Evaluator: 57 Grade Level: 2 Program: FOSS

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
2nd grade FOSS Module called Solids and Liquids explores the driving questions of how are solid and liquid material similar and different? and how do the properties of solid and liquid materials relate to how they can be used and how they can change? Anchor Phenomenon 1 is explored in Investigation 1. The question of what properties of materials should be considered, and what would be some good designs for a small pet toy is asked. Students plan and carry out investigations by making observations of properties and structures

of solid objects. Anchor Phenomenon 2 is addressed in Investigations 2-4 where students examine various materials as math counters to complete the task of describing the effects of Sun and water on each of the materials. Finally, Anchor Phenomenon 3 is explored in Investigation 4 where students are asked, how can we test materials to gather evidence that it is a solid or a liquid? Students make observations about toothpaste to be able to construct an explanation of whether a matter is a solid or a liquid.

To what extent do the materials support Criterion 1A? Include your reasoning.
The 2nd grade Solids and Liquids FOSS materials support 1A in that the investigations build on one another to keep the overarching anchor phenomenon of matter and two of its phases-solids and liquids on the forefront of exploration, sense making, and content attainment. The investigations look at real world situations such as creating a good pet toy, finding out what happens when solids and liquids mix with water, and how to engage in evidence from arguments to determine if a material is a solid or a liquid.

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
An example of how the three dimensions are integrated in the 2nd grade FOSS Solids and Liquids module is in investigations 2-4 in which students examine the properties of a variety of liquids and smaller pieces of solids. An explanation is constructed based on observations and analysis or what happens when solids and liquids mix with water. Cause and effect relationships between heating and cooling are identified. The NGSS connections are as follows: DCI- PS1.A Structures and Properties; PS1.B Chemical Reactions, CCC-Cause and Effect; Energy and Matter; Stability and Change, SEP- Asking Questions; Analyzing and Interpreting Data, Constructing Explanations.

To what extent do the materials support Criterion 1B? Include your reasoning.
The three dimensions of the NGSS are woven throughout the investigations and are color coded so teachers can easily identify which ones will be addressed in the investigations. Pages 29-35 of the Solids and Liquids

Investigation Guide explains how the Performance Expectations are integrated throughout the module. Pages 44-47 breaks it down by investigation. Thorough explanations of how they are connected comprehension of their interconnectedness builds. Teachers are provided with extensive information.

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
Examples of coherence in the 2nd grade FOSS Solids and Liquids are evident with the first investigation beginning with the basic states of matter. Objects, solid matter, are investigated in Part 1 by describing and identifying their physical properties. Part 2 looks at kind of matter, material, their objects are made of. Students group and sort objects by properties in Part 3, and Part 4 is an engineering activity. ELA connections are present with the Reading in Science Resources such as "Everything Matters" in Investigation 1. Students are asked to ask and answer questions (RI 1) while reading the selection. ELA side notes can be found on sidebars throughout investigations.

To what extent do the materials support Criterion 1C? Include your reasoning.
The conceptual flow of the first investigation builds to answer the module's driving questions of how are solid and liquid materials similar and different? and how do the properties of solid and liquid materials relate to how they can be used and how they can change? This module builds on the science concepts of matter and its interactions developed in Kindergarten. CCSS integration in the investigations are explained on pages 29-35 of the Investigation Guide as well as throughout investigations.

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
Science notebook entries and performance assessments are embedded assessments. Assessments are explained in the "Getting Ready for" section of an investigation part. Assessment Master 1 called Embedded Assessment notes is a half sheet of paper to help teachers analyze student work. There are investigation benchmark assessments called I-Check given at the end of the investigation. What to look for in the assessment can be found in the Assessment Coding Guide on FOSSweb.

To what extent do the materials support Criterion 2A? Include your reasoning.
Assessments are evident throughout the modules in the form of student notebook entries and performance assessments. Notebook entries formatively drive instruction as does check lists and assessment notes. Notebook entry examples are present in the Investigation Guide. Focus questions are italicized as are

discussion questions from reading. Questions can be used formatively to assess student learning during investigations.

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
Instructional experiences are hands-on in each investigation. For example, each student receives seven objects in 2nd grade FOSS Solids and Liquids Module Investigation 1. They collect their objects at the end of Part 1 to store in a zip bag to use for Part 2. Students use their science notebooks to record observations, responses to focus questions, and connections to the classroom and outside the classroom. Questions, graphic organizers, vocabulary words, and other structured sheets are printed from masters so students can keep organized sequential work. Content reading, online resources, extension activities are also available to enhance the instructional experience.

To what extent do the materials support Criterion 2B? Include your reasoning.

Criterion 2B is supported by the materials in that FOSS provides hands-on experiences with materials included. In Investigation 1 of 2nd grade FOSS Solids and Liquids, each part provides materials for hands-on explorations. In addition, the content reading material and discussion questions are engaging as is the online and interdisciplinary extension.

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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
Students record and discuss entries in their science notebooks in order to help them make sense of their instructional experiences. They also participate in "sense-making discussions" like when they are asked to share their drawings for building a bridge in 2nd grade FOSS Solids and Liquids Module Investigation 1 Part 4. They are also asked to read and discuss after reading. Sentence stems, word walls, and identifying vocabulary in text are evident throughout the investigations.

To what extent do the materials support Criterion 2C? Include your reasoning.

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Support to enhance sense making is evident in the way student notebooks are modeled and organized throughout all investigations. Discussion opportunities are embedded in many parts of the investigations. Academic language is also supported through word walls, sentence stems, and discussions.

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
Page 38-47- in the Investigation Guide of Solids and Liquids provides background for the conceptual framework of solids and liquids. It not only provides content background to explain matter, but it also connects investigations to the NGSS and CCSS. Page 74-79 provides backgrounds on solids and how to teach about solids to children and how it connects to the three dimensions. In addition to the Investigation Guides, a Teacher Resource book is provided which includes science-centered language development, science notebook, teacher, and assessment masters. Diagrams and examples are present in the Investigation Guides as well as teaching notes in the sidebars. There is also an online resource for teachers.

To what extent do the materials support Criterion 2D? Include your reasoning.
Criterion 2D is supported by the materials in that it provides background knowledge and an explanation of the concept's connection to the CCC, DCI, SEP, and CCSS. The Investigation Guide makes lesson planning easy in that diagrams, sidebars, color coding, and numbering are present. It is easy to read and follow. Online resources and teacher professional learning is available.

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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
There are four investigations in 2nd grade FOSS Solids and Liquids 9-week module. Within each investigation there are four to five parts with each part taking 45-50 minutes to complete. Therefore, five parts taking 45 minutes each would equal 225 minutes a week. The materials are available in both English and Spanish and EL support suggestions are provided in sidebars of the Investigation Guide. Multimedia includes interactive activities such as putting ice cubes in an oven and watching them melt as well as reading materials available online in both English and Spanish. Content can be read to students.

To what extent do the materials support Criterion 3A? Include your reasoning.
FOSS materials support Criterion 3A in that it meets the recommended instructional minutes for science. In addition, language supports and multimedia resources are available. The multimedia content is easy to access and use. The pictures are vibrant and important vocabulary is bolded. Print and online resources are coordinated to eliminate confusion.

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
FOSS supplies enough materials for a class of 32 students with consumables for three uses. The 2nd grade Solids and Liquids kit comes with multiple large boxes that include print material, shared items, Items for each investigation, and consumable items. A Kit Inventory List is included in the materials as well as a list of what materials are supplied by the teacher for all investigations, outdoor investigation, and each investigation. Examples of things supplied by the teacher include chart paper and marking pens or a computer with Internet access.

To what extent do the materials support Criterion 3B? Include your reasoning.
FOSS materials support Criterion 3B in that ample supplies are included to carry out the investigations. The materials appear to be of high quality and complete. Also, components of material identification are supported with drawings in the Investigation Guide to make it easier for teachers to know what to use for each investigation.

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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
Students read "Everything Matters" in the *FOSS Science Resources* book during Investigation 1, Part 1 of the Solids and Liquids 2nd grade FOSS module. Connections are made to the reading by holding up plastic bags containing samples created in the exploration portion of the lesson. eBooks are available for students. There are also online activities for students to review their classroom observations like the one in Investigation 2, Part 3 call "Falling Bottle Puzzle" which helps to extend the classroom observation experience.

To what extent do the materials support Criterion 1A? Include your reasoning.
The reading materials of FOSS support criterion 3C in that there are multi-media formats in English and Spanish. FOSS employs the basic principles of culturally and linguistically responsive teaching and provides ample support materials to inform teachers. Print materials appear to represent diverse learners and provide supports for students with varied language and comprehension levels.

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