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
-Unit 1, Balancing Forces anchor phenomena: The floating train rises, floats above the track, then later falls back to the track. -Unit 1, Chapter 1, chapter level phenomena: Why does the train rise?

-Story line for Unit 1, Chapter 1 includes students being challenged to explain a floating train to a city getting a new train service for their city.
-Unit 1, Lesson 1.2 Investigative phenomena: Sometimes things start to move.
-Students view an animation video to introduce the question for Unit 1, Chapter 1, make predictions and discuss their initial ideas, then plan and conduct investigations of force through hands on activities like trying to make a wooden block move with a variety of objects and creating a chain reaction with objects like dominoes. Students then analyze the patterns they see and read to obtain information about the science concept of force and discuss with each other to gain more information about the anchoring phenomena and write explanations.
-In Unit 3, "Environments and Survival," students complete an engineering task to design a robot that can pull up and grind up invasive plants using what they learn about giraffe traits.

To what extent do the materials support Criterion 1A? Include your reasoning.
This criterion is fairly well met by the instructional materials. The phenomena present are strongly tied to student experiences and real life scenarios, as is demonstrated in the train phenomena in Unit 1. Anchoring phenomena are present for each unit, as well as an anchoring phenomena for each topic, that breaks down the unit phenomena so students can examine it bit by bit. Investigative phenomena are also present for each lesson. The engineering design challenge presented in Unit 3 demonstrates a strong connection between engineering and the core science ideas because students have to use information about what they've learned to complete their design.

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 Unit 4, Weather and Climate, Chapter 1, students are comparing climates and students need to plan and conduct investigations to measure rainfall and temperature using scale, proportion, and quantity. They then analyze quantitative data to compare weather patterns as evidence in an argument about which island would be the best habitat for orangutans. -In Unit 4, Weather and Climate, Chapter 3, students use mathematics and computational thinking as they compare bar graphs representing weather data over many years. They figure out that weather has stable patterns, but also analyze how weather changes. They understand that climate is the pattern of weather in a location. Students revise their arguments about the orangutan sanctuary for a final time based on new climate evidence they gain in the lessons.

-In Unit 1, students use engineering to design a floating paperclip, as well as a magnet trick.
-There are no Engineering standards included in Standards and Goals for Unit 2 "Inheritance and Traits"
-In Unit 3, "Environments and Survival," students complete an engineering task to design a robot that can pull up and grind up invasive plants using what they learn about giraffe traits.
-In Unit 4, "Weather and Climate," students complete an engineering task to design a structure that can withstand simulated hurricane winds and rain.

To what extent do the materials support Criterion 1B? Include your reasoning.
The 3 Dimensions are very well integrated at the unit and chapter level. Students may have to analyze proportions in one lesson and then use evidence to understand patterns in another. Therefore, students are using a variety of combinations of the 3Ds. Engineering is a strong component of both Unit 3 and 4 and students have a specific design task to complete. Unit 1 has hands on tasks that require engineering design concepts, but Unit 2 does not have any engineering tasks or standards so this criterion is not highly met from this aspect.

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
-In Unit 1, Balancing Forces, students gain an understanding of the physical science standards of force and motion by investigating a phenomena about a train that floats above the tracks. Students investigate a part of the phenomena in each Chapter of the unit by completing hands on tasks, reading about the concept and discussing and writing about their findings. At the end of each chapter, the students reflect on what information they've gained on the anchoring phenomena. -In each unit, ELA standards are embedded through chapter readings, written explanations, and discussions.

-Students use math practices in units such as Unit 4, Weather and Climate to measure weather, collect data and analyze patterns.
-Kindergarten students complete a unit on Pushes and Pulls which will give them background knowledge to investigate Balancing Forces in 3rd Grade.
-Progress Build sections are provided in the overview sections of the units for teacher to show how students progress through the unit, chapters and lesson content.

To what extent do the materials support Criterion 1C? Include your reasoning.
The instructional materials are very coherent. Each chapter of each unit ties to the anchoring phenomena and the lessons are clearly sequenced. There is a strong presence of ELA embedded in every chapter with math concepts used as well, when needed. There are conceptual ties to knowledge students would have gained in previous grade levels as well.

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
-In Unit 1, Balancing Forces, Lesson 1.1, there is a pre-unit assessment that gauges students pre understanding of the Science and Engineering Practices, as well as the Crosscutting Concept of stability and change. -possible students responses and rubrics/assessment guides are included for notebook pages and assessments. -Unit 1, Lesson 1.4 there is an "On the Fly Assessment" during a student discussion about a train moving. The materials provide guidance to "look/listen for" their knowledge of force occurring when objects move. There is also guidance, for "now what" if students are not demonstrating understanding, including how to

guide the discussion. This is a formative assessment of the DCI for third grade Forces and Motion.
-In Lesson 5.5, students write their final explanations about why the train changed from floating to falling. These written explanations provide a good basis to assess each student's level of understanding of the core concepts from the unit. Rubrics are provided to assess the 3Ds.
-In the Assessment System for Unit 1 it notes that At the end of each chapter, students are invited to check their progress toward understanding how the floating train works, using the following prompts for response like "I understand why the train rises."

To what extent do the materials support Criterion 2A? Include your reasoning.
This criterion is well met by the instructional materials. There are multiple options for formative assessments, including teacher checks and student self checks for understanding. The assessment includes ties back to the initial phenomena and are connected to the 3Ds. The rubrics, student response examples and "now what" sections provide clear guidelines for teachers to assess student understanding.

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
-In Unit 4, Weather and Climate, Chapter 1 students do a hands on investigation of temperature using thermometers and an investigation using water and measurement tools to model measuring rainfall. This connects back to the phenomena of learning about the climate an orangutan lives in. -In Unit 4, Weather and Climate, Chapter 4 students build structures to withstand hurricanes and test them using cups of water and a hair dryer. They make predictions about meteorologists and natural hazards and read a text before this activity and make connections back to their predictions after. -In Unit 2, Inheritance and Traits, in the Flextensions section (optional to the unit), students observe the life cycle of meal worms to reinforce their understanding of life cycles of organisms.

To what extent do the materials support Criterion 2B? Include your reasoning.
The instructional materials provide a lot of hands on experiences to guide student learning. Students are investigating measuring weather to expand their understanding of weather, then exploring natural hazards as they continue to learn about weather and climate. These investigations are relatable to students real lives and experiences. The Flextensions provide more authentic understanding of organisms in the Inheritance and Traits unit because students are working with real organisms. This is an important component of learning, but is optional in the unit. There are multiple modalities present in each section of the unit including reading, discussion and hands on activities.

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
-In Unit 1, Balancing Forces, students complete hands on investigations, readings and discussions and write explanations about a hovering train including "Why does the train rise," "Why does the train fall," and "Why does the train float?" At the end of the unit, students use what they've learned to write final explanations about how a hovering train works. -In Unit 1, Lesson 1.2, students share their observations to begin learning about force. The vocabulary word force is learned in context through their explorations with objects, then reinforced and taught more explicitly in the reading, "Forces all around" in lesson 1.3.

To what extent do the materials support Criterion 2C? Include your reasoning.
This criterion is well met by the instructional materials because student sense making is center around their discussions with each other after completing hands on activities. The lesson progressions allow students to discover more about the science concepts, write explanations and revise and/or expand upon their written explanations. Vocabulary is embedded in their investigations and discussions and also learned in the reading portions of each chapter.

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
-Background information is given in the unit overview for Unit 1 about the concept of force, as well as pedagogical considerations such as, "It can be confusing for students to categorize every force as either a push or a pull." Student preconceptions are also provided for the teachers, such as, "They might say that an object has force or that the force is inside the object." -The online guide has multiple sections for teachers to access support including Standards and Goals, and 3D statements for each unit and chapter. -The instructional guide has clear directions such as "project and play the Floating Train video." -There are differentiation notes for each lesson such as "Embedded Supports for Diverse Learners," like student-to-student discussions, as well as suggestions for specific differentiation strategies for English Learners, Students Who Need More Support and Students Who Need More Challenge. These include general statements such as using sentence frames and starters and strategic partnering. -There is an NGSS guide for families that includes information on the 3rd grade standards.

To what extent do the materials support Criterion 2D? Include your reasoning.
The instructional materials support this criterion fairly well. The directions, background information and pedagogical information is very comprehensive for teachers making it clear to teach. There is specific connections to the standards and 3Ds. There are differentiation supports, but they are mostly general, not specific to the unit/lesson. There is standards information for families, but not content suggestions for home.

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
-For 3rd grade, there are 4 units, with 22 one hour lessons each. This equates to 147 minutes of instruction per week which is short of our recommended minutes of 240 minutes a week for 3rd grade. -The print and online materials have Spanish and English versions -Teacher instructional guides are available in both print and online. -Student notebooks is available in print and available to download as a pdf. -Student notebook contains all graphic organizers, templates and diagrams needed for the lessons. In Unit 4, Weather and Climate, there is a graphic organizer where students can keep track of the amount of rainfall they track for two different cups during their investigation. -There are video animations included for each anchoring phenomenon. For Unit 1, Balancing Forces, there is a video of a hovering train going through a city. -There are student apps available online for simulations and activities. For Unit 1, Balancing Forces, students can interact with magnets in the Force Diagramming Tool app. -The teacher online curriculum can be downloaded and saved using the "Offline Preparation" tool.

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

The instructional materials are comprehensive. There are translation capabilities for the materials and plenty of technology options for students and teachers. The Student Notebook cannot be assigned and completed online through the curriculum, but the print option is comprehensive. The student apps could be used both and home and school if technology is available. The instructional minutes fall short of our recommended weekly minutes for science, but there are many "Flextension" activities that could be used to increase instruction.

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 enough materials for the activities to be completed in pairs or small groups. For example, there are 18 rubber balls in the toolkit for Unit 1, Balancing Forces, meant to be used in pairs for a class of 36 students. -Non consumable materials such as magnets, washers and blocks are made of good quality and could be reused. -All materials are included in the toolkit to complete the investigations. Items like organisms (meal worms, pill bugs) for the Flextension activities would have to be purchased by the teacher.

To what extent do the materials support Criterion 3B? Include your reasoning.
The science equipment included is fairly comprehensive. There are not enough materials for students to complete the investigations individually, but there are enough for a class of 36 students to work in pairs and small groups. The materials are quality.

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
-In Unit 2, Environments and Traits, the text "The Code" explores how our traits are similar and different and the text "Scorpion Scientist" highlights the work of arachnologist Lauren Esposito. These texts represent diverse people that reflect our students. -Texts for reading are available in print only and have embedded vocabulary support. -High level thinking is used during reading activities to support comprehension, such as finding evidence of how traits are inherited in Unit 2, Environments and Traits, the text "Handbook of Traits."

To what extent do the materials support Criterion 1A? Include your reasoning.
The reading materials are appropriate for 3rd grade level, include diversity when applicable and there are comprehensive lessons and notebook pages to incorporate the texts. The reading materials are not available through the online curriculum however.

Referenced, adapted and formatted from the following documents:

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