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
- Each unit (for this one the 4th grade units are Energy Conversions and Waves, Energy, and Information) is anchored in phenomena, and each "chapter" has a phenomena as well. - 4th grade students take on the role of systems engineers for Ergstown – who experiences frequent blackouts. They view a picture of Ergstown and explain in writing and drawing why they think the lamp won't turn on. Students connect any personal experiences with blackouts. - In the Waves unit, 4th grade students take on the role of marine biologists under charge of the park superintendent to investigate more about dolphin communication to answer how dolphins can communicate with each other when they can't see each other and are far away.

To what extent do the materials support Criterion 1A? Include your reasoning.
Score of 2-This criterion is met fairly well. There are hands on and simulation experiences that students go through in trying to make sense of the phenomena presented. Each lesson consists of a sequence of activities that engage students with a variety of materials to make sense of the phenomena. The phenomena are not exactly everyday experiences of all students. Some students may have been in a blackout whereas others may never have. Same with dolphins – some may know or have seen dolphins but many have not. This company does a good job in building the

knowledge though, through students sharing what they know about the phenomena, listening to others share, and then the PPT backfills information that may help students with the necessary background knowledge to move forward on a somewhat even playing field.

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
As noted in page 3 of the downloaded teacher's guide for the Energy Conversions unit – "There are no textbooks. Each lesson consists of a sequence of activities that engage students with a variety of materials." Each of the PPTs provided for each lesson do a good job stimulating student thinking. I do feel that too much of it is teacher-led discussions, and sometimes is too guided which can stifle inquiry. For example on page 41 of the teacher lesson guide students view slides of a blackout and read a message from the town's mayor. They are introduced to the problem they need to figure out rather than asking questions and defining the problem themselves, based on the phenomena presented. There are many opportunities to engage in investigation through all of the lessons in both Physical Science units. In the PPTs they specifically point out to students that they are doing the work that scientists do. For example on page 53 of the teacher guide in the Energy Conversions unit they mention that students are simulating the work of scientists by sharing their ideas, which typically leads to a refinement of their own ideas based on new evidence presented. Another example is in the Waves, Energy and Information unit PPT, Lesson 1.2, Slide 5 where they have students using a reference book like scientists do. It's an explicit connection made in the PPT.

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

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Score of 2-I think Criterion 1B is mostly supported based on my evidence provided, but I do feel that there is too much teacher guidance on the simulations, discussions, and tasks. I do think it would not be too difficult to adapt some of these to make them more student-led, but it would take some extra planning time for teachers.

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
These materials did not make any connections between units and grade levels that I found. Lessons within each unit flow very well, but I did not see explicit connections to other science disciplines. Standards are listed that are an interdisciplinary connection. From the teacher's guide in the Energy Conversions unit – "A Progress Build describes the way in which students' explanations of the central phenomena should develop and deepen over the course of a unit. It is an important tool in understanding the design of the unit and in supporting students' learning. A Progress Build organizes the sequence of instruction, defines the focus of the assessments, and grounds inferences about students' understanding of the content, specifically at each of the Critical Juncture Assessments found throughout the unit."

To what extent do the materials support Criterion 1C? Include your reasoning.
Score of 3-I think these materials are lacking in meeting the 1c. I wasn't able to pull much evidence for this part, which informed my decision.

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
Students are asked to apply knowledge on the end of chapter and end of unit assessments. For example, in Lesson 4.4 (Waves unit), students use their sound diagram they worked on and the things they read to explain patterns in communication. For an individual lesson assessment it seemed more coherent. In the Waves unit Lesson 1's phenomenon dealt with how a mother dolphin communicates with her calf across a distance. Lesson 1.5 was the lesson assessment and it had students construct an explanation based on their experiences in the four previous lessons. The explanation was making sense of the phenomenon. However, this assessment was very guided, and I'm not sure how much work students would really be doing on their own to actually be assessed. Assessment guides are provided in that they are thorough in mentioning things that should be considered for a rubric to score students in a three dimensional way, but they don't actually provide a rubric that teachers can download and use. They do provide possible student responses. On-the-fly assessments are included in each unit, but not necessarily each lesson. Unit pre-assessments are provided for teachers to use in planning for instruction.

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

Score of 3-The materials partially support criterion 2a. While they are rooted in phenomenon, they do not provide rubrics that assess all three dimensions in a form that teachers can download easily. In addition, some of these assessments are heavily teacher-led, making it hard to truly assess student sense-making of the phenomena in a 3D way.

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
Lesson 1.2 in the Waves unit students use rope and a spring toy to make waves to help build their understanding of waves and how they travel, patterns. Students are given an opportunity to state what they know about things or experiences. Lesson 1 of the Energy Conversions units has students think about any experience they had with a blackout. Lesson 1 of the Waves unit has students think about what they know about dolphins. There are some shared experiences such as listening to three different dolphin calls and students record their observations.

To what extent do the materials support Criterion 2B? Include your reasoning.
Score of 3-These materials partially support Criterion 2b, in part because I struggled finding evidence for this category.

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 lots of language supports in the online and print materials for these two Physical Science units. Each lesson provides some sort of graphic organizer and is very guided in reading and questioning. Students are asked to write and draw when constructing explanations. This curriculum is heavily reading based and provides multiple reading supports. In the hard copy materials students engage in reflection before and after each lesson. Vocabulary is supported throughout each lesson, and new words are pulled out to put on a word wall. On page 5 of the Energy Investigation Notebook there is an example of supporting understanding of multiple meaning words. Oral language support example is from Pg. 75 of the Energy Investigation Notebook – Roundtable discussion activity. There are sentence stems for written responses. Example is preparing students for the town hall meeting on page 85 of the Energy Investigation Notebook. Lesson 2.2 (Energy Conversion unit) offers great reading support for synthesizing ideas about converting energy. Page 14 in the Energy Investigation Notebook shows how it is supported.

Several times throughout each of the two units there is a chart where students write the scientific word, and then in the next column they write “everyday use” of the term.

There is a ton of teacher-led discussion and student partner talk in each lesson in each unit.

There are some videos throughout each unit that students watch to help build understanding, and then they discuss with each other, whole class.

To what extent do the materials support Criterion 2C? Include your reasoning.
Score of 3-I think this criterion is decently supported well by the instructional materials for oral and written language support, but not for the other look for’s. They make a point in each PPT to highlight certain terms like investigate, source, etc. and the idea is to build a word wall as they go along. I also really like the chart where the scientific word is placed on one side and then students consider it’s everyday use on the other side. The additional books included are great for students reading about science, but if we are focused on reading about science…it is taking away from doing the 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 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
This curriculum does an excellent job in this area. It's probably the highlight of the curriculum for me. - Provides an over 600 page downloadable teacher guide for each of the Physical Science units, for teachers that like a hard copy of things, but they have to go online to access the PPTs and videos. - Each unit has a well done PPT with notes on each slide for the teacher of things to say, things to consider. - The online and hard copy guide go into tons of detail for each unit and individual lesson. There are rationales for the curriculum, an overview of each lesson plus a lesson at a glance with suggested time frames. They provide materials and prep and are very extensive in detailing out what the teacher should do before the lesson and after the lesson. They go over other digital resources, vocabulary, standards, differentiation, areas students may struggle, and what kind of tech is needed for the lesson and how it can be adapted without the tech (if possible). - Some of the lessons provide at home investigations. In the Waves unit, lesson 3.1 and 4.1 both provide optional home investigations. - Teacher references are offered for teachers that want to look at more sources.

- The differentiation ideas are extensive for each Physical Science unit. See page 46 in the teacher guide for Energy Conversions as an example of specific ways to differentiate for students with disabilities. In the same guide, page 45 goes into details to support EL students.
- Background info on the content is discussed for each lesson, and instructional suggestions are made.

Pg. 564-623 are all teacher references to support understanding of the curriculum.

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To what extent do the materials support Criterion 2D? Include your reasoning.
Score of 1-These materials do a great job in supporting criterion 2d. It's truly the highlight of this curriculum. They offer just about everything you could think of that would make a teacher's life so much easier…with the exception of assessments. They do not provide a 3D rubric that is already created and can be downloaded. They provide great ideas to think about in a 3D way, but no actual rubric ready to go.

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
Materials are available in print and online. I saw an “Espanol” button, but I think that was to change the teacher’s language to Spanish. I did not see in any of the materials where you could switch the language to anything other than English. There were a lot of good graphic organizers and reading supports provided. There are lots of language supports in the online and print materials for these two Physical Science units. Each lesson provides some sort of graphic organizer and is very guided in reading and questioning. Students are asked to write and draw when constructing explanations. This curriculum is heavily reading based and provides multiple reading supports. In the hard copy materials students engage in reflection before and after each lesson. Vocabulary is supported throughout each lesson, and new words are pulled out to put on a word wall. On page 5 of the Energy Investigation Notebook there is an example of supporting understanding of multiple meaning words. Oral language support example is from Pg. 75 of the Energy Investigation Notebook – Roundtable discussion activity. There are sentence stems for written

responses. Example is preparing students for the town hall meeting on page 85 of the Energy Investigation Notebook.

Lesson 2.2 (Energy Conversion unit) offers great reading support for synthesizing ideas about converting energy. Page 14 in the Energy Investigation Notebook shows how it is supported.

Several times throughout each of the two units there is a chart where students write the scientific word, and then in the next column they write “everyday use” of the term.

There is a ton of teacher-led discussion and student partner talk in each lesson in each unit.

There are some videos throughout each unit that students watch to help build understanding, and then they discuss with each other, whole class.

When there were humans in a slide, I noticed diverse cultures. Lesson 2.2 PPT from the Energy Conversion unit is an example.

There are many videos and tutorials to support student learning.

To what extent do the materials support Criterion 3A? Include your reasoning.
Score of 3-These materials come a bit short for this criterion. I did not see where materials are available in any language other than English. I may have missed it. Also, I forgot to check on the length of each lesson and if that would be sufficient for our students for the year.

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
Enough materials are included in a kit for small groups, and it appears that each student would get their own reading books (the support books that are included in each unit). Materials will last and/or can be replaced easily (with a budget). Teachers would not be able to share kits, so it would need to be one kit per teacher.

To what extent do the materials support Criterion 3B? Include your reasoning.
Score of 1 – there are plenty of materials and they can be replaced as long as there is a budget within the school for it.

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
Tier 2 vocabulary is highlighted as well as Science specific vocabulary. There are explicit moments in each PPT of each lesson that brings attention to these words. Students record them in their science notebooks. I didn't find that there were a lot of pictures of humans in the PPTs, but Lesson 2.2 from the Energy Conversions unit depicted some diversity and made a historical connection in the PPT. I found more diversity in the books that were included in the kit. Reading comprehension is supported throughout with graphic organizers. This is the only curriculum that provides several additional books. In the Energy unit those books were: Blackout!, Systems, It's All Energy, Sunlight and Showers, and one other that I forgot the name of. These books are short and engaging for 4th grade readers. There is a text features scavenger hunt in the Energy Investigation Notebook where they have students look through the Systems book. Students are supposed to explain what the text feature helps them understand. Pages 8-9. Reading reflections are included throughout each investigation. For example, there is a reading reflection on Systems – pg. 4 in the Energy Investigation Notebook.

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

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Score of 2. I feel this curriculum partially supports this criterion. I see that the vocabulary is more pre-done or pre-discussed rather than attaching vocab or dissecting vocabulary after an experience.

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Referenced, adapted and formatted from the following documents:

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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

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