Washoe County School District K-5 Science
2020 Instructional Materials Evaluation Rubric
(Certified Teaching Professional Form)

Category 1: Designed for Three-Dimensional Learning

Criterion 1A: Phenomena and Problems

Instructional materials focus on students making sense of phenomena or designing solutions to problems which drives student learning.

- Students are engaged with phenomena or problems that can be explained or solved through the application of the three-dimensions.
- A good phenomenon builds on everyday student experiences and targets grade appropriate learning goals.
- Anchoring, investigative and everyday phenomena may be present.
- Engineering lessons require students to use elements of the science core ideas together with elements of core ideas from engineering design to solve problems.

Less of this:	**More** of this:
Phenomena are just for the initial hook.	Phenomena drives the learning.
Phenomena are fun or flashy to engage students.	Phenomena that builds on everyday experiences supports engagement.
Phenomena are brought in after students develop the science ideas so they can apply what they learned.	The development of science ideas is anchored in investigations of phenomena.
Engineering problems are unrelated to the science learning.	Engineering involves designing solutions to problems that arise from phenomena.

Examples of Evidence:

- ◊ Photographs of trash washed up on a beach that leads into a unit on waves in 4th grade physical science unit. (A first-hand experience, video, photograph or data set to start a learning sequence that becomes the "why" for further study grounded in everyday student experiences.)
- ◊ A time lapse video of a badger decomposing is shown to start a life science unit on matter and energy in ecosystems. Students return to the video throughout to explain what is happening.
- ◊ Garbage from the lunchroom is examined to start a unit on matter and how it changes in the 5th grade physical science unit.
- ◊ 3rd grade students explore balloons, aluminum cans, styrofoam beads, and transparent tape to make observations and generate questions about static electricity in the physical science unit, lesson 3.
- ◊ Students address the problem of communicating at a distance without sound following a study of light in the 1st grade physical science unit.

Specific Evidence from Materials
--Each unit has "Phenomena Storylines" (anchoring phenomena). For example, in the grade 2 unit "Insects and Plants", there are 3 anchoring phenomena storylines. These are: "How are insects in our park the same and different?", "Why

are insects important to plants?", and "How can plants meet their needs and grow in crack in the sidewalk?".
--"Phenomena Storylines" are introduced at the beginning of the guide (pg. iv, v) as the anchoring phenomena of the unit and seem to be separate from the investigations and the learning goals of those lessons.
--Each investigation has a "Focus Question" that is also labeled as a phenomenon. These are more of guiding questions and do not explicitly refer to "Phenomena Storylines" (anchoring phenomena).
--For example, the focus questions of the grade 2 unit "Insects and Plants" include "What is the natural history of a mealworm?", "What is the natural history of a flowering plant?", "…of a milkweed bug?", "How does the natural history of moths compare to insects", "How does the natural history of butterflies compare to other insects?".
--Students are introduced to anchoring phenomena informally with a class discussion of the scenario at the beginning of the unit. This is not listed explicitly in the teacher manual for investigation 1 of the unit. However, a brief additional resource is provided at the beginning of the guide on pages iv and v to provide suggestions on how to incorporate the "Phenomenon Storylines" into instruction.
--Focus questions drive each lesson. These are referred to regularly.

***Loosely tied to grade 2 life science standards. This unit focuses mostly on animals (4 animals, 1 plant) and their life cycles which is a third grade standard (3-LS1: Develop models to describe that organisms have unique and diverse life cycles but have in common birth, death, growth, reproduction, and death). See unit overview below.

In order to provide young students with indepth opportunities to experience the biodiversity on Earth, they will become naturalists and study insects and plants in and out of their classroom. The anchor phenomenon for this module is the natural history of common insects and their interactions with plants. The driving question for this module is what is the natural history of some plants and animals in different habitats?

Students build on their understanding of growth and development of plants and animals from grades K–1 by observing new organisms over time. Students see the life cycles of insects unfold in real time and compare the structures and functions exhibited by each species to reveal patterns. At the same time, students grow a flowering plant in the classroom. They gain experience with the ways that plants and insects interact in feeding relationships, pollination, and seed dispersal.

The NGSS Performance Expectations bundled in this module include:

Life Sciences
3-LS1-1 (foundational)
2-LS2-1
2-LS2-2
2-LS4-1

Engineering, Technology, and Applications of Science
K–2 ETS1-1
K–2 ETS1-2
K–2 ETS1-3

To what extent do the materials support Criterion 1A? Include your reasoning.

Click or tap here to enter text.

Criterion 1B: Integrating the Three-Dimensions

Instructional materials integrate elements of the Science and Engineering Practices, Crosscutting Concepts and Disciplinary Core Ideas.

- Students develop and use multiple grade-appropriate elements of each dimension.
- The dimensions are integrated to work together and are not taught in isolation.
- Learning experiences integrate multiple different pairings of the dimensions to build understanding of the targeted performance expectations.
- Engineering is integrated with at least once per domain of science.

Less of this:	**More** of this:
Students only engage in a single practice element in a lesson.	The lesson helps students use and develop multiple practice elements.
Lessons teach the dimensions separately or only address them at the general level.	Lessons integrate grade-appropriate elements for each dimension.
Engineering lessons focus on trial and error activities that don't require science or engineering knowledge.	Grade-appropriate elements of engineering design and science core ideas are integrated with the other dimensions.
Engineering consists of challenges or step-by-step directions to build something.	Engineering is integrated into the grade-appropriate science core ideas and use explanations of phenomena to design solutions.

Examples of Evidence:

- ◊ 4th grade students conduct an investigation using fair tests in which variables are controlled and the number of trials considered, including collecting measurements and representing data in tables, with balls and ramps to determine cause and effect relationships of speed and energy in unit 2 lesson 4.
- ◊ Students ask questions about waves moving objects and collaboratively investigate how to make different looking waves in water and analyze how these waves affect a floating object in the physical science unit.
- ◊ 3rd grade students generate, test and refine solutions to keep two moving objects from touching each other by applying ideas learned about magnets in lesson 9.
- ◊ With teacher guidance, kindergarten students conduct an investigation with peers to compare the effects of different directions of pushes and pulls on playground balls, student chairs and erasers on different surfaces in the physical science unit, lesson 3.

Specific Evidence from Materials
--In the grade 2 unit "Insects and Plants", students observe a mealworm's structure and behavior over a 10-week period and record changes in its life cycle as it changes from a larvae to a pupa to a beetle (investigation 1). --In the grade 2 unit "Insects and Plants", students plant a brassica seed and observe the plant grow over a month from seed to sprout to flowering plant. Students conduct investigations to test the effects of water and sunlight (investigation 2). --In the grade 2 unit "Insects and Plants" students search for seeds outside and read about how seeds are dispersed (investigation 2). --In the grade 2 unit "Insects and Plants" students search for insects on school grounds and collect and sort evidence of plants eaten by insects (investigation 4).

--In the grade 2 unit “Insects and Plants” students observe painted lady butterflies from larvae to adult. Student design and construct a model of a pollinator using common materials and test them on flowers.
--Investigations are part of Tier 1 instruction.
--At the beginning of each investigation, in depth explanations of the SEPs and CCCs targeted in the lesson. Specific examples are given under each SEP or CCC identified. For example, in the grade 2 unit “Insects and Plants” pages 83 and 84 give teachers guidance on the SEPs and CCCs addressed in investigation 1 (mealworms). See evidence below.

NGSS Foundation Box for CC

- **Patterns:** Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.
- **Structure and function:** The shape and stability of structures of natural and designed objects are related to their function(s).

Exposing Crosscutting Concepts (CC)

The third dimension of instruction involves the crosscutting concepts, sometimes referred to as unifying principles, themes, or big ideas, that are fundamental to the understanding of science and engineering.

These concepts should become common and familiar touchstones across the disciplines and grade levels. Explicit reference to the concepts, as well as their emergence in multiple disciplinary contexts, can help students develop a cumulative, coherent, and usable understanding of science and engineering. (National Research Council, 2012, page 83)

In this investigation, the focus is on these crosscutting concepts.

- **Patterns.** Life cycles of insects can be observed and compared and used as evidence to determine general patterns in nature.
- **Structure and function.** Animals and plants have structures that are related to the functions that are essential to the organisms' survival in certain environments.

Connections to the Nature of Science

- **Science addresses questions about the natural and material world.** Scientists study the natural and material world.

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To what extent do the materials support Criterion 1B? Include your reasoning.
Click or tap here to enter text.

Criterion 1C: Coherence

Instructional materials help students develop increasingly sophisticated understandings within and across grade-levels.

- Lessons fit together to target a set of performance expectations with multiple opportunities for students to revise understandings over time.
- Instructional materials make connections between lessons, units and grade levels.
- Lessons build on students' prior learning in all three dimensions.
- Students engage in learning experiences with explicit connections to other science disciplines and other subjects with intention.

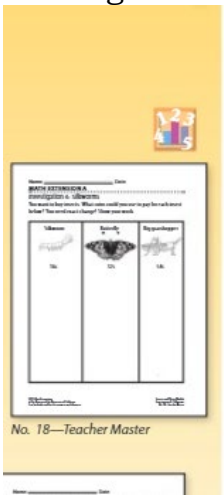
Less of this:	**More** of this:
Lessons are unrelated.	Lessons are presented in a logical sequence to develop understandings.
Lessons build on prior learning but only for the DCIs.	Lessons work together with students' foundational knowledge and practice from prior lessons and grade levels.
Science domains are taught in isolation.	When appropriate, science domains are integrated to show connections.
Other subjects, when included, are not intentionally chosen to support grade-level standards.	Grade-level appropriate standards from ELA, math or other subject areas are integrated with science learning.

Examples of Evidence:

- ◊ In the first unit, students address the physical science standards around the phenomena of garbage and partially address a life science standard related to decomposers. In the second unit on ecosystems, students extend and apply their understanding of decomposers which leads to an engineering problem about materials such as plastics that do not decompose.
- ◊ 5th grade students are investigating water sources around the Earth and make connections to properties of matter in both the physical science and earth science units and prior learning about weather and climate from 3rd grade.
- ◊ 2nd grade students plan and conduct an investigation with water and earth materials as a whole class in one lesson and then in the next lesson students work with a small group to plan and conduct another investigation with wind and earth materials to further learning of core ideas and practices.
- ◊ Students apply ELA learning to write a set of directions for conducting an investigation in the earth science unit, lesson 6.
- ◊ Students use line plots to analyze climate data in grade 3, unit 4.

Specific Evidence from Materials
--Lessons within each unit connect and build upon each other. For example, in the grade 2 unit "Insects and Plants", students investigate the life cycles of living specimens and observe their growth over time. Each investigation focuses on a unique organism. The sequence of organisms is: mealworm, brassica seed, milkweed bug, silkworm, butterfly. --Lesson focus questions connect to the theme of the natural history of… and to life cycles. --Lessons rarely, if ever, connect back to the anchoring phenomena (Phenomena Storylines). Teachers must do this on their own accord.

--"Math Extensions", “Science Extensions”, and “Environmental Literacy Extensions” are offered after every investigation. These are not integrated into instruction during the Tier 1 investigations or instruction.
--For example, in the grade 2 unit “Insects and Plants”, students can practice addition and money skills in the context of buying insects. A “Teacher Master” is included that gives directions and facilitates recording. See example below from investigation 4 (silkworms) on page 276.


No. 18—Teacher Master

INTERDISCIPLINARY EXTENSIONS

Math Extension

- **Problems A and B**
  Students practice addition and money skills in the context of buying insects.

  Notes on the problem. If coin manipulatives are available, bring them out for these problems. Additional paper or student writing boards might help students write the addition problems.

Science Extensions

- **Look inside a cocoon**
  After a moth has emerged from a cocoon, cut the cocoon open for students to inspect. Ask what they think the two crispy brown objects inside the silk cocoon might be. [The smaller one is the last larval molt, and the larger one is the protective skin that covered the pupa inside the cocoon.]
- **Invent an insect**
  Ask students to use what they know about insects to design a new insect. They may create any type of insect as long as it has the essential characteristics (three body parts and six legs). Remind

--During some of the investigations, students read from the student booklets to gain content specific information. For example, in the grade 2 unit “Insects and Plants” students read the section “Life Goes Around” to find the difference between the life cycles of animals (investigation 5, page 308).
--Students discuss the reading and make sense of it. The jigsaw reading strategy is suggested to support students. See evidence below.

READING *in Science Resources*

15. Read “Life Goes Around”
Ask students what a life cycle is. Brainstorm with students what they know about different animals and their life cycles. When does a life cycle start? When does it end? Why is it called a cycle? What are the stages?

Introduce the title “Life Goes Around” and explain that this article will tell students about the natural history of different animals. Let students preview the text by discussing the different types of animals in the photographs and where they live (their habitats). Read aloud or have students read the first three pages independently.

Pause and ask students to tell their reading partners what the main idea of this section is. Have them summarize the life cycle of the ladybug using the photographs as a guide.

Read page 58 aloud and then tell students to read the rest of the article on their own to find out what is different about the life cycles of other animals. Give them self-stick notes to mark the pages where they find something they did not know before, a question they have, and any confusing words or phrases.

16. Discuss the reading
Discuss the reading, using these questions as a guide.

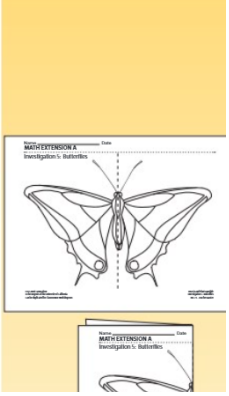
➤ *According to the story, what does* cycle *mean?* [To go around.]
➤ *What did the story tell us about life cycles?*

--“Art Extensions”, and “Language Extensions” are also offered with some lessons. See evidence from investigation 5 of the grade 2 unit “Insect and Animals”.

INTERDISCIPLINARY EXTENSIONS

Language Extensions

- **Diagram life cycles**
  The life cycles of the ladybug, trout, frog, duck, and mouse are all described in the article "Life Goes Around." Have students choose one of the animals and diagram its life cycle. Students can draw a picture representing each stage, and add arrows showing the transition from one stage to the next. The pictures should be drawn in a circle to represent the recurring cycle.
- **Read *Lifetimes***
  Lifetimes, a book by Bryan Mellonie and Robert Ingpen, describes lifetimes for plants, people, birds, fish, and insects. "So, no matter how long they are, or how short, lifetimes are really all the same. They have beginnings, and endings, and there is living in between." This book is appropriate to read to students as they begin to see the insects they have cared for die a natural death.



To what extent do the materials support Criterion 1C? Include your reasoning.
Click or tap here to enter text.

Category 2: Instructional Supports

Criterion 2A: Assessing the Three-Dimensions

Instructional materials support monitoring student progress in all three dimensions.

- Multiple and varied assessments allow students to demonstrate learning in all three dimensions including application of knowledge in performance tasks.
- Formative assessments, including teacher, self and peer assessments, are embedded throughout to inform instruction.
- Assessments are unbiased and elicit direct, observable evidence from all students.
- A phenomena or problem drives tasks, and information from the task is required to complete it.
- Rubrics and scoring guidelines are provided for interpreting student performance including sample student responses

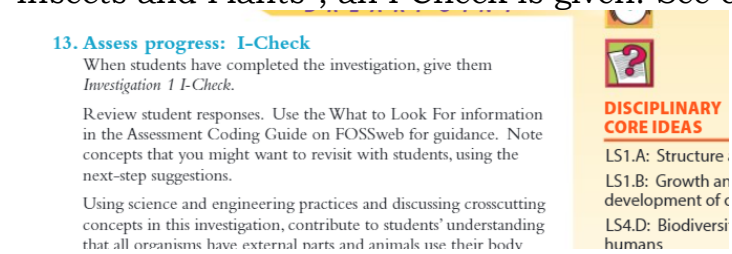
Less of this:	**More** of this:
Checks for understanding elicit only a few student responses or rely primarily on group projects.	Individual student artifacts are used to measure student understanding of each dimension.
Only summative assessments that measure the end point of understanding are provided.	Formative assessments provide feedback to adjust instruction and inform students of their progress.
Assessments are primarily rote memorization of facts and terminology.	Assessments reflect application of all three dimensions including tasks that are driven by phenomena or problems.
Only multiple-choice tests are given.	Multiple measures and types of assessment are used throughout.

Examples of Evidence:

- ◊ As students are engaged in a performance task in unit 3, lesson 2, there are indicators for teachers to look for and information about possible responses. This information is embedded in the lesson.
- ◊ In unit 1, there are two performance assessments, peer feedback throughout, exits slips, a summative assessment, and a prewrite.
- ◊ Individual student learning is assessed using written work that answers the driving question of the unit. (Earth Science, p. 76)

Specific Evidence from Materials
--Multiple assessment opportunities are available for classroom use. --Embedded assessments are included in each investigation. These include student artifacts, science notebook entries, answers to focus questions, and performance assessments. --For example, in investigation 1 (mealworms)- part 2, there is a performance assessment where teachers conduct a 30-second interview with each student as they study the mealworm. See evidence below. **8. Plan assessment: performance assessment** During the observation sessions, conduct 30-second interviews with students as they study the mealworms. This will provide a good opportunity for you to observe students' science and engineering practices. Carry the *Performance Assessment Checklist* with you as you visit the groups while they are working.

--I-Checks are benchmark assessments at the end of each investigation and require students to demonstrate their understanding of the DCIs, SEPs, and CCCs.
--For example at the end of investigation 1 (mealworms) of the grade 2 unit "Insects and Plants", an I Check is given. See evidence below.


13. Assess progress: I-Check

When students have completed the investigation, give them *Investigation 1 I-Check*.

Review student responses. Use the What to Look For information in the Assessment Coding Guide on FOSSweb for guidance. Note concepts that you might want to revisit with students, using the next-step suggestions.

Using science and engineering practices and discussing crosscutting concepts in this investigation, contribute to students' understanding that all organisms have external parts and animals use their body

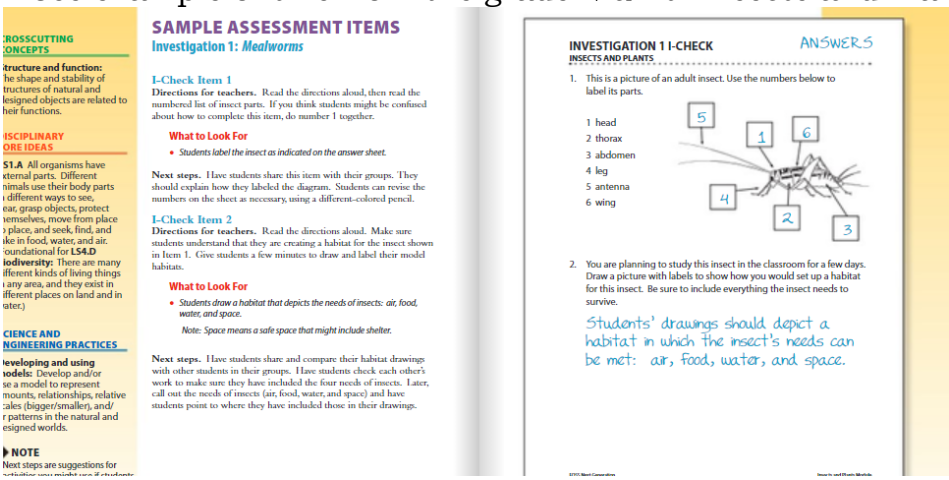
DISCIPLINARY CORE IDEAS

LS1.A: Structure

LS1.B: Growth an development of

LS4.D: Biodiversi humans

--I-Checks are 2-3 pages long with 4-5 test items on each page. "Sample Assessment Item" pages are included in the assessment section of each unit and give directions for teacher, "What to Look For" sections, and sample student answers.
--See example of this from the grade 2 unit "Insects and Plants" below.


SAMPLE ASSESSMENT ITEMS

Investigation 1: *Mealworms*

I-Check Item 1

Directions for teachers. Read the directions aloud, then read the numbered list of insect parts. If you think students might be confused about how to complete this item, do number 1 together.

What to Look For

- *Students label the insect as indicated on the answer sheet.*

Next steps. Have students share this item with their groups. They should explain how they labeled the diagram. Students can revise the numbers on the sheet as necessary, using a different-colored pencil.

I-Check Item 2

Directions for teachers. Read the directions aloud. Make sure students understand that they are creating a habitat for the insect shown in Item 1. Give students a few minutes to draw and label their model habitats.

What to Look For

- *Students draw a habitat that depicts the needs of insects: air, food, water, and space.*

Note: Space means a safe space that might include shelter.

Next steps. Have students share and compare their habitat drawings with other students in their groups. Have students check each other's work to make sure they have included the four needs of insects. Later, call out the needs of insects (air, food, water, and space) and have students point to where they have included those in their drawings.

INVESTIGATION 1 I-CHECK ANSWERS

INSECTS AND PLANTS

1. This is a picture of an adult insect. Use the numbers below to label its parts.

1 head
2 thorax
3 abdomen
4 leg
5 antenna
6 wing

2. You are planning to study this insect in the classroom for a few days. Draw a picture with labels to show how you would set up a habitat for this insect. Be sure to include everything the insect needs to survive.

Students' drawings should depict a habitat in which the insect's needs can be met: air, food, water, and space.

--A large assessment section is provided for teachers in each unit describing the types of assessments, how assessment is used to measure the 3 dimensions, and unit specific assessment information.

To what extent do the materials support Criterion 2A? Include your reasoning.
Click or tap here to enter text.

Criterion 2B: Instructional Experiences

Instructional materials support equitable access to science knowledge and practice for all students.

- Students engage with direct (preferably first-hand), shared experiences that are relevant and authentic, serve as the basis for learning and meet the developmental needs of elementary students.
- Students' questions, prior experiences and diverse backgrounds related to the phenomenon or problem drive learning.
- Materials provide an opportunity to learn by allowing for the development of scientific understandings over time using multiple modalities.
- Materials provide opportunities for students to make connections to and explore the natural world outside the classroom.

Less of this:	**More** of this:
The lesson focuses on a topic that some students have experienced.	Direct experiences in the classroom provide access and equity for all students.
Student questions and prior experiences are not connected to the learning.	Materials provide supports for connecting students' own questions to the targeted learning.
Students read about what others have done.	Students learn through concrete experiences.
Only one or two modalities are used.	Multiple modalities are used throughout each instructional segment.

Examples of Evidence:

- ◊ Students develop physical models of a landfill as open and closed systems to observe during the 5th grade garbage unit.
- ◊ Students identify components of garbage disposal in their homes and communities which connects the phenomena that started the unit.
- ◊ Students conduct a first-hand investigation of erosion and deposition using a stream table, observe time-lapse videos of landslides, engage in a virtual investigation, read accounts of earth changes by wind and record changes to the playground after a snow event in the 4th grade earth science unit.
- ◊ Students raise trout from eggs in the classroom and make observations over time as part of their study of traits in the life science unit.

Specific Evidence from Materials
--In the grade 2 unit "Insects and Plants", students observe a mealworm's structure and behavior over a 10-week period and record changes in its life cycle as it changes from a larvae to a pupa to a beetle (investigation 1). --In the grade 2 unit "Insects and Plants", students plant a brassica seed and observe the plant grow over a month from seed to sprout to flowering plant. Students conduct investigations to test the effects of water and sunlight (investigation 2). --In the grade 2 unit "Insects and Plants" students search for seeds outside and read about how seeds are dispersed (investigation 2). --In the grade 2 unit "Insects and Plants" students search for insects on school grounds and collect and sort evidence of plants eaten by insects (investigation 4).

--In the grade 2 unit “Insects and Plants” students observe painted lady butterflies from larvae to adult. Student design and construct a model of a pollinator using common materials and test them on flowers.
--All investigations include multiple first-hand experiences for students to engage with the content. Discussions, writing in science notebooks, videos, and interactive online activities are also used to engage with the content.

***Although students engage with numerous relevant, first-hand experience it is important to note that these are loosely tied to grade 2 life science standards. This unit focuses mostly on animals (4 animals, 1 plant) and their life cycles which is a third grade standard (3-LS1: Develop models to describe that organisms have unique and diverse life cycles but have in common birth, death, growth, reproduction, and death). See unit overview below.

In order to provide young students with indepth opportunities to experience the biodiversity on Earth, they will become naturalists and study insects and plants in and out of their classroom. The anchor phenomenon for this module is the natural history of common insects and their interactions with plants. The driving question for this module is what is the natural history of some plants and animals in different habitats?

Students build on their understanding of growth and development of plants and animals from grades K–1 by observing new organisms over time. Students see the life cycles of insects unfold in real time and compare the structures and functions exhibited by each species to reveal patterns. At the same time, students grow a flowering plant in the classroom. They gain experience with the ways that plants and insects interact in feeding relationships, pollination, and seed dispersal.

The NGSS Performance Expectations bundled in this module include:

Life Sciences
3-LS1-1 (foundational)
2-LS2-1
2-LS2-2
2-LS4-1

Engineering, Technology, and Applications of Science
K–2 ETS1-1
K–2 ETS1-2
K–2 ETS1-3

To what extent do the materials support Criterion 2B? Include your reasoning.
Click or tap here to enter text.

Criterion 2C: Student Sense-making

Instructional materials support equitable access to science knowledge and practice for all students.

- Materials support student sense-making at both an individual and group level.
- Classroom discourse focuses on expressing and clarifying student reasoning with opportunities for students to share ideas and feedback with each other that supports the iterative and collaborative co-construction of explanations.
- Materials include supports for oral and written language processing to involve students in scientific discourse for sense-making including a language-in-use approach.

Less of this:	**More** of this:
The teacher tells students what they need to know.	Students figure out explanations through classroom discourse with each other.
The teacher calls on a few students to share reasoning.	All students have the opportunity to share their thinking orally or in writing.
The focus is only on getting the "right" answer.	Sense-making begins with initial student ideas that progress in sophistication.
Vocabulary is front-loaded. All students are provided with sentence frames.	Specialized vocabulary is embedded in the instructional sequence with multiple opportunities to use and development over time. Writing supports are differentiated.

Examples of Evidence:

- ◊ 5th grade students develop models of how scents travel that are refined over the course of a three weeks using a combination of visual and written language providing multiple opportunities to develop precise vocabulary in the physical science unit.
- ◊ 3rd grade students answer questions in their notebook individually using pictures and words to explain their initial ideas about how static electricity works and have the opportunity to revise this after discussing with a peer and the whole class in the physical science unit.
- ◊ The teacher facilitates a class discussion using a word wall where kindergarten students share observations with a shoulder partner and the whole group about the kinds of things in their homes to figure out that the things we need come from nature.
- ◊ Suggested sentence frames are included to support oral and written responses when needed with the goal of independence.

Specific Evidence from Materials
--Discussion plays a large role in the instructional sequence of each investigation. --For example, throughout investigation 4 in the grade 2 unit "Insects and Plants" students discuss observations of the vial of silkworm eggs. They discuss what they see and make predictions. --For example, in part 4 of investigation 4, the class discusses the leaf evidence found that proves plants are being eaten by animals. Many high-quality questions are provided. See evidence below.

11. Discuss the leaf evidence

Ask,

- *Which type of evidence did we find the most? The least?*
- *Which plant seems to be the most popular food source?*
- *How many different kinds of plants show evidence of being eaten?*
- *Did anyone see any animals eating the leaves?*
- *Which plants had no observable insect damage?*
- *What plant parts, other than leaves, did you find as evidence of animals eating a plant?*
- *What changes are animals making to their environment?*

--Guiding questions are provided for some sections of each part of the investigation. They prompt teachers to ask engaging, high quality questions in the individual, small group, and whole group settings.

--Further some investigations include a "Sense-making Discussion" section that promotes student reasoning. See evidence from investigation 5 of the grade 2 unit "Insects and Plants".

18. Have a sense-making discussion

Have students respond to the review items on notebook sheet 20, *"Life Goes Around" Review*. These are also found at the end of the article in the *Science Resources* book. Read the items aloud to the class.

- *Does a ladybug larva look like its parents?* [No.]
- *Tell about the life cycle of a ladybug.* [Egg, larva, pupa, adult.]
- *Tell about the life cycle of a different animal.* [Egg, baby trout, adult trout; egg, tadpole, frog; baby mouse, adult mouse.]
- *Name five animals that hatch from eggs.* [Trout, frog, butterfly, silkworms, milkweed bugs.]
- *Name three animals that are born alive (not from eggs).* [People, mouse, elephant, dog, cat.]

Ask students to discuss the guiding question for the investigation.

- *How does the life cycle of butterflies compare to other insects?* [A butterfly goes through this cycle: egg, larva, pupa, adult. That is the same cycle as beetles and moths. The milkweed bug life cycle is different than the other insects.]

--Vocabulary is introduced during instruction and reviewed at the end of instruction. For example, in investigation 4 (silkworms) of "Insects and Plants", the work "silkworm" is introduced after students have observed vials of silkworm eggs. See evidence below.

- *How are they different from mealworm larvae?*

8. Introduce *silkworm*

Tell students,

*The insects in your vials are **silkworms**. They hatched out of the little gray eggs. Baby silkworms are larvae. The silkworm larvae will live in our classroom with us, and we will learn more about them.*

--In the same lesson the vocabulary is reviewed at the end of the investigation of part 1.

15. Review vocabulary

Review key vocabulary added to the word wall in this part. Here's an example of cloze review for this part.

- *Our new insect is a _____.*

S: Silkworm (larva).

- *Silkworms get the food and water they need from _____.*

S: Mulberry leaves.

To what extent do the materials support Criterion 2C? Include your reasoning.
Click or tap here to enter text.

Criterion 2D: Teacher Supports

Instructional materials support teacher planning and instruction.

- Materials include background knowledge in both science content and pedagogy and student preconceptions.
- Materials have clear and concise instructional directions and connections to the standards.
- Materials provide guidance to support differentiated instruction, extra support and extensions at the appropriate level for a broad range of learners.
- Materials include professional learning and additional instructional planning resources.
- Materials have supports for families to extend learning and offers suggestions for how to help their student(s) at home.

Examples of Evidence:

- ◊ Information prior to lessons gives teachers things to except that students may already know in unit 1 p.12 in addition to how their understandings will build.
- ◊ 1st grade students have a choice to investigate different variables related to shadows, and suggestions are included as well as extensions to do at home. (Light unit, p. 40)
- ◊ The assessments include recommendations for additional supports when students don't meet expectations. "Students may struggle to articulate that scientists look back at the data they collect to look for patterns and to draw conclusions about phenomena. One way to support them in this thinking might be to share an anecdote such as, "When I was growing up, my mom used to measure my height by marking it on the wall in the pantry. When I look back at those marks, I notice patterns, like that I grew faster between the ages of 5 and 8 than I did when I was older."" (p.14)
- ◊ Students make observations of the sky with their families, looking for patterns over time. Families are provided with background information on how to record observations and what patterns to expect.

Specific Evidence from Materials
--Each investigation has a "Home/School Connections" that relates to activities done at school. A "Teacher Master" is provided for families to explain and facilitate the activity at home. For example, in the grade 2 unit "Insects and Plants", students look around their yards for evidence of insects. Students go on an insect search and record evidence on a T-chart (investigation 4, page 278). --The program is teacher centered and has abundant resources for teachers. --A large assessment section is provided for teachers in each unit describing the types of assessments, how assessment is used to measure the 3 dimensions, and unit specific assessment information. --A large "Background for the Teacher" section is included at the beginning of each investigation with in-depth information on the science behind the investigation. See evidence below.

INVESTIGATION 1 — *Mealworms*

TEACHING NOTE

> the grade-level Planning chapter in Teacher ces for a summary tion of the phenomena ts investigate in this module three-dimensional learning ch.

BACKGROUND *for the Teacher*

The module anchor phenomena is the life story of some common but phenomenal insects. **Natural history** is the scientific study of animals or plants through observation rather than experimentation. A **naturalist** is a person who studies the organisms as they live in nature. In order to provide young students with an indepth opportunity to experience the biodiversity of plants and animals, we will focus on a few insects we can bring into the classroom and their relationships with plants in different habitats. The number of species of insects are more than any other animal group. Our young naturalists will begin their study by looking at beetles.

Darkling beetles in the larval, pupal, and adult **stages** are excellent classroom animals. They exhibit interesting behaviors; they are small but not tiny; they don't bite, smell bad, fly, or jump; and they are extremely easy to care for.

The **mealworm**, despite its misleading common name, is not a worm; it is a beetle **larva**. Any similarity to a true worm is incidental. Mealworm larvae are golden yellow and have thirteen **segments**—a **head**, three **thoracic** segments, and nine **abdominal** segments. Mealworm larvae are the counterpart of the familiar caterpillar in the butterfly life cycle. Mealworms pull themselves around on six stubby **legs**, one pair on each thoracic segment.

What Do Mealworms Need to Live?

--A large "Teacher Children about…" section is included for each investigation. It includes "Developing DCIs", "Engaging in SEPs", and "Exposing CCCs", as well as "Connections to the Nature of Science". See evidence below from investigation 1 of "Insects and Plants".

TEACHING *Children about Mealworms*

Developing Disciplinary Core Ideas (DCI)

There are more kinds of insects on Earth than all other kinds of animals put together, and they dominate the planet in terms of total living mass, total numbers of individuals, and most widespread occupation of the planet's ecosystems. They are also very accessible to young students for firsthand observation and they go through changes in their life cycle that add to the concept of diversity. That is the reason that insects were selected for students to engage with the concept of diversity of life in different places.

Almost all primary students will know something about insects. Bees make honey, fireflies flash in the dark, caterpillars turn into butterflies, ladybugs have spots, and so forth. Students will also know that flies are a nuisance at a picnic, ants get into the sweets, wasps deliver a powerful sting, mosquitoes suck blood, and moths eat wool sweaters.

NGSS Foundation Box

LS1.A: Structure and functi

- All organisms have extern Different animals use thei in different ways to see, h objects, protect themselv from place to place, and s and take in food, water, ar also have different parts (leaves, flowers, fruits) that survive and grow. (Extern grade 1)

LS1.B: Growth and develop of organisms

- Reproduction is essential continued existence of ev

Engaging in Science and Engineering Practices (SEP)

Engaging in the practices of science helps students understand how scientific knowledge develops; such direct involvement gives them an appreciation of the wide range of approaches that are used to investigate, model, and explain the world. Engaging in the practices of engineering likewise helps students understand the work of engineers, as well as the links between engineering and science. Participation in these practices also helps students form an understanding of the crosscutting concepts and disciplinary ideas of science and engineering; moreover, it makes students' knowledge more meaningful and embeds it more deeply into their worldview. (National Research Council, *A Framework for K-12 Science Education*, 2012, page 42)

In this investigation, students engage in these practices.

- **Asking questions** about mealworms based on observations to find out more about the growth and development of these organisms.
- **Planning and carrying out investigations** with mealworms,

NGSS Foundation Box for SEP

- **Ask questions** based on observat to find more information about th natural world.
- **Make observations** (firsthand) to collect data that can be used to m comparisons.
- **Make predictions** based on prior experiences.
- **Record information** (observation thoughts, and ideas).
- **Use and share pictures, drawings** and/or writings of observations.
- **Use observations** (firsthand or fro media) to describe patterns and/o relationships in the natural world

S Foundation Box for CC

ns: Patterns in the natural man designed world can erved, used to describe mena, and used as evidence.

ure and function: The shape bility of structures of natural signed objects are related to nction(s).

Exposing Crosscutting Concepts (CC)

The third dimension of instruction involves the crosscutting concepts, sometimes referred to as unifying principles, themes, or big ideas, that are fundamental to the understanding of science and engineering.

These concepts should become common and familiar touchstones across the disciplines and grade levels. Explicit reference to the concepts, as well as their emergence in multiple disciplinary contexts, can help students develop a cumulative coherent, and usable understanding of science and engineering. (National Research Council, 2012, page 83)

In this investigation, the focus is on these crosscutting concepts.

- **Patterns.** Life cycles of insects can be observed and compared and used as evidence to determine general patterns in nature.
- **Structure and function.** Animals and plants have structures that are related to the functions that are essential to the organisms'

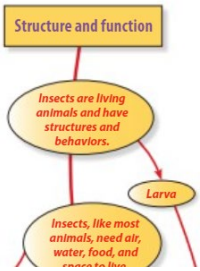
--A "Conceptual Flow" is also offered showing the trajectory of learning in each investigation. See evidence below from investigation 1 of "Insects and Plants".

Conceptual Flow

The anchor phenomenon for this module is the natural history of insects, including their interactions with plants. This is how students will engage with the diversity of life in different places. The driving question for this module is what is the natural history of some plants and animals in different habitats?

In this investigation, students experience one of the most powerful phenomena when they are introduced to the simple mealworm. For many children, the mealworm will be the first living organism they will know as having a natural history. The guiding question is what is the natural history of a beetle?

The **conceptual flow** for this investigation begins when students are introduced to one kind of insect—mealworms. After observing the **structures and**



To what extent do the materials support Criterion 2D? Include your reasoning.
Click or tap here to enter text.

Category 3: Student Materials

Criterion 3A: Program Design

Instructional materials represent a comprehensive K-5 core program.

- Materials provide instruction that correlates to our recommended instructional minutes for science.
- Materials are available in both English and Spanish.
- Graphic organizers and templates for science notebooks are included.
- Teacher and student materials have resources both in print and online.
- Multimedia supports are included such as videos, tutorials and simulations and when appropriate reflect the diversity of our students and society in a culturally responsive manner including different genders and sexual orientations, from many cultures and nations, both contemporary and historical.
- Technology options are appropriate for both classroom and home use possibly including translation capabilities.

Examples of Evidence:

- ◊ There are four units, each representing nine weeks of instruction at 180 minutes a week. This is short of our recommended minutes of 240 minutes a week for 5th grade.
- ◊ There are 132 60-min lessons for the whole year. This correlates to our recommended instructional minutes of 220 minutes per week for grades K-2. (3-4 60-min lessons per week)

Specific Evidence from Materials
--For grade 2 there are 3 units, one unit for life, physical, and earth/space science. --Within the life science unit "Insects and Plants", there are 5 investigations with about 4 parts in each investigation. Each part has 1-3 sessions. So, there are about 40 lessons in this unit. --Within the earth and space unit "Pebbles, Sand, and Silt", there are 4 investigations with about 5 parts in each investigation. Each part has 1-3 sessions. So, there are about 40 lessons in this unit. --Within the physical science unit "Solids and Liquids", there are 4 investigations with about 5 parts. Each part has 1-3 sessions. So, there are about 40 lessons in this unit as well. --Extensions also had 2-3 additional sessions onto each part of the investigation. --This would absolutely satisfy the 220 minutes a week for 2nd grade. --Overall, there is A LOT of material and instruction offered with A LOT of preparation for teacher. This is almost to a fault. Teachers will be prepping every day, and this is pretty time consuming and demanding of teachers. --Student reference books are provided in Spanish and English. --Many videos are available for content reinforcement. These videos are dated (maybe filmed the 1990's) and could be disengaging/boring for students. The image quality is poor, and the graphics/effects are very simplistic and outdated. --Interactive digital resources are available. For example, in grade 2 there is a memory game where students match cards of organisms in specific habitats.

Another game has students choose the organism that does not belong in the habitat selected. Another online tool gives information about organisms within specific habitats.

To what extent do the materials support Criterion 3A? Include your reasoning.
Click or tap here to enter text.

Criterion 3B: Science Equipment

Instructional materials include hands-on materials and equipment that support three-dimensional learning.

- Enough materials are included to allow students to do the investigations themselves.
- Materials are of a quality that will last through many uses.
- Materials include the tools necessary to make observations and measurements and conduct investigations.

Examples of Evidence:

- ◊ There are enough thermometers, graduated cylinders, balances, magnifying glasses and measuring tapes for a whole class to use in small groups.
- ◊ Everything is included to engage in the lessons except for things that would already be found in the classroom like tape and colored pencils.

Specific Evidence from Materials
--A large quantity of each material is included with the set. Almost everything is included. Some common items like glue, tape, and markers are not included. --All materials are clearly labeled, making sand and rock identification very easy. --Tools such as measuring tapes and strainers are included. --Habitats are included for each organism being studied. (i.e., butterfly cages, terrariums, small plastic containers, grow lights). --Materials are of high quality. Plastic items are durable. For example, rock placers to hold rock samples while students study, are very durable.

To what extent do the materials support Criterion 3B? Include your reasoning.
Click or tap here to enter text.

Criterion 3C: Reading Materials

Instructional materials include grade-appropriate texts that support three-dimensional learning.

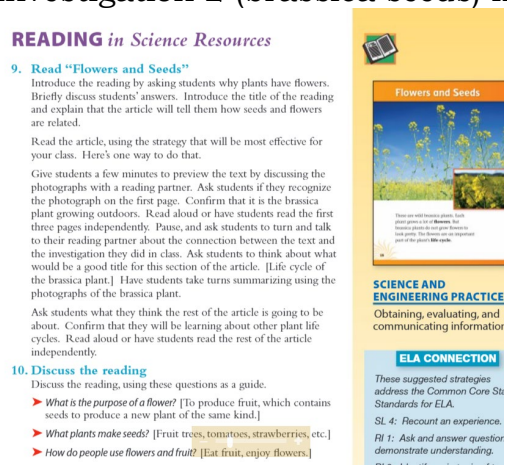
- A range of text types and genres, both print and online, are embedded in learning experiences.
- Texts support context-specific academic vocabulary.
- Materials reflect the diversity of our students and society in a culturally responsive manner including different genders and sexual orientations, from many cultures and nations, both contemporary and historical.
- Materials include supports for reading comprehension for a variety of student needs including high-quality questions.

Examples of Evidence:

◊ Texts include an interview of Sylvia Earle and profiles of Chien Shiung Wu and Benjamin Banneker. These highlight the connections to the science students are learning. Pictures of scientists working in the field represent the diversity of our students.

◊ Cultural myths about the sun and stars are included in the earth/space science unit.

◊ Vocabulary is highlighted in the reading that follows a concrete experience where the vocabulary is first introduced.

Specific Evidence from Materials
--One student reading booklet is included per student for each unit (1 book x 3 units). This includes all the informative text that students have throughout each unit. Pages are colorful, clear and engaging. Pages and books (stapled) are also sturdy and will last many years. --Or one "textbook" is included per student with all three units bound as one. Book is bound with a sturdy binding and hard cover and would last many years. --These student reading resources are used about once an investigation and are located in sections called "Reading in Science Resources". See evidence from investigation 2 (brassica seeds) from the grade 2 unit "Insects and Plants".  **READING** *in Science Resources* **9. Read "Flowers and Seeds"** Introduce the reading by asking students why plants have flowers. Briefly discuss students' answers. Introduce the title of the reading and explain that the article will tell them how seeds and flowers are related. Read the article, using the strategy that will be most effective for your class. Here's one way to do that. Give students a few minutes to preview the text by discussing the photographs with a reading partner. Ask students if they recognize the photograph on the first page. Confirm that it is the brassica plant growing outdoors. Read aloud or have students read the first three pages independently. Pause, and ask students to turn and talk to their reading partner about the connection between the text and the investigation they did in class. Ask students to think about what would be a good title for this section of the article. [Life cycle of the brassica plant.] Have students take turns summarizing using the photographs of the brassica plant. Ask students what they think the rest of the article is going to be about. Confirm that they will be learning about other plant life cycles. Read aloud or have students read the rest of the article independently. **10. Discuss the reading** Discuss the reading, using these questions as a guide. ➤ *What is the purpose of a flower?* [To produce fruit, which contains seeds to produce a new plant of the same kind.] ➤ *What plants make seeds?* [Fruit trees, tomatoes, strawberries, etc.] ➤ *How do people use flowers and fruit?* [Eat fruit, enjoy flowers.] Flowers and Seeds SCIENCE AND ENGINEERING PRACTICE Obtaining, evaluating, and communicating informatio ELA CONNECTION *These suggested strategies address the Common Core St Standards for ELA.* *SL 4: Recount an experience.* *RI 1: Ask and answer questio demonstrate understanding.*

--Recommended book selections are provided. The books are not provided from the list.
--NO other reading resources are available except for the student booklets mentioned above.

To what extent do the materials support Criterion 1A? Include your reasoning.
Click or tap here to enter text.

Evaluator: 47 Grade Level:Grade 2 Program: Foss Next Generation

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