Evaluator number: 20 Grade: 4 Program: FOSS
1= Best, 2 = Partial, 3 = Least

Washoe County School District K-5 Science
2020 Instructional Materials Evaluation Rubric
(Community Members, Administrators and Families 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.

- A good phenomenon builds on everyday student experiences and targets grade appropriate learning goals.
- Engineering design solutions are tied to grade specific science ideas.

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 bucket of water is physically explored by students and leads to exploration of properties of matter in 2nd grade.
- ◊ 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
4th Grade Energy Unit – page 13 statement: Engagement with real-world phenomena is at the heart of FOSS. In every part of every investigation, the investigative phenomenon is referenced implicitly in the focus question that guides instruction and frames the intellectual work. The focus question is a prominent part of each lesson and is called out for the teacher and student…students record the focus question in their science notebooks, and after exploring the phenomenon thoroughly, explain their thinking in words and drawings. Anchor Phenomenon for the Energy Unit: 1 – How can a child lift a box that an adult cannot during a magic trick? 2 – How does mass and speed affect the number of bowling pins that fall? 3 – What's wrong with the solar powered parking meters at the park? Students collect data from five different investigations and connect their findings to the phenomena. Five investigations focus on the concepts that energy is present whenever there is motion, electric current, sound, light, or heat, and that energy can transfer from one place to another. The driving question for the module is how does energy transfer between systems?

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Overall in the five investigations:
Students investigate electricity and magnetism as related effects and engage in engineering design while learning useful applications of electromagnetism in everyday life. Students conduct controlled experiments by incrementally changing the variables to determine how to make an electromagnet stronger. They investigate how the amount of energy transfer changes when balls of different masses hit a stationary object. Students explore energy transfer through waves that results in sound and motion. They gather information about how energy and fuels are derived from natural resources and how that affects the environment. They explore alternative sources of energy that use renewal resources.

For example – in Investigation 1:
Students investigate the phenomenon of electric current in circuits, the pathways through which electricity flows. They work with a variety of components – D-cells, lightbulbs, motors, switches, and wires – and explore conductors and insulators. They explore series and parallel circuits and compare the functioning of the components in each circuit. They formulate and justify their predictions, based on their observations of electricity transferring energy to produce light and motion.

Thinking Like An Engineer – Throughout the Energy unit. Page 21 in the Student book is an example.

To what extent do the materials support Criterion 1A? Include your reasoning.
Score of 1 for this criterion 1a. Foss does an excellent job providing appropriate learning experiences for 4th graders, in a well-designed, coherent manner. The phenomenon is engaging and requires student sense-making.

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Criterion 1B: Integrating the Three-Dimensions
Instructional materials integrate elements of the Science and Engineering Practices, Crosscutting Concepts and Disciplinary Core Ideas.

- Students are doing science as scientists would to explain the natural and human-built world.
- Materials use an inquiry-based and problem-solving approach where students engage in the practices of science and engineering.
- Science and engineering are not presented in a linear manner; they are messy.

Examples of Evidence:

- ◊ Students conduct an investigation, including collecting data, with balls and ramps to determine cause and effect relationships of speed and energy in unit 2 lesson 4.
- ◊ Students investigate how to make different looking waves in water and how these waves affect a floating object in the 4th grade 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.

Specific Evidence from Materials
For example – in Investigation 1: Students investigate the phenomenon of electric current in circuits, the pathways through which electricity flows. They work with a variety of components – D-cells, lightbulbs, motors, switches, and wires – and explore conductors and insulators. They explore series and parallel circuits and compare the functioning of the components in each circuit. They formulate and justify their predictions, based on their observations of electricity transferring energy to produce light and motion. Thinking Like An Engineer – Throughout the Energy unit. Page 21 in the Student book is an example. Students engage in sense-making discussions to analyze collected data from the different investigations to connect to the anchor phenomenon. Students use digital resources and informational text to gather evidence and confirm or revise their thinking. Students are engaging in the science, not just reading about it.

To what extent do the materials support Criterion 1B? Include your reasoning.
Score of 1- This curriculum does an excellent job of integrating the three-dimensions. The organization of the phenomena is easy to follow. Explicit connections are made between the Practices, DCIs, CCCs and ELA standards starting on pages 60-66.

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Criterion 1C: Coherence
Instructional materials help students develop increasingly sophisticated understandings within and across grade-levels.

- Materials make connections between lessons, units and grade levels.
- Students engage in learning experiences with explicit connections to other science disciplines and other subjects with intention.

Examples of Evidence:

◊ 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.
◊ Students apply ELA learning to write a set of directions for conducting an investigation in the earth science unit, lesson 6.
◊ Line plots are used to analyze data in unit 4 at the 3rd grade level.

Specific Evidence from Materials
4th Grade Energy Unit-Investigations Guide page 46: Provides a background for the conceptual framework in energy for the teacher: Early awareness of magnetism; Early awareness of electricity; Unification of magnetism and electricity; How electricity works; How magnetism works; Primary Source of Energy; Stored Energy; Energy transmission; Motion and force; Wave forms; Vision; Engineering design Pages 58-59 shows content sequence for grades 3-8, showing where 4th grade falls.

To what extent do the materials support Criterion 1C? Include your reasoning.
Score of 2 – to no fault of FOSS's, I ran out of time to review this part more in depth.

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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.

Examples of Evidence:

- ◊ As students are engaged in a performance task, there are indicators for teachers to look for and information about possible responses and next steps. 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
4th grade Energy unit Investigations Guide, pg. 17: Formative assessment in FOSS is called embedded assessment. Teacher observes action during class in a performance assessment or reviews notebooks after class. Performance assessments look at students' engagement in science and engineering practices or their recognition of crosscutting concepts, and are indicated with the second assessment icon. The embedded assessments are based on authentic work produced by students during the course of participating in the FOSS activities. Bullet points in the "Guiding the Investigation" tell the teacher specifically what students should know and be able to communicate. Also from Pg. 17: Benchmark Assessments: These consist of Survey, I-Checks, Posttest, and interim assessments. The survey is given before instruction begins. I-Checks are actually hybrid tools: they can provide summative information about students' achievement, but more importantly, they can be used formatively as well to provide diagnostic information. The posstest is a summative assessment given after instruction is complete. Interim Assessments: give students practice with items specifically designed to measure three-dimensional learning described by NGSS PE's. They generally begin with a scenario, and ask students to apply practices and crosscutting concepts as well as disciplinary core ideas to respond to the item. They can be administered during a module, at the end of the module, or at the end of year grade level assessment.

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On pages 396-407 of the Energy Unit Investigation Guide, It breaks down specifically what PE's are assessed and how they are assessed. It continues to give information on each type of assessment, and what to look for. Pages 408-411 provide next step strategies for the teacher as to what to do next after assessing students.

FOSS also has FOSSmap which allows for an assessment online in grades 3-8. You can open online assessments for students,review codes for student responses, and run reports to help the teacher assess student learning. It was developed by Lawrence Hall of Science in conjunction with the Berkely Evaluation and Assessment Research center at the University of California as part of funding from the National Science Foundation. Page 413 shows a great example of the information a teacher can obtain from the FOSSmap Reports. There are several items under this:
Embedded Assessment Report: run for each embedded assessment the students complete. Lists names of students who "got it" as well as those that need individual help Allows teachers to record things they might want to put more emphasis on or do slightly differently the next time they teach the module.
Max Code Frequency Report: chart that tells teacher at a glace which items were problems for the class.
Class by Item Report: Shows detail of each item and students' responses.
Student Item Report: a good report to send home to parents. Lists all of the items on a test and shows how the student responded to each. Provides the max code, the code the student received, and a description of what the student knows or needs to work on, based on the evidence inferred from the item.
Class by Level Report: Groups students into four levels (notions, recognition, conceptual, strategic).
Class Diagnostic Reports: by standard or by question item provide the NGSS PE, the number of questions that relate to that standards, and a percentage.

To what extent do the materials support Criterion 2A? Include your reasoning.
Score of 1 – FOSS Provides many different ways to assess student learning, which incorporate assessing all three dimensions. They also provide look for's and sample rubrics. The online tools are very helpful in making informed instructional decisions based on student progress.

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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.

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 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
The investigative experiences with the Energy unit help to create first-hand, shared experiences that will help students start to make sense of the phenomena. I wouldn't say that students' prior experiences and diverse backgrounds necessarily relate to the phenomenon or problem. Students are hit with hands on, reading informational text, discussions, etc. FOSS provides outdoor experiences for students in some of the investigations.

To what extent do the materials support Criterion 2B? Include your reasoning.
Score of 1 – None of the curriculum relates or builds specifically on students' prior experiences and diverse backgrounds, but FOSS does a great job of creating a shared experience to create the jumping off point for students.

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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.

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 a magnet 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
There are a ton of supports for oral and written language processing. Pages 46-47 in the teacher resource guide for the Energy Unit provides ideas and how to's for oral practice. They suggest: Establishing a culture of talk, Pair and small-group discussions, science talk, oral presentations, poems/chants/songs, teacher feedback, and vocabulary development. The science vocabulary is actually introduced and developed in the context of an active investigation and pays attention to nonspecific-content (Tier 2) words that facilitate deeper understanding and communication skills. Pages 44-45 of the teacher resource guide gives ideas for supporting English language development with different levels of scaffolds for how to talk about the evidence students collected. Pages 42-43 of the teache resource guide goes through how in order to complete an analytical task, students will need to have receptive language function plus productive language function. Gives some good ideas here. Each investigation in the Energy unit has great questions for students to think about and discuss.

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

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Score of 2, based on not spending enough time with the FOSS materials specifically looking at the sense-making piece.

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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 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
4th Grade Energy Unit-Investigations Guide page 46: Provides a background for the conceptual framework in energy for the teacher: Early awareness of magnetism; Early awareness of electricity; Unification of magnetism and electricity; How electricity works; How magnetism works; Primary Source of Energy; Stored Energy; Energy transmission; Motion and force; Wave forms; Vision; Engineering design Also, each investigation provides several pages of background for the teacher. See Investigation 1 in the Energy Unit Investigation Guide pages 100-113. What I particularly liked about this section is that FOSS specifically points out on page 111 the SEP's, and on pages 112-113 shows the conceptual flow and how it is related to the anchor phenomenon, which for this unit is observable energy. It specifically points out what CCCs are in this Investigation, what the connections

are to the Nature of Science, and any Connections to Engineering, Tech, and Applications of Science.

Page 91 shows supports for teachers. There are a bunch. The guide is available hard copy or interactive. The interactive guide allows the teacher to write notes online. Many teacher resources are available in Spanish. Page 93 describes PD available for teachers. Page 108 goes over student misconceptions.

There is a 42 page guide that gives ideas to differentiate for: ethnically diverse students, Standard EL, EL, students living in poverty, foster youth, girls and young women, advance and gifted learners, students with disabilities, and students who have difficulties with literacy.

To what extent do the materials support Criterion 2D? Include your reasoning.
Score of 1. I have this criterion tied with Amplify. Both programs have very detailed, excellent supports for teachers. On the flip side, sometimes there is too much support and it can be overwhelming.

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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
I did not find where materials are available in Spanish for students. Instructional materials provide about 11 weeks of instruction at 4-5 days per week. For most of WCSD elementary schools, this is more than enough (Personally I would argue we always need more science!). In some ES in the district, the Energy unit would take the entire first semester to complete. There is an entire online support for teachers and students through FOSSweb. There are PPT slides for each investigation which are a great visual tool. The PPTs are to be used in conjunction with the guide. There are options for home and classroom use with tech, but I'm unsure of Spanish translation. I didn't see that anywhere in my notes or from what I remember. The couple of videos I watched and flipping through the student informational text I saw diversity in people. Resources are available in both print and online for teachers and students.

To what extent do the materials support Criterion 3A? Include your reasoning.
Score of 2 – only because I'm unsure of the Spanish translation for students piece. Otherwise, FOSS provides great online and printable materials.

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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
There are plenty of materials included in each FOSS kit for one class to share in small groups. However, if the idea is that one kit will be shared between teachers, this curriculum will not work for our students. FOSS's materials are of good quality and are likely to last. All necessary materials are included to conduct all parts of the investigations.

To what extent do the materials support Criterion 3B? Include your reasoning.
Score of 1 here, because everything needed is included.

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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
Guiding and Focus Q's for phenomena- Energy unit pg. 4: How can you turn a stell rivet into a magnet that turns on and off? How does the number of winds of wire around a core affect the strength of the magnetism? How can you reinvent the telegraph using your knowledge of energy and electromagnetism? 4th Grade Energy Unit Investigations Guide pabge 21: FOSS is the only curriculum of the three that has guiding principals around access and equity. They are: 1 – Provide multiple means of representation. Give learners various ways to acquire information and demonstrate knowledge. 2-Provide multiple means of action and expression. Offer students alternatives for communicating what they know. 3-Provide multiple means of engagement. Help learners get interested, be challenged, and stay motivated. There is a 42 page guide that includes differentiation ideas for: ethnically diverse students, Standard EL, EL, students living in poverty, foster youth, girls and young women, advance and gifted learners, students with disabilities, and students who have difficulties with literacy.

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

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Score of 1 – Even though Amplify does a better job supporting reading for students, FOSS does a better job supporting diverse learning needs.

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Referenced, adapted and formatted from the following documents:

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