Evaluator: 33 Grade Level: 1st Grade Program: Foss Science

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
Evidence: Air & Weather Unit There is evidence of phenomena driving the learning. Each Investigation and focus question come back to the phenomena. An example of this in the air and weather unit is with the phenomena of wind.

Focus questions are how can bubbles be used to observe wind? How strong is wind? How can pinwheels be used to observe wind?

To what extent do the materials support Criterion 1A? Include your reasoning.
The FOSS material highly support Criterion 1A because the phenomena is clear and revisited often by the focus questions throughout all investigations. There is evidence in all 3 Units (Air & Weather, Plants and Animals, & Light and Sound) that the phenomena builds on students everyday experiences or things that they can easily relate to. There are highly engaging and manageable engineering tasks such as constructing pinwheels to observe wind, observing bubbles, constructing parachutes, kites and wind vanes.

Evaluator: 33 Grade Level:1st Grade Program: Foss Science

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 FOSS overview section it lists NGSS standards. It is clear that integration of the three dimensions is present.On pages 50-54 in the Air & Weather unit there is clear evidence of how the investigations will address the CCC's, SEP's, and DCI. Each Lesson or investigation includes multiple practice elements. There is evidence on pages 84,143,198,199, & 243 in the Teachers Manual for Air & Weather that give powerful suggestions of engineering for teachers, regarding the construction of wind vanes, kites, anemometers, pinwheels and parachutes. In the Plant and Animal Unit, students plant ryegrass, alfalfa seeds & wheat and compare the patterns that they observe over time with each hands on learning

experience. Student in first grade are encouraged to ask questions and participate in sense making discussions to draw conclusions about the patterns they observe.

To what extent do the materials support Criterion 1B? Include your reasoning.
The FOSS science materials highly support criterion 1B because students are doing the tasks themselves in each investigation. In first grade they will have opportunities to engineer and design their own pinwheels, parachutes, & kites, with teacher guidance where they can observe/ experience how air interacts with their objects. First graders are given opportunity to write in their science journals after participating in sense making discussions in whole group.

Evaluator: 33 Grade Level: 1st Grade Program: Foss Science

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
Evidence of Coherence in Air & Weather FOSS Unit: There is coherence over time across grade level bands. In the Teachers manual on pages 46-54. Connections were clearly made to the NGSS by investigations which is so helpful for teachers. I was so impressed with this section!!!! There were two examples of mathematical links in the Air & Weather Unit. One was a math extension activity on pg. 133 that related to real world toys connected to air. First grade students could relate to these toys and this addressed appropriate mathematic standards for this grade.

The second example was a suggestion on pg. 161 where it stated that "first graders should be able to tell time to the nearest half hour and you could round the sunrise and sunset times to the nearest half hour to address age appropriate math standards."

To what extent do the materials support Criterion 1C? Include your reasoning.
The FOSS materials highly support Criterion 1C with the connections rubric on pages 46-54 that connect NGSS by investigations. Also, in each investigation in the teachers manual, in the outer columns it clearly states the NGSS standards that are included in the lesson. It addresses foundational knowledge or prior knowledge that students may have received in kindergarten. For example, structure and function of plants building on plant parts.

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
Evidence: Performance Assessments Embedded Assessments during the sense making discussion or investigations. Assessment checklists, helpful to teachers. I-checks for each investigation Unit assessments.

To what extent do the materials support Criterion 2A? Include your reasoning.
The FOSS science materials highly support Criterion 2A because they provide a variety of ways to measure student growth. The I-checks after each investigation are age appropriate and provide a way for teachers to see evidence of learning taking place. The I-checks are multiple choice, have

pictures and contain matching. The performance assessments given in the student science journals, and during engineering tasks are authentic. The assessment checklists allow teachers to observe behaviors on practices to confirm that students are using these practices. The variety of assessments allow for all three dimensions to be addressed throughout a unit of study.

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
Evidence: Students construct pinwheels & test them outside. Students construct parachutes and test them outside. Students construct kites as well. In the plant and animals unit, students plant ryegrass, alfalfa seeds and wheat. They observe the wheat grow through straws. They plant a source of food(real world). Focus questions in every lesson are meant to focus students on what they are learning. The question is revisited multiple times in the lesson.

Vocabulary cards and sentence stems are used to develop speaking and listening in discussions. This is age appropriate for sense making discussions that take place whole group. This helps ensure equitable learning takes place.

There is plenty of equipment for each individual student to each have their own materials.

Sound & Light Unit: Online activities sorting sounds loud & soft sound properties.

Students redirect light using mirrors. Students construct spoon gong system and string-cup telephone communication devices. (Engineer & Design)

Drop chambers where students drop objects into a drop chamber to listen to sounds.
p. 101 in the Sound & light unit, students experience using a tuning fork to see the vibrations in the water.

To what extent do the materials support Criterion 2B? Include your reasoning.
The FOSS science materials highly support Criterion 2B in several ways: Students do participate in common concrete, hands-on and shared experiences. Such as constructing their own parachutes, pinwheels and kites. Also, planting their own ryegrass, alfalfa and wheat. They will plant a group terrarium which is a common experience. Students science journals provide a place for students to write their questions that they have while learning about the phenomena. The vocabulary cards and sentence stems provide support for ALL learners. There are enough materials for each individual learner to participate in science learning for each investigation making this extremely equitable.

Evaluator: 33 Grade Level:1st Grade Program: Foss Science

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
Evidence: Science notebooks are used in all 3 units (Air & Weather, Plants & Animals, Light & Sound) Every investigation lesson contains vocab. Word cards, and sentence stems to help EL learners. P. 105 in Air & Weather "I observed the parachute_____. "It did that because_____." In the Air & Weather Unit, it directly addresses sense making on p. 115 and at least once in each investigation.

Sound & Light Unit: Example of EL sentence stem "I used a___ to___ a light beam". I can see___,____&___.
Sense making examples are found in online activity of sound sorting. There is also a paper version of sorting pictures by loud and soft sounds.

Students engage in hands on investigations using materials such as syringes, vials, terrariums, air pumps, syringe plungers etc.

Sound & light unit materials: kalimba, flashlights, mirror, tone generator to discover the volume.

I- checks for assessing their learning.

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

Evaluator: 33 Grade Level:1st Grade Program: Foss Science

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
Evidence: IN ALL Three FOSS Units!!! Teacher Prep Videos – these are quick videos 6-8mins. Long that allow teachers to see the materials that they needs, know the safety involved in the investigation, and give a summary of the lesson. Interactive Whiteboard lessons - This would be great in distant learning. FOSSweb.com resources SO MANY resources. Investigation guide On going professional development on the Fossweb.com site. Investigation summary helps teachers at a glance for phenomena p. 78 &79 in Air & Weather unit. On pg. 50-54 Connections to NGSS by investigations- this would be so helpful to teachers when planning units.

Home connections- letters to send to families that explain what their students are learning and why they are learning it.

Suggestions of teacher look fors on p. 116 " Students need to indicate that air is compressed or it pushes back in the plunger."

To what extent do the materials support Criterion 2D? Include your reasoning.
The FOSS science materials HIGHLY support Criterion 2D for all the reasons and evidence I listed above.

Evaluator: 33 Grade Level: 1st Grade Program: Foss Science

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
Evidence: Air & Weather Unit. p.16&17 in FOSS there is a chapter of teacher resources that give teachers ideas and strategies for enhancing the science & engineering experiences vocabulary cards & language structures are introduced in authentic ways. Science notebooks - printed materials and online access to materials for students. Home connections – letters to families to provide over all goasl. (p.68). Minutes for pacing are included in each investigation.

To what extent do the materials support Criterion 3A? Include your reasoning.

Evaluator: 33 Grade Level: 1st Grade Program: Foss Science

Concern that some teachers might be overwhelmed by instructional materials & kits. Storage space may be an issue.

Is there enough information in the Plants & Animals unit on animals…The units go into great depth on plants but only have a few lesson with animals. Ex. bugs in the terrarium, squirrel behavior game and an investigation on what animals do to help their young survive.

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
Each unit has two boxes of materials to support hands on learning in classroom. Teachers manual & teachers resources contain black line masters for science notebook pages.

To what extent do the materials support Criterion 3B? Include your reasoning.
The Foss science materials highly support Criterion 3B because it contains good quality materials that will last through many uses. Materials include air pumps, syringes, thermometers, terrariums, cups, seeds, individual bagged sound kits for the drop chamber. Some concerns may be that schools will need to find storage space for the science materials kits. Will consumables be replaced each year?

Evaluator: 33 Grade Level:1st Grade Program: Foss Science

Evaluator: 33 Grade Level:1st Grade Program: Foss Science

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
Evidence: Big Books Student e-books that are projectable Individual student books Media Library - virtual field trips. The articles in the book address specific concepts that students are learning.

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

Evaluator: 33 Grade Level:1st Grade Program: Foss Science

Referenced, adapted and formatted from the following documents:

Achieve, Inc. (2016). EQuIP Rubric, Version 3.0.

Achieve, Inc. (2018). Science Task Prescreen.

Achieve, Inc. (2016). Using Phenomena in NGSS-Designed Lessons and Units.

Achieve, Inc. (2017). Primary Evaluation of Essential Criteria (PEEC) for Next Generation Science Standards Instructional Materials Design.

Brennan et al. (2017) *Priority Features of NGSS-Aligned Instructional Materials: Recommendations for Publishers, Reviewers and Educators* [White paper].

BSCS (2017). Guidelines for the Evaluation of Instructional Materials in Science.

BSCS Science Learning (2018). NextGen TIME

MacDonald et al. (2020). *Design Principles for Engaging Multilingual Learners in Three-Dimensional Science* Wisconsin Center for Education Research (WCER) Working Paper No. 2020-1. https://wcer.wisc.edu/docs/working-papers/WCER_Working_Paper_No_2020_1.pdf

National Academies of Sciences, Engineering, and Medicine (NASEM) (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom.* Washington, DC: The National Academies Press.

National Research Council (NRC) (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press.

NGSS Lead States (2013). *Next Generation Science Standards: For States, By States.* Washington, DC: The National Academies Press.

Nolan, C. (2015). *Getting their hands dirty: Engaging learners in authentic science practices outside the classroom* (Practice Brief No. 20). STEM Teaching Tools.

Washoe County School District Needs Evaluation

Washoe County School District. (2020). Request for Instructional Material Submission RFP 2020A.