Science Evaluation Tool

2020 Curricular Materials Review- Comprehensive Programs

Grades K-12 Idaho adapted Primary Evaluation of Essential Criteria (PEEC)[[1]](#footnote-1)

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**Instructions:**

Publishing Company:

* Complete the evaluation form below. Please provide written justification as to how the material meets the standard along with location references. If a justification requires additional space, please submit response on an additional document.

Review Team Member:

* Please use associated information and attachments to complete the evaluation form.
* Explain any discrepancies between your findings and those provided. Explanations and comments should directly reflect the rubric.
* Further explain any findings.

**Introduction**

PEEC was explicitly and specifically designed to evaluate materials created for the NGSS. The innovations that are part of these standards are fundamentally rooted in the Framework. This means that states and districts, like or in Idaho, that did not adopt the NGSS, but that adopted standards based on the three dimensions of the Framework should also be able to use it to evaluate instructional materials that are developed for these key innovations. For example, Idaho Science Content Standards use the title supporting content (SC) to refer to disciplinary core idea (DCI) found in NGSS.

The Primary Evaluation of Essential Criteria (PEEC) is used to help determine the degree to which instructional materials are designed to meet the current science instructional practices. High quality instructional materials are a critical component of implementing these practices. PEEC is designed to:

* Bring clarity to the complicated process of selecting instructional materials;
* Help educators to focus on the critical innovations within best current instructional practices via a process to dig deeply into instructional materials programs to evaluate their presence; and
* Answer the question “How thoroughly are these science instructional materials programs designed for the best current instructional practices?”

The five NGSS innovations are:

1. **Making Sense of Phenomena and Designing Solutions to Problems.** Making sense of phenomena or designing solutions to problems drives student learning.
2. **Three-Dimensional Learning**. Student engagement in making sense of phenomena and designing solutions to problems requires student performances that integrate grade-appropriate elements of the Science and Engineering Practices (SEPs), Crosscutting Concepts (CCCs), and Supporting Content (SC) in instruction and assessment.
3. **Building K-12 Progressions**. Students’ three-dimensional learning experiences are designed and coordinated over time to ensure students build understanding of all three dimensions of the standards, nature of science concepts, and engineering as expected by the standards.
4. **Alignment with English Language Arts and Mathematics**. Students engage in learning experiences with explicit connections to and alignment with English language arts (ELA) and mathematics standards.
5. **All Standards, All Students**. Science instructional materials support equitable access to science education for all students.

## Why PEEC?

PEEC takes the compelling vision for science education as described in A Framework for K–12 Science Education and embodied in the NGSS and operationalizes it for two purposes:

1. To help educators determine how well instructional materials under consideration have been designed for the Framework and NGSS; and
2. To help curriculum developers construct and write science instructional materials that are designed for the Framework and NGSS.

The NGSS do not shy away from the complexity of effectively teaching and learning science. They challenge us to shift instructional materials to better support teachers as they create learning environments that support all students to make sense of the world around them and design solutions to problems. This vision is summarized in the following paragraph from the Framework:

*By the end of the 12th grade, students should have gained sufficient knowledge of the practices, crosscutting concepts, and core ideas of science and engineering to engage in public discussions on science-related issues, to be critical consumers of scientific information related to their everyday lives, and to continue to learn about science throughout their lives. They should come to appreciate that science and the current scientific understanding of the world are the result of many hundreds of years of creative human endeavor. It is especially important to note that the above goals are for all students, not just those who pursue careers in science, engineering, or technology or those who continue on to higher education.*

This vision is not only aspirational; it is based on scientific advances and educational research about how students learn science. This research and resulting vision for science education have implications for instructional materials that reach far beyond minor adjustments to lessons, adding callout boxes to margins, crafting a few new activities, or adding supplements to curriculum units. The advances in the NGSS will be more successfully supported if entire science instructional materials programs are designed with the innovations described by this evaluation tool and if states, districts, and schools use this tool to ensure that the materials they choose really measure up.

The word “designed” is intentionally and deliberately used here—and throughout the PEEC materials—instead of “aligned.” This choice was made because alignment has come to represent a practice that is insufficient to address the innovations in these standards.

When new standards are released, educators traditionally create a checklist or map in order to determine how well their instructional materials match up with the standards. If enough of the pieces of the standards match up with the pieces in the lessons or units or chapters, the instructional materials are said to be “aligned.” In this sense, “alignment” is primarily correlational and, if the correlation is not high enough, the only shift that is needed is to add additional materials or remove particular pieces. This traditional approach to alignment assumes that (1) matching content between the language of the standards and the instructional materials is sufficient for ensuring that students meet the standards, and (2) that all approaches to the way instructional experiences are designed in materials are created equally as long as the content de-scribed by the standards appears.

However, the innovations of the Framework and NGSS cannot be supported by instructional materials that simply have the same pieces and words as the standards. In the NGSS, academic goals for students are stated as performance expectations that combine disciplinary core ideas, crosscutting concepts, and science and engineering practices. The nature of this multidimensional combination is as important as the presence of the constituent components, and has implications for how students build the knowledge and skills needed to be able to meet multidimensional standards. Thus, the word “designed” was chosen because it reflects the degree to which the innovations represented by the standards are a foundational aspect of both the design and content the instructional materials.

This focus on these innovations speaks to the second purpose of PEEC: to support authors and curriculum developers as they work to produce instructional materials for the NGSS. This sup-port began with NGSS Appendix A (The Conceptual Shifts in the Next Generation Science Standards), and was soon followed by the first version of the Educators Evaluating the Quality of Instructional Products (EQuIP) Rubric for Science that described what these shifts looked like in instructional materials at the lesson and unit level. The EQuIP Rubric for Science has been successively revised based on extensive use and feedback, and is now in its third version. The les-sons from EQuIP process have been further articulated and codified to form the NGSS Innovations section of PEEC. While different from the “Publisher’s Criteria” that were developed for the Common Core State Standards in scope, format, and structure, the core intent of the innovations is similar: to help curriculum developers and curriculum users think about how the standards should manifest themselves in instructional materials by focusing on the aspects that are most central to meeting the demands of the NGSS and most different from traditional approaches to standards, instruction, and materials. The goal is to help developers more easily create and refine instructional materials, and to do so knowing that their efforts are focused on the same innovations that schools, districts, and states will be using to select instructional materials for use.

## Prior to Evaluation

Assemble all previously identified materials necessary for the evaluation. In addition, each evaluator should have a reference copy of the:

* [Standards-Idaho Science Content Standards](http://www.sde.idaho.gov/academic/shared/science/ICS-Science-Legislative.pdf)
* [Primary Evaluation of Essential Criteria (PEEC) for Next Generation Science Standards Instructional Materials Design pgs. 10-29](https://www.nextgenscience.org/sites/default/files/PEEC%201.1%20Final_0.pdf" \o "PEEC)
* [Glossary](file:///C:\Users\kbrady\AppData\Local\Microsoft\Windows\Temporary%20Internet%20Files\Content.Outlook\Glossary.pdf)
* Shifts represented in the 2018 science Idaho content standards relative to previous versions:
  + Science and Engineering Practices and Crosscutting Concepts are integrated throughout the Performance Standards (K-12) and are the *driving force* for instructional practices, not content domain.
  + Fewer Performance Standards and Supporting Content topics allow deeper understanding and exploration.
  + Phenomenon and project/problem based learning and instructional models best correlate with the Performance Standards and state assessment.
  + In preparation for middle school and high school courses, specific content concepts are taught at specific grade levels, K-5.

PEEC is an extensive process for schools, districts, or other teams of teachers to use to evaluate aspects of instructional materials. The PEEC evaluation process involves three successive phases. Idaho will only be completing the program-level evaluation phase.

# evaluation Form

## Category 1: Making Sense of Phenomena and Designing Solutions to Problems

**Category 1**

This tool is to be used to collect evidence and make claims about how instructional materials provide opportunities for students to make sense of phenomena and design solutions to problems.

### Directions:

Record evidence of where the category has clearly been incorporated into the materials and instances where it does not appear to have been incorporated. Check evidence that applies and provide page numbers, a brief description of the evidence, and an explanation of how it either supports or contradicts the claim.

#### Claim 1:

From the student’s perspective, most learning experiences are focused on making sense of phenomena and designing solutions to problems.

**Evidence:**

Materials have meaningful and relevant phenomena or problems as the central component for learning experiences throughout the materials.

Students have opportunities to use appropriate SEPs and CCCs to make sense of phenomena and/or to design solutions.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

#### Claim 2:

Guidance is provided to teachers to support students in making sense of phenomena and designing solutions to problems.

**Evidence:**

One phenomena/problem or a series of related phenomena/problem drive instruction and help maintain a focus for all the lessons in a sequence.

Guidance is provided to the teacher for how each of the lessons supports students in explaining the phenomena or solving the problem.

Teaching strategies are provided to use student sense-making and solution-designing as a mechanism for making their three-dimensional learning visible.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

### Summary and Recommendations

1. Based on the evidence collected, to what degree do the materials incorporate this category over the course of the program?

Materials incorporate the category.

Materials partially incorporate the category.

Materials do not incorporate the category.

1. Reviewer Notes/Comments:
2. If this category is only partially incorporated, suggest additional professional learning or other support that would be needed for teachers to use the materials in a way that incorporated the innovation in their instruction.

## Category 2: Three-Dimensional Learning

**Category 2**

This tool is to be used to collect evidence and make claims about how instructional materials address three-dimensional learning.

### Directions:

Record evidence of where the category has clearly been incorporated into the materials and instances where it does not appear to have been incorporated. Check evidence that applies and provide page numbers, a brief description of the evidence, and an explanation of how it either supports or contradicts the claim.

#### Claim 1:

Student sense-making of phenomena and/or designing of solutions requires student performances that integrate grade-appropriate elements of the SEPs, CCCs, and SC.

**Evidence:**

All three dimensions of science instruction purposefully integrated throughout the learning materials and phenomenon.

Learning experiences are designed to allow and encourage students to engage in scientific practices to develop a deeper understanding of each of the three dimensions.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

#### Claim 2:

Teacher materials communicate the deliberate and intentional design underpinning the selection of three-dimensional learning goals across the program.

**Evidence:**

Teacher materials clearly identify which elements of the three dimensions are targeted by a lesson or unit. However, there is no limit to the intersection and integration of the three dimensions.

Teacher materials clearly indicate how student progress is measured across the three dimensions.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

#### Claim 3:

Student materials include accessible and unbiased formative and summative assessments that provide clear evidence of students’ three-dimensional learning.

**Evidence:**

Materials regularly elicit direct, observable evidence of three-dimensional learning (SEP, SC, CCC);

Materials include authentic and relevant tasks that require students to use appropriate elements of the three dimensions;

Provide a range of item formats, including construct-response and performance tasks, which are essential for the assessment of three-dimensional learning consonant with the framework and the NGSS.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

#### Claim 4:

Over the course of the program, a system of assessments coordinates the variety of ways student learning is monitored to provide information to students and teachers regarding student progress for all three dimensions of the standards.

**Evidence:**

Consistent use of pre-, formative, summative, self- and peer-assessment measures that assess three-dimensional learning;

Consistent support for teachers to adjust instruction based on suggested formative classroom tasks; and

Support for teachers and other leaders to make program-level decisions based on unit, interim, and/or year-long summative assessment data.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

#### Claim 5:

When appropriate, links are made across the science domains of life science, physical science, and Earth and space science.

**Evidence:**

Disciplinary core ideas from different disciplines are used together to explain phenomena.

The usefulness of crosscutting concepts to make sense of phenomena or design solutions to problems across science domains is highlighted.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

### Summary and Recommendations

1. Based on the evidence collected, to what degree do the materials incorporate this category over the course of the program?

Materials incorporate the category.

Materials partially incorporate the category.

Materials do not incorporate the category.

1. Reviewer Notes/Comments:
2. If the category is only partially incorporated, suggest additional professional learning or other support that would be needed for teachers to use the materials in a way that incorporated the innovation in their instruction.

## Category 3: Building Progressions

**Category 3**

This tool is to be used to collect evidence and make claims about how instructional materials address building progressions.

### Directions:

Record evidence of where the category has clearly been incorporated into the materials and instances where it does not appear to have been incorporated. Check evidence that applies and provide page numbers, a brief description of the evidence, and an explanation of how it either supports or contradicts the claim.

#### Claim 1:

Students engage in the science and engineering practices with increasing, grade-level appropriate complexity over the course of the program.

**Evidence:**

Materials have increased complexity of science and engineering practices between units.

Learning experiences build on prior understanding and do not assume students are starting their understanding from scratch.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

## Claim 2:

Students utilize the crosscutting concepts with increasing grade-level appropriate complexity over the course of the program.

**Evidence:**

Explicit connections made between students foundational knowledge and experiences from prior grade levels.

Learning experiences build on prior understanding and do not assume students are starting their understanding from scratch.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

## Claim 3:

The disciplinary core ideas are presented in a way that is scientifically accurate and grade-level appropriate.

**Evidence:**

Materials reference grade-level appropriate content as found in Idaho Content Standards.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

## Claim 4:

Teacher materials make it clear how each of the three dimensions builds progressively over the course of the program in a way that gives students multiple opportunities to demonstrate proficiency in the breadth of the performance expectations addressed in the program.

**Evidence:**

Teacher materials explain how the elements of the practices are mapped over the course of the instructional program.

Teacher materials describe how the learning sequence builds on prior learning.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

## Claim 5:

Each unit builds on prior units by addressing questions raised in those units, cultivating new questions that build on what students figured out, or cultivating new questions from related phenomena, problems, and prior student experiences.

**Evidence:**

For each of the units, look at the transitions into and out of the units. Are the units linked together from a student’s perspective?

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

## Claim 6:

Teacher materials clearly explain the design principles behind the sequencing of the storyline.

**Evidence:**

Teacher materials explain design principles used to integrate the dimensions throughout the unit.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

## Claim 7:

Student materials engage students with the nature of science and engineering, technology, and applications of science over the course of the program.

**Evidence:**

Learning experiences connect engineering design and the nature of science with the three dimensions.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

## Claim 8:

Teacher materials make connections to the nature of science, engineering, technology, and applications of science over the course of the program.

**Evidence:**

Support materials describe thehow learning connect engineering design and the nature of science with the three dimensions.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

### Summary and Recommendations

1. Based on the evidence collected, to what degree do the materials incorporate this category over the course of the program?

☐ Materials incorporate the category.

☐ Materials partially incorporate the category.

☐ Materials do not incorporate the category.

1. Reviewer Notes/Comments:
2. If the category is only partially incorporated, suggest additional professional learning or other support that would be needed for teachers to use the materials in a way that incorporated the innovation in their instruction.

Category 4: Alignment with English Language Arts and Mathematics

***Category 4***

*This tool is to be used to collect evidence and make claims about how instructional materials align with English Language Arts and Mathematics.*

**Directions:**

Record evidence of where the category has clearly been incorporated into the materials and instances where it does not appear to have been incorporated. Check evidence that applies and provide page numbers, a brief description of the evidence, and an explanation of how it either supports or contradicts the claim

Claim 1:

Materials engage students with English language arts in developmentally appropriate ways that support state English language arts standards.

**Evidence:**

Learning experiences explicitly and intentionally connect to ELA learning in meaningful, real world, grade-appropriate and substantive ways.

***Explain Evidence*** *using page numbers, brief descriptions, and additional information:*

**Rating:**

None

Inadequate

Adequate

Extensive

Claim 2:

Materials engage students with mathematics in developmentally appropriate ways that support state mathematics standards.

**Evidence:**

Learning experiences explicitly and intentionally connect to mathematical learning in meaningful, real world, grade-appropriate and substantive ways.

***Explain Evidence*** *using page numbers, brief descriptions, and additional information:*

**Rating:**

None

Inadequate

Adequate

Extensive

Claim 3:

Teacher materials make connections to state mathematics and English language arts standards and incorporate teaching strategies that support this student learning where appropriate.

**Evidence:**

Support materials highlight connections to state mathematics and English language arts standards and incorporate teaching strategies that support student learning where appropriate.

***Explain Evidence*** *using page numbers, brief descriptions, and additional information:*

**Rating:**

None

Inadequate

Adequate

Extensive

### Summary and Recommendations

1. Based on the evidence collected, to what degree do the materials incorporate this category over the course of the program?

☐ Materials incorporate the category.

☐ Materials partially incorporate the category.

☐ Materials do not incorporate the category.

1. Reviewer Notes/Comments:
2. If the category is only partially incorporated, suggest additional professional learning or other support that would be needed for teachers to use the materials in a way that incorporated the innovation in their instruction.

Category 5: All Students, All Standards

***Category 5***

*This tool is to be used to collect evidence and make claims about how instructional materials address All Standards, All Students.*

**Directions:**

Record evidence of where the category has clearly been incorporated into the materials and instances where it does not appear to have been incorporated. Check evidence that applies and provide page numbers, a brief description of the evidence, and an explanation of how it either supports or contradicts the claim.

Claim 1:

Students have substantial opportunities to express and negotiate their ideas, prior knowledge, and experiences as they are using the three dimensions of the NGSS to make sense of phenomena and design solutions to problems.

**Evidence:**

Phenomena, problems and other learning experiences are designed to include opportunities for students to express, negotiate and connect their ideas with prior knowledge and experiences.

Learning experiences allow students of diverse needs, abilities and approaches to make progress towards common learning goals

Learning experiences are relevant and authentic to a range of student backgrounds and interest.

***Explain Evidence*** *using page numbers, brief descriptions, and additional information:*

**Rating:**

None

Inadequate

Adequate

Extensive

Claim 2:

Teacher materials anticipate common student ideas and include guidance to surface and challenge student thinking.

**Evidence:**

Support materials give examples of anticipated or common student approaches to thinking.

Support materials give examples of questioning or strategies to illicit, guide, and challenge student thinking.

***Explain Evidence*** *using page numbers, brief descriptions, and additional information:*

**Rating:**

None

Inadequate

Adequate

Extensive

Claim 3:

Materials provide suggestions for how to attend to students’ diverse skills, needs, and interests in varied classroom settings.

**Evidence:**

Appropriate reading, writing, listening, and/or speaking alternatives (e.g., translations, picture support, graphic organizers, etc.) are available for students who are English learners, have special needs, or read well below the grade level.

Materials provide extra support (e.g., phenomena, representations, tasks) for students who are struggling to meet the targeted expectations.

Materials have extensions for students with high interest or who have already met the performance expectations to develop deeper understanding of the practices, supporting content, and crosscutting concepts.

**Explain Evidence** using page numbers, brief descriptions, and additional information:

**Rating:**

None

Inadequate

Adequate

Extensive

### Summary and Recommendations

1. Based on the evidence collected, to what degree do the materials incorporate this category over the course of the program?

☐ Materials incorporate the category.

☐ Materials partially incorporate the category.

☐ Materials do not incorporate the category.

1. Reviewer Notes/Comments:
2. If the category is only partially incorporated, suggest additional professional learning or other support that would be needed for teachers to use the materials in a way that incorporated the innovation in their instruction.

For Questions Contact

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1. (Achieve, 2017) [↑](#footnote-ref-1)