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
Students are introduced in lesson #1 about a problem in the town of Faraday in which they are building a new train to get people from one place to another. However, the train is a floating train. It rises, floats above the track, then later falls back to the track. The Mayor doesn't think the citizens will ride it because they don't

understand how a train can float. The students are asked to investigate this and give a scientific explanation about how the train floats without anything touching it.

To what extent do the materials support Criterion 1A? Include your reasoning.
The materials support Criterion 1A in that students are introduced to a real life problem in a town. They become scientists investigating many different scientific concepts about how things move, float, and fall through hands-on investigations. They discuss their findings as a class and then come up with a scientific explanation for the citizens of Faraday about how the train works.

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
Students investigate with peers and discuss evidence from their investigations about what causes things to move, float, and fall without anything touching it in order to explain how a train can float. They apply their learning of magnetic force and gravity to how these forces can cause a train to float and fall.

To what extent do the materials support Criterion 1B? Include your reasoning.
The materials support Criterion 1B because students use step by step directions to explore how pushes, and pulls are caused through magnetic force. For example, in lesson #2 students explore how to make a wooden block move using a rubber band. Students follow the steps to make a conclusion about what force can move the wooden blocks. Students come up with the solution that a force such as a push or pull can cause movement.

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 the Unit Balancing Forces students explore the forces of pushes and pulls in chapter 1 and then in chapter 2 they begin investigation untouching forces such as magnetic force. Next, in chapter 3 they investigate gravity. In chapter 4 and 5 students make observations about balanced and unbalanced forces. Students come to understand that two forces can be acting on an object at one time.

To what extent do the materials support Criterion 1C? Include your reasoning.
Within the 3rd grade Unit Balancing Forces students build their scientific knowledge about forces. The lessons build on the prior lesson to continue the understandings that a train can float, move,

and fall due to unseen forces. Within the 3 grade the units build on students understanding of how components work together in systems such as balancing forces, environments, and weather.

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 the 3rd grade units several assessments are seen to guide the teacher in student's understanding. In Balancing Forces a pre-unit assessment is given to unveil student's prior knowledge and misconceptions about force. There are rubrics and evaluation guides to

help the teacher know what to look for and what to do next. These guide the teacher as to what a possible student response could look like. Many opportunities for formative assessments are provided throughout the lessons to guide the teacher in how the students are progressing in the scientific concept. For example, in the unit Inheritance and Traits in lesson 2.1 Activity 3 students are asked to generate with a partner investigable questions about fruit flies. The teacher conducts a class discussion in which they analyze whether each question can be tested with an observable answer. The teacher is able to formatively assess student's understanding of the concept through the students questions.

To what extent do the materials support Criterion 2A? Include your reasoning.
The materials support Criterion 2A because they provide many opportunities for multiple assessments including formative, and summative along with peer and performance assessments.

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 3rd grade's *Balancing Forces* Unit, students work to investigate a Maglev Train and then explain how this inventions seem to defy logic. Through the unit's lessons students explore scientific concepts through hands-on activities, reading informational text, and discussing with peers about how forces can cause stability or change in an object's motion. For example, in lesson 4:2 students investigate how a paper clip can float without a touching force and in lesson one students are given a bag of materials and asked to work in a team to investigate how forces can make objects move without touching them. They come up with a claim based on their evidence and then apply their knowledge to the anchor phenomenon on how balanced forces allow a train to rise, float, and fall without anything touching it. Students create a physical model, a diagram model, and write an explanation presenting scientific explanations detailing how the maglev (magnetic levitation) train appears to defy gravity by floating.

To what extent do the materials support Criterion 2B? Include your reasoning.
Materials support Criterion 2B because students explore and gain first hand sensemaking about the scientific concepts of force and motion through hands-on concrete experiences. They work together with their peers to discover important concepts such as balanced forces of gravity and magnetic forces.

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
3rd grade students figure out an explanation based on their exploration with hands-on materials, reading non-fiction text, classroom discourse while referring to charted ideas and evidence. They experience concepts such as magnetic forces and link important vocabulary throughout the unit's lessons. The complexity in the scientific concepts build throughout the unit's lessons.

To what extent do the materials support Criterion 2C? Include your reasoning.
3rd grade students figure out an explanation about how a maglev train works based on their exploration using concrete materials, reading non-fiction text, having scientific discourse for

sensemaking about these scientific concepts can give the town of Faraday an understanding of how the train will work when nothing is touching it. Throughout the unit students use important vocabulary (cognates are provided) along with in oral and written language by referring to charted learning. They present their explanation of the scientific explanation to the problem to their class.

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
In the 3rd grade unit Balancing Forces the teacher's guide has a section on scientific background. It gives clear and concise information for the teacher about how forces work and on what to do prior and during lessons in the unit along with standards for each lesson. It gives teachers clear steps on how to use the apps. For example, in Lesson 3 students will use the app on a device to construct and model using a diagraming tool and the helpful guide provides the teacher with the understanding on how to demonstrate the app to the students. There is a information for parent's in English and Spanish about the NGSS for this unit that teachers can print out and send home. A pre-unit assessment provides formative information for the teacher to understand students' knowledge and misconception of concepts.

To what extent do the materials support Criterion 2D? Include your reasoning.
The instructional materials help teachers in their planning and instruction. There are ample resources for teachers to understand the scientific background, sequence of learning goals and how to adequately instruct the students in their scientific sensemaking.

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
In 3rd grade's unit Balancing Forces there are 5 chapters with 22 lessons. Each lesson lines out the instructional time needed for each activity. For example in lesson 1 the Teacher at a glance provides the time needed for each part of the lesson: Teacher's introduction 10 min., Discussion of initial ideas 10 min., Making blocks move 20 min., Sharing observations 20 min. The teacher's guide can be accessed both digitally and in print. There are graphic organizers to print out for student's science notebooks. There are multimedia supports such as apps with simulations. Visuals are provided for the concept wall such as vocabulary cards and photos, unit questions, and section headers. In the digital resources there are power point or google slides for projecting the lessons online or an active board.

To what extent do the materials support Criterion 3A? Include your reasoning.
Instructional materials represent a comprehensive K-5 core program in many ways. The 4 units each have 22 lessons that each use a 60 mins. The total instructional time of 1,320 minutes correlate to our recommended instructional time in science. Through the 4 units students use concrete materials, online apps, science notebooks with graphic organizers, and Informative texts to investigate scientific concepts in order to answer a problem or question from each of the 4 units. Multiple digital resources support students learning.

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
Click or tap here to enter text.

To what extent do the materials support Criterion 3B? Include your reasoning.
Instructional materials include hands-on materials and equipment that support three-dimensional learning. The materials provided are of quality and will last through many uses.

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
Click or tap here to enter text.

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

Referenced, adapted and formatted from the following documents:

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Washoe County School District Needs Evaluation

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