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
There is an anchoring phenomenon ("You move in many different ways on the playground.") and lesson-level phenomena (e.g., "A ball starts moving when you kick it." And "Some kicks make the ball go straight, and others make it go sideways. Students return to the lesson level phenomena at the end of each lesson to provide claim, evidence, and reasoning for what they learned about the phenomenon. Students apply their understanding of pushes and pulls to design a marble playground.

To what extent do the materials support Criterion 1A? Include your reasoning.
There is an anchoring phenomenon presented at the beginning of the unit, and related lesson level phenomena for each of the 5 lessons. Students return to the anchoring phebnomenon at the end of the unit to explain it using what they have learned, and each lesson level phenomenon also includes opprotunitiess for explanation.

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
Lessons provide students with opportunities to reflect on their learning (e.g., p. 24 student notebook). Investigations are kindergarten appropriate and use objects and pictures that are accessible to them (e.g., spiders, playgrounds, tennis balls).

To what extent do the materials support Criterion 1B? Include your reasoning.
Students are given opportunitites to reflect on their learning, which could provide opportunities for seeing science as dynamic. Argumentation and explanation are conflated ("answer the question, "in which directions do swings move?"), using the CER framework, p. 18 student notebook. Materials also allow them to explore ideas using tangible objects that are accessible to young learners.

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
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To what extent do the materials support Criterion 1C? Include your reasoning.
There were no explicit conncetions to other science disciplines within this unit; however, connections between science and engineering are made as student draw on their science knowledge to successfully complete an end of unit engineering task.

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
The end of unit performance task asks students to “make a marble playbround” where they first design it, make it, and then make changes based on whether or not it worked. They then explain through words, how they made it work better. There is a sample answer for how students would explain how they made their marble playground work better. Digital materials include examples for how students can respond to performance tasks (e.g., end of unit CER “using what you’ve learned, expain the unit’s anchoring phenomenon”).

To what extent do the materials support Criterion 2A? Include your reasoning.
Students are using practices and disciplinary core ideas to demonstrate understanding (argumentation, explanation, designing solutions) on performance tasks both within lessons (design a safe slide) and at the end of the unit (design a marble playground). The digital materials provide example responses for teachers to use; however, there does not appear to be a rubric that provides a range of possible responses.

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
Lessons begin with what students know about the lesson-level phenomena and they can write thei questions down. Students conduct investigations related to the designed world outslide the classroom (slides, roller coasters). In Lesson 4 students explore what happens when a "chip" is pushed into various objects, and they are given opportunities to draw their observations in a workbook, or to draw their observations in their online notebook.

To what extent do the materials support Criterion 2B? Include your reasoning.
Lessons begin with providing students with opportunities to discuss what they know about phenomena; however, it does not appear that they explicitly return back to their questions, or how their ideas are explicitly tested. Students are able to talk about about they observed and to also draw what they observed both by hand and digitally.

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
Students are able to draw or write down anything their notice in their notebooks before sharing with the class (e.g., lesson 3 students watch a video of a diverse group of kids kicking a ball and they draw/write what would cause a ball to not go straight.

To what extent do the materials support Criterion 2C? Include your reasoning.
Students are given multiple ways to communicate initial understanding and are able to do so on their own before sharing with the class. However, it is unclear if there are supports for iterative co-construction of explanations.

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
Digital materials for each lesson include background knowledge, how to support students in making connections to their life outside school, participate structures ideas and how to make learning accessible to all learners. (e.g., Lesson 1, "you may wish to have students say and/or write directions in their first language as well." Materials include extension activities, such as a "mystery game" for lesson 4. Each lesson with the unit has two versions: "fast track lesson" and a "master lesson". For example, Lesson 1 has a 38 minute lesson and a 111 minute lesson that includes all of the exentions.

To what extent do the materials support Criterion 2D? Include your reasoning.
Lessons include materials for fast overviews or for deeper learning, and they provide teachers with suggestions for connecting phenomena to out of school learning experiences, as well as how to support learning in the classroom through various participant structures and how to reach the needs of all learners.

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
Student workbooks are provided in both English and in Spanish. Teacher and student materials are available for online and in print. Digital versions of notebooks require students to draw lines and motion (e.g., lesson 4 students can predict what they expect to happen if they push a chip on a cardboard square, and to draw what they observed happen).

To what extent do the materials support Criterion 3A? Include your reasoning.
Teacher materials are available in print and online, with the online version included all extensions. Student workbooks are provided in two languages, and students can also complete entries online. However, digital versions will require some sophisticated understand of how to draw with a mouse, for example in lesson 4 when they are tasked with drawing how something will move).

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
Boxes include enough materials for at least 15 students to work individually on lesson #2.

To what extent do the materials support Criterion 3B? Include your reasoning.
There appears to be enough materials provided that are not readily available in a classroom.

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
Support texts include words for students to use to help them with responding to questions posed and to help reinforce vocabulary related to motion. Each lesson contains an associated text about objects that move and/or objects that move things.

To what extent do the materials support Criterion 1A? Include your reasoning.
Support texts include words for students to use to help then with responding to questions posed and to help reinforce vocabulary related to motion. Online materials appear to reflect the racial and ethnic diversity of students, including videos and texts. Tests are provided for each lessons with pictures and text that reinforce concepts students learned in the lessons.

Referenced, adapted and formatted from the following documents:

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

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Washoe County School District Needs Evaluation

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