NGSS Transition Support Guide

FOSS	**Insects (and Plants)**
	Grade 2 – Interdependent Relations in Ecosystems

IMPORTANT INFORMATION ABOUT CHANGES TO YOUR KIT!

You will notice that a plant investigation (*Planting Brassica)* has been added to your Insects kit. You also have the necessary materials to plant and care for the plants. This change is to support the transition to NGSS Standards for Grade 2 (2-LS2-1). The Brassica plant thrives in direct sunlight, so placing them in an area in your classroom that receives the most sunlight, or perhaps moving the pots outside. These are great opportunities for engaging students in the Science and Engineering Practice of Planning and Conducting Investigations.

Background

In 2013 the Washington State Legislature adopted the *Next Generation Science Standards* as the 2013 Washington State Science Learning Standards. The *Next Generation Science Standards* are built upon a *"three-dimensional"* vision of science learning that exists at the intersection of the *Science and Engineering Practices*, the *Crosscutting Concepts*, and the *Disciplinary Core Ideas*. The Office of the Superintendent of Public Instruction established a multi-year transition timeline and plan to achieve full implementation by the Spring of 2018. Informed by this transition plan, regional LASER science materials centers decided to bring together experienced teachers to provide guidance to those who shared their instructional materials about how best to begin moving to this new paradigm of science learning while still using their existing instructional materials. This guide is one product of that work.

What this Guide Is

The writers of this guide want to help you put the kids in the driver's seat of engaging in science – a key shift in the *Next Generation Science Standards*. They intend this guide to provide you with ideas on how best to build student capacity to work as a scientist or engineer using the *Science and Engineering Practices*; on how best to think about the learning by engaging students in using the *Crosscutting Concepts*; and all while engaging in the content ideas that already exist within this instructional material.

This guide does not align this instructional material to the *Next Generation Science Standards*, but it assists teachers in aligning instruction and student experiences with the goals of the *Next Generation Science Standards*. **This guide does not** represent a re-write of the instructional material, neither does it present newly-developed material. It is meant to help you adjust your use of your existing unit toward a more *"three-dimensional"* approach to learning. It is strongly recommended that you have an understanding of the shifts envisioned by the NGSS by familiarizing yourself with the Framework for K-12 Science Education. If you would like more information on the Disciplinary Core Ideas that are the focus of the Insects kit, please read Life Science Core Ideas 2 and 4.

Directions for Using this Guide

Before teaching this unit, please refer to the NGSS Transition Support Guide to review the *Science and Engineering Practices* and *Crosscutting Concepts* for each investigation. The guide highlights what the teacher and student does in each investigation to support the *Science and Engineering Practices* and

Crosscutting Concepts that are already implicit in the instructional materials. If you need support on using *Science and Engineering Practices* refer to Appendix F and for *Crosscutting Concepts* refer to Appendix G in the *Next Generation Science Standards.* For example, in Investigation 1- the *Science and Engineering Practice* is Analyzing and Interpreting Data. Therefore, the teacher should use guiding questions to elicit student responses and model recording observations on a class chart. The students will observe and record data in their own science notebooks. For the engineering activity added after Investigation 6, you may want to familiarize yourself with the approach to engineering envisioned by NGSS in the Framework as well as Appendix I.

Heads-Up/Things you might need in order to use this guide

Before you teach this kit, you will need to prepare materials for Investigation 1 to allow students to cut out Mealworm stages and glue them in life cycle order. You will also want to prepare circular charts for the various insects and prepare a prediction template for Investigation 3. Science notebooks are encouraged for this kit. If you would like information of using science notebooks in the classroom, refer to the FOSS Folio included in your teacher guide or visit the LASER Science Notebooking website at www.sciencenotebooks.org . Investigation 5 has been adapted to include a written performance assessment. If you are unfamiliar with Claims-Evidence-Reasoning (CER) as a method for writing in science, please contact your Science Leadership teacher or Regional Science Coordinator. Investigation 6 has been added to give an opportunity to use Engineering Design with this kit. You will need to prepare materials to create an imaginary insect for this investigation.

For More Information

If you have questions about this guide or its content, please direct your inquiry to your science materials center, or Regional Science Coordinator.

NGSS Transition Support Guide – FOSS Template

Publisher	Kit Title	Grade Level
FOSS	Insects	2nd Grade

Investigation 1	Classroom Instruction	Science and Engineering Practice	Crosscutting Concept	Helpful Modifications
Mealworms		**Analyzing and Interpreting Data** Students make observations and/or measurements to produce data to serve as the basis for an explanation of a phenomenon.	**Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.	**Core Idea – from NRC Framework and NGSS Performance Expectation** What is biodiversity? (There are many different kinds of living things in any area, and they exist in different places on land and in water.) – LS4.D 2- LS4-1
	What the student does	Students make and record observations of the needs of living things in their science notebooks (pg 14). Continuously add to this data throughout the investigation and allow students to share and discuss their thinking about stability and change.	Students are able to discuss the changes the mealworms go through during their life cycle.	Change the life cycle chart & Mealworm Stage Poster on pgs. 22-23 to be circular to show that the cycle is iterative, and label the stages on the poster. Students can cut out Mealworm Stages from the poster and glue them in life cycle order.
Throughout the investigation:	What the teacher does	• Using guiding questions to illicit student response. Modeling recording data with class content chart. (pg 14)	• N/A	• Integrate literacy connections through Science Resources book, notebook entries, and speaking and listening strategies.

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Investigation 1.5	Classroom Instruction	Science and Engineering Practice	Crosscutting Concept	Helpful Modifications
Brassica Seeds		**Analyzing and Interpreting Data** Students make observations and/or measurements to produce data to serve as the basis for an explanation of a phenomenon.	**Cause and Effect** Events have causes that generate observable patterns.	**Core Idea – from NRC Framework and NGSS Performance Expectation** How do organisms grow and develop? Plants depend on water and light to grow. (LS2) 2-LS2-1 Connect to RI.1.1 – 'Flowers and Seeds' in Science Resources book
	What the student does	Students make and record observations of plant growth. Use the student data chart provided but paste into science notebooks. Continuously add to this data throughout the investigation and allow students to share and discuss their thinking about cause and effect.	Students are able to discuss the changes the plants go through and how may be the cause of these changes.	To help students make the connections between plants and animal's needs, be sure to use the stories in the student reader "Animals and Plants in Their Habitats." Students can create a classroom Venn diagram to compare these needs.
Throughout the investigation:	What the teacher does	• Using guiding questions to illicit student response. Modeling recording data with class content chart.	• Posing deeper thinking questions about what the *Brassica* plants need to grow. What is causing the growth? Why might some be growing taller than others?	• Have students research what type of animals might eat a *Brassica* plant if it grew in the wild. (*Brassica* is a member of the mustard family.) Butterflies often use *Brassica* as food. Do humans eat this plant? (Students could plan an investigation.)

Investigation 2	Classroom Instruction	Science and Engineering Practice	Crosscutting Concept	Helpful Modifications
Waxworms		**Analyzing and Interpreting Data** Make observations and /or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.	**Patterns** Scientists look for patterns when making observations about the world.	**Core Idea – from NRC Framework and NGSS Performance Expectation** What is biodiversity? (There are many different kinds of living things in any area, and they exist in different places on land and in water.) – LS4.D 2- LS4-1
	What the student does	Compare and contrast life cycle of waxworm to life cycle of mealworm using Venn diagrams (math extension pg 16)	Students compare the life cycle of the waxworm to the mealworm. Some changes are slow, some are more rapid.	Using waxworm stages on pg. 20, create the life cycle flowchart.
Throughout the investigation	What the teacher does	• Teacher models how to obtain, and record data using the Venn diagram on pg 16. • Teacher asks probing questions to facilitate interpretive thinking. • Teacher facilitates class discourse to analyze observations/data and develop conceptual understanding of results.	• Emphasize the differences and similarities in the changes that occur during the life cycles of the mealworm and the waxworms.	

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Investigation 3	Classroom Instruction	Science and Engineering Practice	Crosscutting Concept	Necessary Modifications
Milkweed Bugs		**Analyzing and Interpreting Data** Make observations and /or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.	**Patterns** Scientists look for patterns when making observations about the world.	**Core Idea – from NRC Framework and NGSS Performance Expectation** What is biodiversity? (There are many different kinds of living things in any area, and they exist in different places on land and in water.) – LS4.D 2- LS4-1
	What the student does	Compare and contrast life cycle of milkweed bugs (simple metamorphosis) to life cycle of mealworms and wax worms (complete metamorphosis).	Students compare the life cycle of the milkweed bugs to waxworms and mealworms. Some changes are slow, some are more rapid. Children will notice similarities and differences leading to ideas for how they might be classified.	Students should predict what the adult insect will look like based on previous observations.
Throughout the investigation:	What the teacher does	• Use language of observation, recording, compare and contrast, making predictions.	• Use language to support identifying patterns, noticing change, predicting rate of change, similarities and differences in life cycles (all include birth, growth, reproduction and death).	Provide a prediction template for students to draw their prediction, and then note what actually happened. Use Student Books pgs 46-54.

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Investigation 4	Classroom Instruction	Science and Engineering Practice	Crosscutting Concept	Necessary Modifications
Silkworms		**Analyzing and Interpreting Data** Make observations and /or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.	**Patterns** Scientists look for patterns when making observations about the world.	**Core Idea – from NRC Framework and NGSS Performance Expectation** What is biodiversity? (There are many different kinds of living things in any area, and they exist in different places on land and in water.) – LS4.D 2- LS4-1
	What the student does	Record information from observations. Compare predictions based on previous observations of insects.	Identify how the insects investigated share common habitats but also have differences in how they exist in different places on land, in water, etc.	Students should revisit previous investigations in the science notebook and identify the structures and functions of previous insects on the investigations.
Throughout the investigation:	What the teacher does	• Teacher models how to obtain, and record data. • Support students in making the connections to past observations by revisiting notebooking.	• Reinforce that ongoing nature of life cycle (stability and change) but begin to phase in vocabulary of structure and function.	Teachers should emphasize that previous insects investigated also show structures that relate directly to the function or behavior of an insect.

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Investigation 5	Classroom Instruction	Science and Engineering Practice	Crosscutting Concept	Necessary Modifications
Butterflies		**Constructing Explanations** Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.	**Structure and Function** Subsystems have shapes and parts that serve functions.	**Core Idea – from NRC Framework and NGSS Performance Expectation** How do animals help plants? (LS1) 2-LS2-2
	What the student does	Students make a claim supported by evidence that young butterflies have structures (such as antennae to sense, the cocoon to protect, wings to move, etc.)	Students use first-hand observations from science notebooks and readings from student's books as evidence to support their claim.	Provide students with Claims-Evidence-Reasoning sentence frames to model this method of constructing an explanation.
Throughout the investigation:	What the teacher does	• Teacher facilitates discussion around what a claim is (a claim answers a question, that's all). • Support students in selecting appropriate evidence to support their claim.	• N/A	**Performance Assessment** How does a painted ladies external structures help it to survive? For more information on Claims-Evidence-Reasoning, contact your Regional Science Coordinator.

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Investigation 6	Classroom Instruction	Science and Engineering Practice	Crosscutting Concept	Necessary Modifications
Other Insects		**Developing and Using Models** Use tools and/or materials to design and/or build a device that solves a specific problem.	**Structure and Function** The shape and stability of structures of natural and designed objects are related to their functions.	**Engineering Design Extension** Use an Engineering Design process graphic to introduce the method.
	What the student does	Design an imaginary insect and habitat. Students will draw, label and describe their insect, its life cycle and habitat in terms of how its structure relates to function. If time permits, students can build a model of the habitat and place their insect	Students understand that organisms and objects can be described in terms of how shape is related to the purpose of the structure (shape of head, legs, body etc.)	Students should revisit previous investigations in the science notebook and identify the structures and functions of previous insects on the investigations.
Throughout the investigation:	What the teacher does	• Provides the criteria, materials, asks questions to prompt integration of previous observations.	• Ask probing questions to help students connect the idea of structure and function- why does their insect have the number of legs that it has?	Be sure to allow students time to present their designs to the class, or set aside time for a formal gallery walk to view each students' work.