Washoe County School District K-5 Science
2020 Instructional Materials Evaluation Rubric
(Community Members, Administrators and Parents Form)

Category 1: Designed for Three-Dimensional Learning

Criterion 1A: 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.

Specific Evidence from Materials
Unit Anchor Phenomenon: *The floating train rises, floats above the track, then later falls back to the track.* I am not sure that students in the U.S. have seen a Mag Lev train. For pushes and pulls – I think there are many more common phenomena available for third grade. Additionally, I have tried this activity from the EIE curriculum and even college aged students have great difficulty with this activity. Students watch a video of the train "floating". This is an animation? I believe that a real Mag Lev train video would be more effective to engage the students… They may not think this is real… The learning progression in this kit does build on some hands-on experiences, but other experiences are teacher demo or video. For instance – the electromagnet is a teacher demo. The connection that a third grader would have to make from magnets to electromagnets (turning on and off the magnetic force by using electricity) seems to be a leap in fully understanding the phenomenon. Exploring magnets and using paperclips in exploration activities do seem appropriate (Floating paperclip challenge) – However, to summarize, there are 5 multipart lessons in this kit (with about 20 lesson components) and only about 10 activities that are mixed between teacher demo and student investigations.

To what extent do the materials support Criterion 1A? Include your reasoning.
I think that the phenomenon for this unit is not appropriate for third graders and requires knowledge from upper grades to actually understand the phenomenon. Most students in our country have no idea what a mag lev train is.

The engineering portion does fit into the 3-5 band ETS standards with appropriate methods. Just the final task will be difficult as explained above.

Criterion 1B: 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.

Specific Evidence from Materials
In the Balancing Forces kit – there are many activities – many of them are paper and pencil – class level thinking and organizing "teacher" led activities. Students do get to work with magnets to build a "floating" car in 2.2 – but before getting to do this – there is a long series of content laden paper and pencil activities to do first – this follows more of a literacy approach to science – not a inquiry activity based approach – or at least minimizes the activity first approach valued by the NGSS. E.g. Why do things fall (3.1). Students use overly simplistic materials to explore gravity (paper clip and domino) and a heavy book. Students follow a very guided (closed) inquiry to explore gravity. E.g. ELL modifications are oversimplified and dated strategies. Strategic partnering is critical for all components of the lesson – vocabulary cards are not supported by the NASEM report as front loading or critical to student success – sense making is ignored. This approach is a structured inquiry. Although the teacher may be able to open the inquiry more, the materials suggest a more structured approach to the activities, which include several teacher demonstrations – rather than student explorations. This is a weakness in this kit. Much of the Engineering in this activity is engineering the train at the end. The kit does provide some activities that are crucial to the content understanding so that the engineering of the train may be possible – it will take a good teacher to guide the students through this with success.

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

1B – a very structured inquiry – rather than one with more guided or open-ended options. The weakness here is the use of teacher demos for some of the activities - when kids should be performing these explorations. The use of video is necessary for completion of the unit.

Criterion 1C: 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.

Specific Evidence from Materials
There is a scope and sequence to this unit on Balancing Forces. The kit begins with Moving things (blocks) and the forces that are required to do this. Then goes into non-touch forces including an activity with magnet tricks. The unit then goes into gravity as a force and chain reactions. The kids perform a floating paperclip activity and then finally get to build the basic components of the floating train model. One concern for this unit is that it covers a lot of physical science concepts in one unit – even at third grade – this is a lot of content for just a few activities. In order to cover so much content – some activities are replaced with videos and teacher demonstrations which are a weakness to the learning progression in this kit. The kit makes explicit connections from one activity to another, but most elementary teachers do not have the physics background to make those connections and the teacher content guides don't help that much. After teaching introductory physics – I spend most of the semester on forces and motion and even college students had a difficult time putting this together in one semester. I feel that this unit tries to do too much content without understanding to get to the goal of modeling a mag lev train. There are readers and lots of ancillary material that can be used for integrating into language arts. This is fairly good with this kit. However, many materials promote older learning ideas in integration. I did not see Spanish versions of the student readers – but I assume that they have them.

To what extent do the materials support Criterion 1C? Include your reasoning.
See response above

Category 2: Instructional Supports

Criterion 2A: 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 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

Specific Evidence from Materials
This is third grade, but uses older standards? I put in a comparison of just the first standard to show the difference. According to Amplify - NGSS Disciplinary Core Ideas 3PS2:1 is • **PS2.A: Forces and Motion**:   ○ Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (3-PS2-1) According to the NGSS web site the DCI is as follows: **3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.** This is a serious confusion to teachers who will be held accountable to the standards and the mis match will cause all sorts of confusion with assessments. There are multiple and varies assessments. These range from traditional worksheet type assessments to more notebook type entries. There are formative and performance tasks that have an ability to be used as assessments. I would like to see a better connection to the use of notebooks consistently (as a scientist would use them) with periodic assessment checks.

There are formative and summative as well as reading inventories for a teacher to use.

The phenomenon does indeed drive the task, I just feel that this is an inappropriate phenomenon due to the depth of knowledge of forces and the difficulty of the final modeling task to build a mag lev train. (See comment sin 1A.

Plenty of rubrics – especially for the formative tasks. All available online. Now – there are many tasks that are video watching and teacher demonstrations that do not have assessments tasks related to them – this requires students to gain knowledge passively and hopefully "apply" that knowledge into the final model being built.

To what extent do the materials support Criterion 2A? Include your reasoning.
Overall – I think this is mediocre – beginning with the standards mis match and following through with more traditional means of reading connections – it seems that there is a lot left for the student to figure out from videos and teacher demonstrations – not from first hand experience.

Criterion 2B: 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.

Specific Evidence from Materials
As mentioned above – there are 5 sections with over 20 lesson components with less than half of them being hands-on activities. Videos and teacher demonstrations along with student readers build out the majority of this kit – thus requiring more traditional means of learning rather than the hands-on investigations that are advocated by the NGSS (NVACSS). The kit uses some good questioning strategies, but in this kit – prior knowledge to the entire phenomenon is probably missing – thus a bad start to any unit that

requires building knowledge and not using common background knowledge -this will provide difficulty for ALL students, but especially MLL students.

See question 1A. There are multiple modalities (Video, teacher demo, hands-on, readings, etc.), but how much do we want to rely on traditional learning strategies to build hands-on learning and problem solving (SEP) portions of the standards?

Materials are common and can be found in most stores. So – when the kids get to do an activity – they will be using materials that are accessible and do not require much specialty (Exception with the spring scales). However, the final mag lev challenge is very difficult and most students would not be familiar with the phenomenon.

To what extent do the materials support Criterion 2B? Include your reasoning.
Overall – I give this a medium score based upon the comments above.

Criterion 2C: 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.

Specific Evidence from Materials
Materials that are used (when the kids get to do a hands-on activity… provide some sense making and challenges. Some very simple (moving blocks) to others that will create interest – Magnet Tricks with Magnets. Floating paperclips on a string using magnets is also a lot of fun. However, there may not be enough materials for some of the activities for the whole class – making group work more challenging. And the use of video teaching and teacher demonstrations complicates matters even more for essential background building. This is an interesting piece – I had to look for a lot of these strategies, but they were in the teacher version of the materials. There are student to student prompts and teacher led questions to get conversations going. These were imbedded. I do believe that there are more current and productive versions of productive student talk available in the research and used by other kits.

This kit has a strong literacy connection that will appeal to many elementary level teachers. However, teaching science is not reading books. I think that this would be very easy to revert to student books, teacher demonstrations and videos to do the majority of the teaching and then throw in a few hands-on activities. I prefer more of a hands-on approach first with sense making with multiple modalities to follow up approach.

To what extent do the materials support Criterion 2C? Include your reasoning.
This is a tough one – again – I would give an average score – I think that teachers will like the literacy based approach, but more emphasis on hands-on learning and constructing knowledge first hand via activities should be more prominent – over the reading, videos, and teacher demonstrations.

Criterion 2D: 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 children at home.

Specific Evidence from Materials
This section is a difficult one due to the curriculum utilizing more traditional approaches to learning. The kit does use a phenomenon (Mag lev trains), but then only about 50% of the learning comes from hands-on investigations. Much of the materials will be learned from video, teacher demonstrations and supported with the student readers. Lots of opportunities for students to learn misconceptions about the phenomenon – especially with one of the activities labeled “Magnetic Tricks” – Bad connection to Nature of Science using science “tricks”! There are strategies for differentiated instruction. However, responding to MLL strategies – the strategies utilized are more traditional and do not use the most recent research (NASEM report – ELL in Science Subjects). There is front loading of vocabulary – strong emphasis on vocabulary rather than on sense-making. Some strategies are more simplifications rather than re-working materials so that it is comprehensible for Els. Also – I did not see books in Spanish – although I am sure that you can get them. (I asked Ellen about this).

There are resources for teachers to learn about the content and I believe that there are some extensions for personal learning. I do know that Amplify does outreach and PD. Not sure what the cost is or how this will be aligned to the adoption (I could say this about all of the kits being reviewed).

There are some family supports and some things to take home to the family – although not in the hands-on activities portion – this would be a teacher innovation and extension. I think that family supports should include hands-on investigations to take home and explore with the family. This kit uses readings, worksheets and a few other resources for family engagement.

To what extent do the materials support Criterion 2D? Include your reasoning.
I am surprised that the Lawrence Hall has not done better in this category with this curriculum. They are a leader in some of the diversity research and associated teaching strategies to reach all students. IT feels as though this is still building in this curriculum as compared to FOSS. Low average score.

Category 3: Student Materials

Criterion 3A: 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.
- Materials have resources both in print and online.
- Multimedia supports are included such as videos, tutorials and simulations.
- Technology options are appropriate for both classroom and home use.

Specific Evidence from Materials
There are 5 modules to the Balancing Forces unit: The following are hands-on – where as the rest are teacher led activities, videos, demonstrations and readings. Hands-on Components: 1.2 – Moving blocks, 1.4 – creating forces in chain reactions 2.1 – Non touch forces, 2.2 Magnet forces, 2.3 Magnet tricks, 3.1 – Investigating Gravity, 3.3 – exploring forces in chain reactions 4.1 – touch forces – gravity, 4.2 – floating paperclips, 4.4 modeling floating train (on paper) 5.4 – modeling a floating train

Due to the amount of content being covered in this one kit – and the correlation to teaching minutes within 3rd grade science – I believe that this activities are too shallow to cover the extent of knowledge that is required to build a mag lev train for third graders. They can build one – just not understand the science behind it – thus making room for a lot of misconceptions rather than sense making about forces.

I am sure that this comes in Spanish – but there were no materials in Spansh in the box.

There are some graphic organizers and lots of online supports that can be downloaded from the web.

Plenty of resources available in print, but more available online – this may be daunting for teachers.

Plenty of multimedia supports, but how accurate are they – the video of the mag lev train is a cartoon – making the resource not very good for students in understanding a phenomenon that they have never seen.

Lots of Tech support (I did not explore all of this).

To what extent do the materials support Criterion 3A? Include your reasoning.
So – about 50% hands-on and the rest is to be delivered via teacher discussions, demonstrations, videos, student readers etc. I think more hands-on components would easily be built out from this kit. Low-Average score

Criterion 3B: 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.

Specific Evidence from Materials
For the hands-on investigation (about 10 of them) there are enough materials for group work situations. For the rest of the kit – the answer is no – like one set-up for an electro magnet that the teacher demonstrates – and is within the 4th grade standards?

Most of the materials are what you would expect for this type of a curriculum. Wood blocks, paperclips, strings etc. can be purchased anywhere. Magnets and spring scales may require more specialized purchasing. So – some materials will last and others will not.

The materials include the devices for simple measurement for this kit. Spring scales are used to quantify pulling forces. Other materials use more observational measurements – that are appropriate for the grade level. There are rulers as well. I suppose that this is satisfactory for the activities presented which are very simple for the most part – until you get to the model of the train.

To what extent do the materials support Criterion 3B? Include your reasoning.
The materials in this kit are pretty average for this type of kit. My concern is more with the 50% of activities and more reliance on other ways of learning required to build the train.

Criterion 3C: 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, 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.

Specific Evidence from Materials
Amplify started as a reading curriculum – so the reading component is built out pretty well in this kit series. There are a range of text types – including non-fiction readers. There are plenty of reading supplements available online and in the teacher materials. The text approach is a front load strategy in both the activities and readings. This is a traditional approach to academic vocabulary learning that is pretty much obsolete according to the NASEM (2018) Els in STEM subects report. More emphasis on sense-making and using whatever verbiage is available for the students (including first language) needs to be further developed in this series in order to reach all students.

Diversity – looking only at the pictures used in the readers only about 50% show diverse students and role models. Many of the scientists are still in lab coats and most male. I think this would be much better by now. As mentioned above – Amplify used to be a reading program – so there are a ton of reading supplements and supports and the activities feel as though they have been thrown in where convenient. When I compare this to FOSS – there really is a large difference to an activity first approach with content supports built to match vs a reading first with a few activities to support the learning.

To what extent do the materials support Criterion 1A? Include your reasoning.
Again – an average score here…

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

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