool Lesson 9 Instructional Guidance "If you notice… Students are not yet connecting how things people do including their use of natural resources can impact the environment, plants, and/

or animals. Possible next steps: If this applies to most or all of your class: Prior to Lesson 10/During the opening Navigate in Lesson 10, take time to revisit Our Growing Ideas chart to connect the class' evidence of people's use of natural resources and ways they change the environment to use those resources to information students obtained in Lesson 9 and will communicate to classmates in Lesson 10. If this applies to a few students in your class: Work with a small group of students before Lesson 10 to review examples from the Environment Observations 1 and Environment Observations 2 handouts and support students to connect those changes in the environment with information on the Plants, Animals, and Me Website website." (Lesson 9 Teacher Assessment Tool Lesson 9 Instructional Guidance) Feedback suggestions are not labeled to indicate how they align with the targeted elements of the three dimensions.

- Lesson 10 Teacher Assessment Tool Summative Guidance 2 There is no guidance about how to use the My Solutions assessment summatively. The one-page document references previous assessment guidance support documents.

Support for ongoing feedback

- Lesson 2 Teacher Assessment Tool, Following Student Sensemaking 1 This tool provides three-dimensional color-coded examples of what the teacher of "listen-fors" and "look-fors", and a column for teachers to record "Notes about what students say, write, draw, gesture, do". **"Use observations and/or obtain information to describe patterns** about what **animals and plants need to live.** (Animals in Lessons 2 and 5; Plants in Lesson 6) **Use observations to describe patterns as evidence for how birds live in places that have the things they need to live and grow.** (Lesson 3) **Construct an argument for how plants and animals can change their environments to meet their needs.** (Animals Lessons 3 and 5; Plants Lesson 6) **Use a model to represent relationships between animals, plants, and their environments, and how they use parts of their environment to meet their needs (e.g., food, water, air, shelter).** (Birds in Lesson 4; Plants and animals Lesson 7) **Construct an argument** for **whether animals and plants** need help from people **to live, using evidence for how plants and animals meet their needs from their environment.** (Birds in Lesson 4; Plants and animals Lesson 7)" (Lesson 2 Teacher Assessment Tool, Following Student Sensemaking 1)
- Lesson 2 Teacher Assessment Tool Following Student Sensemaking 1 "Students might write/draw in Lesson 2 - Image of student work page - The first drawing shows either a bird flying or in the water and the second shows a bird in a nest. The pictures indicate that the student noticed a pattern in birds' actions, however, more clarity could be elicited about what the bird is doing in the first picture to better support making connections to a need (air or water) in the Connect. Possible feedback: What was similar about what all of the birds were doing in these photos? How did you show that here? Let's work together to add some labels to your drawings. What word should we write here? What sound does that word begin with? During or after reading the What Every Birds Needs book: Some of you drew nests! Based on what we just read, what need could those birds have been meeting?" (Lesson 2 Teacher Assessment Tool Following Student Sensemaking) Feedback suggestions are not labeled to identify how the suggested feedback aligns with the targeted elements of the three dimensions.
- Lesson 4 Teacher Assessment Tool Lesson 4 Instructional Guidance Student work samples are shown in three categories, Not yet Secure, Secure with Prompting, and Secure. "Secure with Prompting - Student Work Page Shown - The drawing shows a tree and grass in an environment without people. The writing (scribed by the teacher) explains the bird made a nest by itself (without people). The evidence matches the claim. The evidence implies that the bird is meeting a need for shelter and has changed the environment to do so (parts of a system working together). Use feedback to clarify student's understanding of these ideas and concepts. Possible Feedback: I see you including ideas about a nest. Can you say more about why nests are important for the bird to live and grow? What was the nest made out of? Where did the bird get those materials? Is where the bird lives the same or different after making the nest? Why do you think so?" (Lesson 4 Teacher Assessment Tool Instructional Guidance) Feedback suggestions are not labeled to identify how the suggested feedback aligns to targeted elements of the three dimensions.

- Lesson 7 Teacher Assessment Tool Summative Guidance 1 "Not yet secure...Makes a **claim,** but: Does not provide **supporting evidence** OR **Supporting evidence** is only provided for **animals or plants** OR **Evidence** is not **represented on the class Animal and Plant model. Evidence** is not yet connected to science ideas about **how plants and/or animals use things from** and/or **change their environment to meet their needs** (**air, water, shelter, food**). Possible feedback: Can you tell me more about why you chose (yes/no/maybe)? What examples did we explore where plants or animals did/did not get help from people to meet their needs? Let's look at the class model. How could you show that evidence? Consider working with the student to help label the parts of their drawn evidence with initials or words and/or scribe a sentence to answer the question; adult scribing for students is expected in kindergarten." (Lesson 7 Teacher Assessment Tool Summative Guidance) Feedback suggestions are not labeled to identify how the suggested feedback aligns with targeted elements of the three dimensions.
- Lesson 8 Teacher Assessment Tool Following Student Sensemaking 2 "Students might write/draw in Lesson 8 - Image of student work - Possible feedback: Tell me about what you observed. Can you say more about why you wrote "tubes"? How does that show a change? Let's work together to add more details to your writing." (Lesson 8 Teacher Assessment Tool Following Student Sensemaking 2) Feedback suggestions are not labeled to identify how the suggested feedback aligns with targeted elements of the three dimensions.
- Lesson 9 Teacher Assessment Tool Lesson 9 Instructional Guidance "Not yet Secure - Student work sample image - The student recorded information about a resource people use (water) and who using water could affect (plants and animals). The drawing shows people and two other animals drinking water and the student explained people and animals all need water to live and grow. Possible Feedback: I see you added a lot of detail about why people using water could make it harder for animals to live and grow. What are some ways the website said people could use water that make it easier for plants and animals to live and grow? Those are some solutions you can add here! Let's go back to the "solutions" page for water. What are some solutions based on the writing here? What do you observe people doing in the pictures? Let's add those details to your handout." (Lesson 9 Teacher Assessment Tool lesson 9 Instructional Guidance) Feedback suggestions are not labeled to indicate how they align with the targeted elements of the three dimensions.

Criterion-Based Suggestions for Improvement:

- Ensure "[e]xplicit guidance is provided for teachers to interpret student progress and for students to interpret their own progress in relation to both the instructional materials [e.g., the activity] as well as the standards, elements, parts of elements, and learning performances that are targeted as learning objectives" [Detailed Guidance, p. 40].
    - Ensure that the criteria for not yet secure, secure with prompting and secure, the specific feedback suggestions, and the possible next steps clearly relate to each of the targeted three-dimensional elements.

III.D. Unbiased Tasks/Items

EXTENSIVE

Assesses student proficiency using methods, vocabulary, representations, and examples that are accessible and unbiased for all students.

The reviewers found extensive evidence that tasks/items assess student proficiency using methods, vocabulary, representations, and examples that are accessible and unbiased for all students.

Multiple modes of communication

- Lesson 2 Handout 1 Bird Card Observations "Use the boxes below to write or draw what the birds are doing in each group of cards." (Lesson 2 Handout 1 Bird Card Observations)
- Lesson 4 Student Assessment 1 Bird Argument, The handout is presented with words and three pictures.
- Lesson 4 Synthesize, Step 5 "Provide support for how to record their claim using evidence. Ensure that the Our Growing Ideas chart and the class model are visible for students and encourage students to use them as places to identify evidence from their observations in prior lessons about how birds get what they need to live."
- Lesson 6, Explore, Step 3, Broadening Access Sidebar "As you demonstrate how to read the plant care cards and explain each step, offer multiple ways for students to access the information. Provide digital versions of the cards so students can zoom in or use built-in audio descriptions. Give clear verbal descriptions of each example card, highlighting key details such as the amount of sunlight and water symbols. You can also pair students with a sighted peer who can describe the images and symbols on each card as groups rotate through stations." (Lesson 6, Teacher Guide)
- Lesson 7, Synthesize, Step 2, Broadening Access Sidebar "To support equitable discussions for all learners, encourage students to share their thinking in a variety of ways. Validate and invite all the ways we communicate our ideas, such as with gestures or body movements, pointing at the photos, drawings, models, and words from any languages your students use." (Lesson 7, Teacher Guide)
- Lesson 9, Connect, Step 3 "Distribute materials. Give each pair a device and each student a *My Solution* student assessment as well as writing utensils and a clipboard if needed." There is little evidence for alternative ways to access the information and record for students with special needs.
- Lesson 9 Student Assessment 1 My Solutions, The handout is presented with words and two pictures. There are missed opportunities to include pictures for some vocabulary words: plants, animals, both.

Supports success for all students

- K.4 Lesson4 Teacher Assessment Tool Lesson 4 Instructional Guidance "The following examples represent possible ways students could construct their written and/or drawn arguments on the *Birds Argument* student assessment. Remember that students will demonstrate their understanding through drawing, writing, verbal expression, and/or using gestures. Use the suggestions from the examples in this document along with the prompts in the teacher guide to elicit and notice the expansive ways students express their sensemaking."
- Lesson 8 Teacher Assessment Tool Following Student Sensemaking 2 "Possible evidence of student sensemaking: Remember that students are often using multiple means of communication to express their sensemaking. As you are looking for evidence that students have a secure grasp of the assessment statement, look and listen for these examples. Students might say: Name specific objects that people use to meet needs or do everyday things to live

comfortably (e.g., favorite foods/drinks, familiar types of housing/materials) AND connect them to different natural resources (plants, animals, water, etc.). People/I have/use/eat_____ that are made from _____ (natural resource)! The environment is different after people get natural resources to use! Before there was _____, now there is _____. Using _____ affects some animals/plants because they need it for _____ (food/water/shelter) to live and grow. _____ is a solution because there will be more _____ (resource like trees or water) left in the environment for plants and animals that need it to live and grow. Students might gesture / manipulate Point/gesture to people meeting a need while holding up a need card on the school tour. Point to text or images that show natural resources within the environment, people using natural resources, or solutions that reduce people's impact in books and/or the Plants, Animals, and Me Website website. Act out solutions that reduce people's impact on the environment, plants, and/or other animals. Gesture to artifacts on Our Growing Ideas chart or the class model to explain how using a resource could affect plants and/or animals (e.g., pointing to water next to animals and plants on the model to explain how they need it in their environment to live and grow)." (Lesson 8 Teacher Assessment Tool Following Student Sensemaking 2)

- K.4 Assessment System Overview, "In Lesson 9, circulate while students sketch and write about solutions that they will communicate with classmates in Lesson 10 on their My Solution assessment. Also note the ideas they share in the Synthesize, along with the evidence you have gathered on the Following Student Sensemaking 2 tool from Lessons 8 and 9 to evaluate students' progress toward Assessment Statement 2. Use the Lesson 9 Instructional Guidance to provide feedback to students and plan your upcoming instruction."
- K.4 Lesson 9 Teacher Assessment Tool Lesson 9 Instructional Guidance, "The following examples represent possible ways students could communicate information through drawing and/or writing on the *My Solution* student assessment. Remember that students will demonstrate their understanding through drawing, writing, verbal expression, and/or using gestures. Use the suggestions from the examples in this document along with the prompts in the teacher guide to elicit and notice the expansive ways students express their sensemaking."

Multiple modalities and student choice

- Lesson 9, Broadening Access Sidebar, "To optimize individual student choice and autonomy, involve students in making partnerships based on interest in either people's use of trees or water and encourage each student to write, draw, and/or communicate about the solution that is most interesting to them."
- Lesson 10, Broadening Access Sidebar, "It is important that all students in your class feel that their contributions are valued. Taking time to have students share their completed My Solution assessments demonstrates that their ideas and ways of communicating are valued and encouraged in science. Presenting students' work in this way can help them view themselves as scientists and recognize their idea's contributions."

Criterion-Based Suggestions for Improvement: N/A

III.E. Coherent Assessment System

EXTENSIVE

Includes pre-, formative, summative, and self-assessment measures that assess three-dimensional learning.

The reviewers found **extensive** evidence that the materials include pre-, formative, summative, and self-assessment measures that assess three-dimensional learning. There is an assessment system that supports teachers in understanding how students' three-dimensional performances in each assessment fit together to reflect student learning related to the assessment statements across the unit.

Matches three-dimensional learning objectives

The unit has two three-dimensional assessment statements. Lessons 1-7 build proficiency to reach Assessment Statement 1. Lessons 8-10 allow students to demonstrate proficiency of Assessment Statement 2.

K.4 Lesson 2 Teacher Assessment Tool and Lesson 7 Assessment Tool, "Assessment Statement 1: **Construct an argument** for whether **animals and plants need** people to help them live**, supported by evidence** from **the model representing relationships of how plants and animals meet their needs (including changing their environment) in the places they live."** This assessment statement relates to lessons 2-7.

- Lesson 1, the three-dimensional learning goals are 1.A Use observations to **develop a model that represents birds** and **the places they live (system)**. 1.B **Construct an initial argument (based on observations)** for **whether or not birds** need help from people **to get what they need when living in the same places (system).**
- Lesson 2, the three-dimensional learning goal is 2.A **Use observations to describe patterns** about what **birds need to live and grow.**
- Lesson 3, the three-dimensional learning goals are 3.A **Use observations to describe patterns as evidence for how birds live in places that have the things they need to live and grow.** 3.B **Construct an argument for how birds can change their environments to meet their needs.**
- Lesson 4, the three-dimensional learning goals are 4.A **Use a model to represent relationships between birds and their environments, and how they use parts of their environment to meet their needs (e.g., food, water, air, shelter)**. 4.B **Construct an initial argument (based on observations)** for **whether or not birds** need help from people **to get what they need when living in the same places (system).**
- Lesson 5, the three-dimensional learning goals are 5.A **Construct an argument for how animals can change their environment to meet their needs.** 5.B **Obtain information from infographics** to **determine patterns** in what **animals need to live and grow** and how **can get what they need from where they live.**
- Lesson 6, the three-dimensional learning goal is 6.A **Use observations (firsthand and from media)** to **identify patterns of evidence** that **plants need water and light to live and grow**.
- Lesson 7, the three-dimensional learning goals are 7.A **Use a model to represent relationships between animals, plants, and their environments, and how they use parts of their environment to meet their needs.** 7.B **Construct an argument** for **whether animals and plants** need help from people **to live, using evidence for how plants and animals meet their needs from their environment.**

The practice highlighted in the learning goals for lessons 2, 3.A, and 6.A are not evident in Assessment Statement 1.

K.4 Lesson 8 Assessment Tool, "Assessment Statement 2: **Communicate solutions that will reduce the impact of people's use of natural resources on plants, animals, and the environment."**

- Lesson 8, the three-dimensional learning goals are 8.A. **Read a grade appropriate text to obtain information about how people use natural resources from different parts of their environment for everything they do, including meeting their needs.** 8.B. **Communicate information about how people can cause changes to the environment to get the natural resources they use for everything they do, including meeting their needs.**
- Lesson 9, the three-dimensional learning goals are 9.A **Obtain information using a website with various text, text features, and media about how people doing things to meet their needs and live comfortably uses natural resources** and can **affect the world around them.** 9.B **Obtain information using a website with various text, text features, and media about how people can reduce their impacts** (**cause**) **so animals and plants can meet their needs to live and grow** (**effect**)**.**
- Lesson 10, the three-dimensional learning goal is 10. **Communicate solutions for how people can reduce their impact on plants and animals and the places they live.**

Pre-, formative, summative, and self-assessment

Pre-Assessment

- Lesson 1, Explore, Step 3, Lesson Assessment Opportunity "Pre-assessment: When students birdwatch and record their observations and ideas on their Birdwatching Observations handout, you have an opportunity to gather evidence for learning goal 1.A with the purpose of determining what support students may need in observing and later developing a model of the different parts of birds' environment. Students may also share initial ideas or questions about the relationships between those parts (e.g., birds need plants for food or use nests for shelter), but these will be explicitly addressed in later lessons. Students will continue to develop these ideas and practices throughout this unit. Refer to the Lesson Assessment Guidance at the front of this lesson for ideas to look and listen for." (Lesson 1, Teacher Guide)
- Lesson 1, Explore, Step 3 "Go outside to make observations. Pair students with a partner and distribute the Birdwatching Observations handout to each student, along with a writing utensil, clipboard, and binoculars. Bring students outside and have them work with their partners to notice birds and their surroundings." (Lesson 1, Teacher Guide)
- Lesson 1, Explore, Step 4 Lesson Assessment Opportunity "Pre-assessment: When students contribute ideas from their Birdwatching Observations handout to help co-develop an initial class model, you have an opportunity to gather evidence for learning goal 1.A with the purpose of determining what support students may need in modeling different parts of the birds' environment. Students may also share initial ideas or questions about the relationships between those parts (e.g., birds need plants for food or use nests for shelter), but representing these relationships based on gathered evidence will be explicitly addressed in later lessons. Students will continue to develop these ideas and practices throughout this unit. Refer to the Lesson Assessment Guidance at the front of this lesson for ideas to look and listen for." (Lesson 1, Teacher Guide)
- Lesson 1, Explore, Step 4 "Gather in a Scientists Circle. Distribute materials students will need to co-develop the model (completed Birdwatching Observations handouts, sticky notes, drawing/writing utensils) and transition to a Scientists Circle (refer to slide I)." … "Develop an initial class model. Display slide J. Use the following prompts to support students in collectively developing a model. Consider using the following strategies to support all students in participating in the model's collaborative co-development." (Lesson 1, Teacher Guide)

- Lesson 1, Synthesize, Step 6 "Lesson Assessment Opportunity "Pre-assessment: This discussion and sharing of initial arguments (even though not named as arguments yet for the students) provide an opportunity to gather evidence about Learning Goal 1.B, with the purpose of determining support students may need in upcoming lessons they gather evidence to construct an argument and make a claim in Lesson 4. Students will continue to develop these ideas and practices throughout this unit. Look and listen for students' words, gestures, and markings on their handouts to see and hear their initial ideas. Refer to the Lesson Assessment Guidance at the front of this lesson for ideas to look and listen for." (Lesson 1, Teacher Guide)
- Lesson 1, Synthesize, Step 6 "Make initial arguments. Display slide M. In order to help students see that we have work to do to figure this out, tell the students that they will now get to choose where their thinking is about the question *Do birds, other animals, and plants need help from people to live?*. Reassure students that we do not expect to know the answer right now, but scientists like to try to explain why things happen. Share that they will choose yes, no, or maybe using a *Vote with Your Body* protocol. This is where students use their bodies to move to different areas of the room to vote for yes, no, or maybe to a given question using the following steps." ... "After groups have discussed, ask for a few volunteers to share the group's discussions. Then, after each group has shared, give students the opportunity to change locations if they have changed their mind." (Lesson 1, Teacher Guide)

Formative Assessment

- See III.B for evidence.

Summative Assessment

- Lesson 7, Synthesize, Step 2, Assessment Opportunity "Summative assessment: This discussion is an opportunity to gather evidence about Learning Goal 7.A with the purpose of summatively assessing students' use of the model to explain the relationships between the needs of plants and animals and the places they live and grow. Refer to the Summative Guidance 1 tool and the Assessment Guidance at the beginning of the lesson." (Lesson 7, Teacher Guide)
- Lesson 7, Synthesize, Step 2 "Use a model to explain. Once the class has agreed upon what has been added to the model, transition to using the model to answer the lesson question: How do animals and plants live in their environments? Use prompts like the following to facilitate this part of the discussion. Prompts to use: Based on our model, how can we answer our lesson question, How do animals and plants live in their environments? What claims can we make? Feel free to use words, your bodies and the model to express your ideas! What evidence do we have to explain [select a claim students made]? How does our model show that? Do you think other plants and animals on our model (point to any additional plants or animals on the model like ones birds eat/use from lesson 4) meet their needs in similar ways? Why or why not? Record explanations on the model. Since the model is the summative charted artifact for what students figure out in this lesson, as students share, add their explanations to the bottom of the model for them to refer back to as needed for the rest of the lesson." (Lesson 7, Teacher Guide)
- Lesson 10, Synthesize, Step 4 Lesson Assessment Opportunity "Summative assessment: Students' ideas shared during the consensus discussion is an opportunity to gather evidence about learning goal 10 with the purpose of summatively assessing how students are communicating information about their solutions for reducing the impact of people on plants and animals and the places they live. Refer to the Lesson 10 Summative Guidance tool and the Assessment Guidance at the beginning of this lesson." (Lesson 10, Teacher Guide)
- Lesson 10, Synthesize, Step 4 "Facilitate a Consensus Discussion about the causes of people's actions leading to effects, which are observed patterns. The purpose of this Consensus Discussion is to support students in recognizing that people using natural resources causes changes to the environment that can make it harder (problem) or easier (solution) for some animals and/or plants to live and grow (effect), which can generate patterns in the impacts on

the environment. Facilitate this discussion as a Think-Pair-Share to allow all students to take stock of what they found out during the gallery tour." (Lesson 10, Teacher Guide)

Self Assessment

- Lesson 4, Synthesize, Step 5, Assessment Opportunity "Self reflection: Students' use of the reflection prompts on slide G provides an opportunity for them to review their own arguments, with the purpose of helping them celebrate what they have already included in their arguments and determine the next steps in selecting, changing, or adding evidence to support their claims. Remind students of places they can gather evidence like the Bird Model or Our Growing Ideas chart. Also refer to the Assessment Guidance at the beginning of the lesson." (Lesson 4, Teacher Guide)
- Lesson 4, Synthesize, Step 5 "Prompt students to self-reflect. After students have had 5-10 minutes to work on their arguments, pause their writing and display slide G. Support students to engage in self-reflection around their argument and next steps by reading through each question on the slide. For each question, give students time to view their work and decide if that is something they have completed or if it is something they still need to work on. Emphasize that students can always add more detail to their writing or drawing, even if they noted all parts were done." (Lesson 4, Teacher Guide)
- Lesson 10, Connect, Step 3, Assessment Opportunity "Self reflection: Students' use of the Communication Checklist provides an opportunity for them to review their solutions, with the purpose of supporting students as they practice sharing their solutions and reflect on their work with support of the displayed checklist and with guidance from the teacher. Students then have an opportunity to use their reflection to revise or give themselves reminders for how they share their solution before communicating those ideas with their classmates." (Lesson 10, Teacher Guide)
- Lesson 10, Connect, Step 3 "Self-reflect using the Communication Checklist. Distribute students My Solution assessments from Lesson 9. Give each student a few minutes to practice their presentation making sure they discuss the solution and how it makes it easier for some plants and/or animals to live and grow. As needed, provide time for students to revise any aspect of what they are sharing based on their reflection." (Lesson 10, Teacher Guide)

Peer Assessment

- Lesson 7, Synthesize, Step 3, Assessment Opportunity "Peer feedback: Students' peer-to-peer discussion prior to writing provides an opportunity for them to review their partner's argument, with the purpose of providing feedback that supports their partner in using evidence to support their claim. Students will have an opportunity to use the feedback when they complete the Plant and Animal Argument assessment." (Lesson 7, Teacher Guide)
- Lesson 7, Synthesize, Step 3 "Construct an argument supported by evidence. Display slide F Distribute the Plant and Animal Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to use information from their partners and share more evidence for how plants and other animals get what they need from their environment with or without people, to support their claim. As students work, circulate to check in with students and provide support using prompts like the following. Prompts to use: How does this (points picture student drew on handout) evidence fit (or support) your claim? What suggestions/ideas did you talk about with your partner? What other evidence did we add to the model about how animals live in their environment? How did we show them getting food/water/shelter/air? *Feel free to use words, pictures, or our model to share your ideas.*" (Lesson 7, Teacher Guide)

Coherent three-dimensional assessment system rationale is clearly described.

- K.4 Plants, Animals, & Their Environments Assessment System Overview "Each OpenSciEd unit includes an assessment system that offers many opportunities for different types of assessments throughout the lessons. These opportunities include: pre-assessment, formative assessment, summative assessment, peer assessment (called peer feedback with students), and/or self assessment (called self reflection with students). Grades K-2 units may only include peer or self assessment, not always both. Assessment opportunities are embedded and called out directly in the lesson plans. Please look for the yellow "Assessment Opportunity" support in each lesson plan to identify suggested assessments. In addition, the two tables below outline where each type of assessment can be found in the unit. The first table, Unit Assessment Plan by Assessment Type, lists the purpose, placement, and tools for each assessment type. The second table, Lesson-by-Lesson Assessment Opportunities, chronologically lists the assessment guidance for each lesson. For more information about the OpenSciEd approach to assessment, visit the OpenSciEd Elementary Teacher Handbook." (K.4 Plants, Animals, & Their Environments Assessment System Overview)

Criterion-Based Suggestions for Improvement: N/A

III.F. Opportunity to Learn

EXTENSIVE

Provides multiple opportunities for students to demonstrate performance of practices connected with their understanding of disciplinary core ideas and crosscutting concepts and receive feedback

The reviewers found **extensive** evidence that the materials provide multiple opportunities for students to demonstrate the performance of practices connected with their understanding of disciplinary core ideas and crosscutting concepts, and receive feedback. There is evidence of multiple opportunities for students to demonstrate performance of the targeted learning objectives in each of the three dimensions. The reviewers found extensive evidence that the materials explicitly include both claimed Assessment Statements in more than one activity and assessment, allowing students to develop and improve their performance over time. Students also have opportunities to apply peer and teacher feedback from prior activities to help them progress in their learning.

- Assessment Statement 1: **Construct an argument** for whether **animals and plants need** people to help them live**, supported by evidence** from **the model representing relationships of how plants and animals meet their needs (including changing their environment) in the places they live."** This assessment statement relates to lessons 2-7.
- Assessment Statement 2: **Communicate solutions that will reduce the impact of people's use of natural resources on plants, animals, and the environment."** This assessment statement relates to lessons 8-10.

Multiple, interconnected opportunities over time

K.4 Lesson 2 Teacher Assessment Tool and Lesson 7 Assessment Tool, "Assessment Statement 1: **Construct an argument** for whether **animals and plants need** people to help them live**, supported by evidence** from **the model representing relationships of how plants and animals meet their needs (including changing their environment) in the places they live."** This assessment statement relates to lessons 2-7.

- Lesson 1, the three-dimensional learning goal is 1.A Use observations to **develop a model that represents birds** and **the places they live** (**system**). 1.B **Construct an initial argument** (**based on observations**) for **whether or not birds** need help from people **to get what they need when living in the same places** (**system**).
  - Lesson 1, Explore, Step 3 "Go outside to make observations. Pair students with a partner and distribute the Birdwatching Observations handout to each student, along with a writing utensil, clipboard, and binoculars. Bring students outside and have them work with their partners to notice birds and their surroundings."
  - Lesson 1, Synthesize, Step 6 "Make initial arguments. Display slide M. In order to help students see that we have work to do to figure this out, tell the students that they will now get to choose where their thinking is about the question *Do birds, other animals, and plants need help from people to live?*. Reassure students that we do not expect to know the answer right now, but scientists like to try to explain why things happen. Share that they will choose yes, no, or maybe using a *Vote with Your Body* protocol. This is where students use their bodies to move to different areas of the room to vote for yes, no, or maybe to a given question using the following steps."
- Lesson 2, the three-dimensional learning goal is 2.A **Use observations to describe patterns** about what **birds need to live and grow.**
  - Lesson 2, Explore, Step 3 "Sort bird cards. Distribute a Bird Card Observations handout to each student and a set of Bird Cards to each group. Explain to students that they will sort the cards into categories based on what the birds are doing. Circulate as groups work together, and press them to explain their thinking for their categories."
- Lesson 3, the three-dimensional learning goals are 3.A **Use observations to describe patterns as evidence for how birds live in places that have the things they need to live and grow.** 3.B **Construct an argument for how birds can change their environments to meet their needs.**
  - Lesson 3, Explore, Step 2 "Turn and talk about patterns. Have students turn and talk with their partner about what birds use to possibly meet their needs to live and grow and a pattern of where they get those things. Have a few students share in order to come to a class agreement that the things birds use to possibly meet their needs are in the places they live and that they are able to live there because they can meet their needs. To give an example of this, ask students to give a thumbs up, down, or to the side as to whether a bird that only eats fish could live in a place without fish. They can turn and talk with a partner about why they think that."
- Lesson 4, the three-dimensional learning goals are 4.A **Use a model to represent relationships between birds and their environments, and how they use parts of their environment to meet their needs** (**e.g., food, water, air, shelter**). 4.B **Construct an initial argument** (**based on observations**) for **whether or not birds** need help from people **to get what they need when living in the same places** (**system**).
  - Lesson 4, Synthesize, Step 5 "Argue from evidence. Distribute the Birds Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to share more evidence for how the bird gets what it needs from their environment with or without people, to support their claim. As students work, circulate and provide support using the following prompts as needed."
- Lesson 5, the three-dimensional learning goals are 5.A **Construct an argument for how animals can change their environment to meet their needs.** 5.B **Obtain information from infographics** to **determine patterns** in what **animals need to live and grow** and how **can get what they need from where they live.**
  - Lesson 5, Connect, Step 6 "Continue the discussion to describe patterns. Once the class has discussed each infographic, continue the discussion to use this information to describe patterns of animal needs." It is not clear that all students have opportunities to engage with learning goal 5B.

- Lesson 6, the three-dimensional learning goal is 6.A **Use observations (firsthand and from media)** to **identify patterns of evidence** that **plants need water and light to live and grow**.
  - Lesson 6, Explore, Step 3 "Explore plant stations. Support students as they circulate to each plant station, directing them to be sure to record the needs of each plant. Additional questions to ask while circulating include: What are you noticing about the plants? What is similar about what these (gesture to multiple rows on the handout) need? What is different? How do these plants' needs connect to the experiences we shared earlier? How do you think these plants are getting what they need?"
- Lesson 7, the three-dimensional learning goals are 7.A **Use a model to represent relationships between animals, plants, and their environments, and how they use parts of their environment to meet their needs.** 7.B **Construct an argument** for **whether animals and plants** need help from people **to live, using evidence for how plants and animals meet their needs from their environment.**
  - Lesson 7, Synthesize, Step 3 "Construct an argument supported by evidence. Display slide F Distribute the Plant and Animal Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to use information from their partners and share more evidence for how plants and other animals get what they need from their environment with or without people, to support their claim. As students work, circulate to check in with students and provide support using prompts like the following."

K.4 Lesson 8 Assessment Tool, "Assessment Statement 2: **Communicate solutions that will reduce the impact of people's use of natural resources on plants, animals, and the environment."**

- Lesson 8, the three-dimensional learning goals are 8.A. **Read a grade appropriate text to obtain information about how people use natural resources from different parts of their environment for everything they do, including meeting their needs.** 8.B. **Communicate information about how people can cause changes to the environment to get the natural resources they use for everything they do, including meeting their needs.**
  - Lesson 8, Connect, Step 3 "Engage students in the interactive read-aloud. Read the Natural Resources book. Pause at the indicated places in the book to help students find out that people use things from the environment for everything they do, including meeting their needs. Use the final questions in the following table to lead a brief sensemaking discussion after reading the book. Pause to use gestures, point to illustrations, and allow students to discuss ideas with a partner in their preferred language to offer multiple means of engagement and support deeper understanding."
- Lesson 9, the three-dimensional learning goals are 9.A **Obtain information using a website with various text, text features, and media about how people doing things to meet their needs and live comfortably uses natural resources** and can **affect the world around them.** 9.B **Obtain information using a website with various text, text features, and media about how people can reduce their impacts (cause) so animals and plants can meet their needs to live and grow (effect).**
  - Lesson 9, Connect, Step 3 "Obtain information from the website. Give time for students to obtain information from the website. As students work together, circulate to listen for student ideas and pose the following questions, helping pairs think more deeply about the information on the website and how to record it."

- Lesson 10, the three-dimensional learning goal is 10. **Communicate solutions for how people can reduce their impact on plants and animals and the places they live.**
  - Lesson 10, Connect, Step 3 "Transition to the next step. Close out the gallery tour by having students pause and applaud the work of their classmates. Suggest that they come back together to share what they noticed when listening to different solutions related to ways people can make it easier for some animals and/or plants to live and grow."

Multi-modal feedback loops

- Lesson 4, Synthesize, Step 4 "Share evidence as groups. Have students turn and talk with someone in their group to discuss their evidence for their claim. After students have discussed, ask for a few volunteers to share the group's discussions, prompting students to refer to the evidence on the Our Growing Ideas chart and updated Bird Model to support their claims about why they think yes, no, or maybe. Allow students to change their argument. Allow students to change locations if they want to change their vote for their claim. Students may also want to change their sticky note to change their evidence for their claim. Have new stickies available if students would like to change their evidence." (Lesson 4, Teacher Guide)
- Lesson 4, Synthesize, Step 5 "Argue from evidence. Distribute the Birds Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to share more evidence for how the bird gets what it needs from their environment with or without people, to support their claim. As students work, circulate and provide support using the following prompts as needed." … "Prompt students to self-reflect. After students have had 5-10 minutes to work on their arguments, pause their writing and display slide G. Support students to engage in self-reflection around their argument and next steps by reading through each question on the slide. For each question, give students time to view their work and decide if that is something they have completed or if it is something they still need to work on. Emphasize that students can always add more detail to their writing or drawing, even if they noted all parts were done." (Lesson 4, Teacher Guide)
- Lesson 7, Synthesize, Step 3 "Give directions for the Plant and Animal Argument student assessment. Display slide D and show students how they will share their claim and evidence for plants and animals using the Plant and Animal Argument. Read the first question aloud and show students where they will circle their claim (yes, maybe, no). Review with students that a claim is *an answer to a scientific question*. Also, point out where students can add one piece of evidence about animals from the model that supports their claim and one piece of evidence about plants from the model that supports their claim. Remind them that they can use drawing and/or writing with labels, words, and/or sentences. As part of this demonstration, ask students where they can find evidence collected by the class, listening for them to share ideas from the model. Remind students that their claim should match the evidence they select." … "Transition to partners to plan arguments. Display slide E and have students meet with a partner to discuss how they would answer that question now that we have gathered evidence about the ways birds, other animals, and plants can meet their needs and live in their environments. Use the directions on the slide to explain directions." … "Construct an argument supported by evidence. Display slide F Distribute the Plant and Animal Argument assessment and writing utensils to each student. Remind students that they can add or write at the bottom (or the back) of the handout to use information from their partners and share more evidence for how plants and other animals get what they need from their environment with or without people, to support their claim. As students work, circulate to check in with students and provide support using prompts like the following." (Lesson 7, Teacher Guide)
- Lesson 10, Connect, Step 3 "Prepare for the class gallery tour. Revisit the Communication Checklist (refer to slide D) and remind students of what they will be sharing during the gallery tour." … "Self-reflect using the Communication Checklist. Distribute students My Solution assessments from Lesson 9. Give each student a few minutes to practice their presentation making sure they discuss the solution and how it makes it easier for some plants and/or animals

to live and grow. As needed, provide time for students to revise any aspect of what they are sharing based on their reflection." … "Discuss directions for a class gallery tour. Explain that half of the class will be presenters with their My Solution assessments while the other half of the class will move around the room and listen to their classmates share about their solutions. Remind students to use the Communication Checklist as they are sharing with their classmates. After students share with a few classmates, have students switch roles. The students who just presented will become the listeners and move around to listen to other classmates' presentations." (Lesson 10, Teacher Guide)

Criterion-Based Suggestions for Improvement:

- Ensure "[f]eedback focuses on improving student performance for all key claimed learning in each of the three dimensions." [Detailed Guidance, p. 47]
    - Consider aligning feedback suggestions to targeted three-dimensional elements to ensure teachers can track feedback loops and student progress.

Category Ratings

CATEGORY I	**NGSS 3D Design** *(Criteria A–F)*	0	1	2	(3)
CATEGORY II	**NGSS Instructional Supports** *(Criteria A–G)*	0	1	2	(3)
CATEGORY III	**Monitoring NGSS Student Progress** *(Criteria A–F)*	0	1	2	(3)
TOTAL SCORE			**9**		

Overall Ratings

Overall ratings:

The score total is an *approximate* guide for the rating. Reviewers should use the evidence of quality across categories to guide the final rating. In other words, the rating could differ from the total score recommendations if the reviewer has evidence to support this variation.

E: Example of high quality NGSS design—High quality design for the NGSS across all three categories of the rubric; a lesson or unit with this rating will still need adjustments for a specific classroom, but the support is there to make this possible; exemplifies most criteria across Categories I, II, & III of the rubric. (total score ~8–9)

E/I: Example of high quality NGSS design if Improved—Adequate design for the NGSS, but would benefit from some improvement in one or more categories; most criteria have at least adequate evidence (total score ~6–7)

R: Revision needed—Partially designed for the NGSS, but needs significant revision in one or more categories (total ~3–5)

N: Not ready to review—Not designed for the NGSS; does not meet criteria (total 0–2)

Overall rating below:

E