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
POM Unit is on the phenomena that "properties of mixtures can change." designing glue. Students who have attended school have multiple exposers to glue from the school setting. The Phenomena is identified as "Different glue mixtures have different properties. Some are stickier than others. How can you make a sticky glue? (Introduced in 1.3). Chapter 2 begins the design process around the essential question, "How can we design a glue mixture that is better than what the school uses now?" Each Unit has a Unit Phenomena and each lesson has an individual lesson phenomena that is connected to the unit theme.

To what extent do the materials support Criterion 1A? Include your reasoning.
High Extent: Students have schema about glue. This phenomena of mixtures changing and creating a "new glue" mixture would be highly engaging. The individual lesson phenomena keeps the lessons and the unit connected to the over arching goal.

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
In the Teacher Resources section, under 3-D statements, a color coded guide intentionally identifies where Practices, Disciplinary Core Ideas, and Crosscutting concepts. At the POM unit level it identifies the following as Practices: investigate, analyze and interpret data, design. Cross Cutting: Patterns and Cause/Effect. Core Ideas: Different property of materials. Lesson 1.2 Introduces a text titled “What if Rain Boots Were Made From Paper?” the skill of Predicting is practiced throughout the reading. -In the Hands-On (3) section “Background” the Crosscutting Concept: Patterns Across This Unit- it is described how students use patterns throughout the unit to build understanding. -Students revisit substances in each chapter and begin to develop an understanding how adding or changing ingredients, changing temperatures can alter a substances properties.

To what extent do the materials support Criterion 1B? Include your reasoning.
High extent: The cross cutting concepts are clearly evident and explicit.

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
The Unit builds from understanding a substance, learning how to make observations and describe what they see, to testing glues, exploring glue stickiness, determining how a substance can change when changing the temperature and eventually going through the design process. The lessons build upon each other with reasonable connections to previous lesson experiences. -Each unit has a Coherence Flowchart that lays out the typical structure of a chapter. "Instruction is framed by questions about the unit's anchor phenomenon and the related problem students are solving. Chapter Questions then guide students in figuring out the phenomenon, piece by piece. Within each chapter, investigative phenomena lead to Investigation Questions that focus students on a manageable piece of content that will help them figure out the Chapter Question. Each phenomenon leads to a question which motivates activities, and each activity provides specific evidence related to the Investigation Question. Students synthesize the understanding constructed over multiple activities, and this understanding is formalized through key concepts. Often a key concept leads students to an additional investigative phenomenon and Investigation Question students need to pursue to answer the Chapter Question. At the end of the chapter, students' new understanding is applied back to the unit's anchor phenomenon and leads students to a new Chapter Question or a final explanation."

To what extent do the materials support Criterion 1C? Include your reasoning.
High Extent: Each lesson builds upon the last in coherent and necessary ways, always working towards developing an understanding of the units anchor phenomena.

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
Unit 1 pre-assessment is an opportunity for students to discuss 4 bags of different substances. While students are discussing, a teacher note sheet can be used to document students' understanding. There is a helpful Assessment Guide that identifies potential student preconceptions that may come out in student discussion. -On-the-Fly assessment asking students to complete a writing piece using evidence to support their argument about whether the mystery glues are the same or different. (Lesson 1.4) -On-the-fly (1.5) suggests teachers listening in to students as they observe the glue ingredients. It directs them to listen for students describing properties using their senses. -On-the-fly assessments continue throughout, as well as Critical Juncture, Pre Unit assessments, End of Unit Assessments and Investigative Assessments. -The 3-D Assessment Objectives Overview lays out where each assessment is found and identifies which assessment is assessing the Disciplinary Core Ideas, The Science and Engineering Practices, and Crosscutting Concepts. There are multiple opportunities to assess, SEP, DCI, and CCC.

To what extent do the materials support Criterion 2A? Include your reasoning.
High extent: A variety of different assessments are provided with support for teachers to analyze the assessments well. Teachers have the resources to use them as a common formative assessment.

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
Properties of Materials Resource Multi language Glossary includes vocabulary words for the unit in 9 different languages including: Tagalog, Urdu, Russian, Portuguese, French, Haitian Creole, Chinese, Arabic, Vietnamese. Examples of student prior experiences and backgrounds are provided to support the connection of mixtures (cooking, making "potions," building toys with smaller parts). Students engage in experiences first hand, rather than expecting them to have background knowledge: Lesson 1.3 Observing Properties of Glue. Students all experience mystery glues and get to explore with the properties including smell, texture (stickiness) and visual properties. -Students get to explore how adding heat of cold can change the substance and perform sticky tests again. They make observations and predictions over time. -In Chapter 1 there are 8 Hands On Experiences, 17 Teacher Led Discussions, 4 Student to Student Discussions, 3 Readings, 4 Writing experiences

To what extent do the materials support Criterion 2B? Include your reasoning.
High Extent: The investigation is relevant and engaging. It balances hands on, discussions, and reading and writing well.

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
-Over the course of the unit students begin with understanding what substances are and what properties substances have by experiencing different substances in bags. Moving towards describing substances around them with “riddles” and experimenting with the stickiness of glues. -Lesson 1.3 partners of students examine properties of 2 different glues. Partners are encouraged to “think, pair, share” and engage in student discourse. Students are recording observations in notebooks. Students conduct a “sticky” test to by gluing two beans to an index card labeled for glue A and B. -Student are guided through stating claims and supporting them with evidence (1.4) -Students are exposed to vocabulary words explicitly, words are discussed, demonstrated, placed on the classroom wall. Students engage in discussion around the words with each other. -Students have the investigation notebook to record thinking and learning

To what extent do the materials support Criterion 2C? Include your reasoning.
High Extent: The nature of the experiments, the group work and data collection, all require much conversational opportunities. Students will have explicit vocabulary instruction to support their sense making conversations and writings.

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
Each Unit has a premade and editable slide deck (PowerPoint or Google) that teachers can use to guide their students through each lesson and activity. It contains notes with the information from the manual. It provides possible student responses and teacher actions or example dialogue. -Experiments and activities: Pictures of "Tray Setup" are provided to support teachers in preparing for the activities. Conclusive lists of materials and preparation (including what needs to be copied) are described in Materials and Preparation section of each lesson. Including what needs to be on the Classroom Wall. -Lessons include "Differentiation" Embedded supports for diverse learners and explain why the support works and for what purposes. Ex: Accessing prior knowledge to support students who are EL and struggling with the cognitive load of encountering a new topic. Ex: Frequent Student-to-Student discussions provide multiple opportunities for students to share thinking, and allows for teachers to listen for inaccurate ideas to inform their instruction. -Ex: pg. 55 of TM section on Promoting Inclusion in Discussions, provides ideas such as "refer to norms for discussions, practice telling a partner."

To what extent do the materials support Criterion 2D? Include your reasoning.
High Extent: The resources teachers need to successfully teach the material are all provided.

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
The Investigation Notebook provides students with a place to record observations during their hands on work. It holds vocabulary words and their meanings. It provides prompting and space to reflect on the daily learnings. The templates are great guides for students. (Are these considered consumable?) -There are five texts, 18 hard copies, and digital books, that are used in the lessons. Titles Include: What if Rain Boots Were Made of Paper? And Can You Change it Back? These texts are available in Spanish as well digitally. -The text "Ideas and Inventors" showcases several ethnically diverse inventors including Native Hawaiian, Chinese, Caucasian, and an Engineer named Kakani with dark hair and darker complexion. -Two Apps are available for student use: Properties of Materials Graphing Tool and The Properties of Materials Sorting Tool -There are 3 Units. POM Unit has 4 chapters. Each chapter is broken into lessons and each lesson has multiple activities. The first lesson of the unit is expected to take 60 mins between both activities. The second lesson is also 60 minutes, broken down into 5 activities. The third lesson is 60 mins. There are 9 lessons in Chapter 1, each an hour long. There are 13 more lessons (60 mins long). 22 Total lessons for the Unit.

To what extent do the materials support Criterion 3A? Include your reasoning.
High Extent: The reading resources are an added benefit to the quality investigations.

Evaluator number: 22 Grade: 2 Program: Amplify

There is approximately 7-8 weeks worth of instruction in this unit (with 3-4, 60 min lessons per week) Although the investigation notebook is “pretty”…it may be limiting. It may provide more scaffolding than needed, may limit students to the “space provided” to share their learning and thinking.

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
-Texts are quality, include 18 per class (which may not be enough for some cases) -Most items are consumable, and will eventually run out and will need to be replaced over time.

To what extent do the materials support Criterion 3B? Include your reasoning.
Medium extent: Limited text resources may not allow for all students to have access to a text. Some may have to share. Most “equipment” is a consumable item, “ingredients”….

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
-There are five texts printed books and digital books, that are used in the lessons. Titles Include: What if Rain Boots Were Made of Paper? And Can You Change it Back? These texts are available in Spanish as well digitally. -The text “Ideas and Inventors” showcases several ethnically diverse inventors including Native Hawaiian, Chinese, Caucasian, and an Engineer named Kakani with dark hair and darker complexion.

To what extent do the materials support Criterion 1A? Include your reasoning.
High Extent: The connected reading materials are engaging and diverse and reading opportunity is embedded into the lesson.

Referenced, adapted and formatted from the following documents:

Achieve, Inc. (2016). EQuIP Rubric, Version 3.0.

Achieve, Inc. (2018). Science Task Prescreen.

Achieve, Inc. (2016). Using Phenomena in NGSS-Designed Lessons and Units.

Achieve, Inc. (2017). Primary Evaluation of Essential Criteria (PEEC) for Next Generation Science Standards Instructional Materials Design.

Brennan et al. (2017) *Priority Features of NGSS-Aligned Instructional Materials: Recommendations for Publishers, Reviewers and Educators* [White paper].

BSCS (2017). Guidelines for the Evaluation of Instructional Materials in Science.

BSCS Science Learning (2018). NextGen TIME

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

National Academies of Sciences, Engineering, and Medicine (NASEM) (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom.* Washington, DC: The National Academies Press.

National Research Council (NRC) (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press.

NGSS Lead States (2013). *Next Generation Science Standards: For States, By States.* Washington, DC: The National Academies Press.

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

Washoe County School District. (2020). Request for Instructional Material Submission RFP 2020A.