

NEXT GENERATION SCIENCE STANDARDS: PRIMARY EVALUATION OF ESSENTIAL CRITERIA FOR ALIGNMENT

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INTRODUCTION

In April 2013, release of the [Next Generation Science Standards](#) (NGSS) set new priorities for science education in the United States. The NGSS and the National Research Council’s (NRC) [A Framework for K-12 Science Education](#), on which the NGSS were based, describe a vision of science education that is based on scientific advances and [educational research](#). This research and resulting vision for science education have implications for instructional materials that reach far beyond minor adjustments to lessons, a few new activities, and supplements to curriculum units. The innovations implied by the NGSS must be accommodated by changes to entire science instructional programs.

A prior document, the [Educators Evaluating the Quality of Instructional Products \(EQuIP\) NGSS Rubric](#), provided criteria by which to measure the alignment and quality of *individual lessons and units* with respect to the NGSS. In contrast, the following discussion was designed to accompany the EQuIP rubric and to additionally present criteria and processes that can be used to evaluate the NGSS alignment of *entire school*

science programs — that is, school curriculum, textbooks, and support materials for teachers that are designed for both year-long and K–12 education. The goal of this document is to describe some critical components of school science programs that are aligned with the NGSS.

Shifting school programs to support the implementation of the NGSS will require many changes. The best response to this challenge would be to design brand new school science programs. This approach has the potential of developing a full school science program that most closely meets the vision described in [A Framework for K-12 Science Education](#), the innovations set forth in the NGSS, and the recommendations from the foundational research. Although ideal, this approach has short term constraints of budget, time, and capacity to develop quality programs.

An alternative response to the short term needs is to adapt current instructional materials to incorporate the innovations described in the NGSS. This approach may address constraints of budget and time, but it may be significantly limited by the design of current programs and the degree to which the materials constituting those programs can be adapted to meet the NGSS.

Regardless of the approach, the first step is to thoroughly examine the differences between current science programs and those that are NGSS aligned. That is the primary emphasis of the following discussion.

REVIEWING INSTRUCTIONAL MATERIALS WITH PRIMARY EVALUATION OF ESSENTIAL CRITERIA FOR ALIGNMENT (PEEC- ALIGNMENT)

First, a few words about PEEC-Alignment. The acronym is intentionally a play on words. In one sense, the evaluation is a peek, or a quick look at a program. In another sense, this document describes a peak, the highest point, principal, or most important features of NGSS-aligned programs. PEEC-Alignment is designed to achieve both of these important goals.

Before conducting a complete and likely time-consuming review, it is most efficient to get a sense of the issues and make a decision about the need for a thorough and complete review.

This document is meant to help reviewers answer the question: “Does the program under review contain or exhibit the essential features of an NGSS-based program?” For this goal, PEEC-Alignment centers on the innovations set forth in the NGSS and their implications for instructional materials. If the program under review does not incorporate the most primary innovations set forth in the NGSS, then there is little need to conduct a full, detailed review to determine if materials are fully aligned to the NGSS. In other words, PEEC-Alignment is only meant to be an evaluation of NGSS alignment. There are many additional criteria for quality instructional materials that are not listed in this document. The omission is not because they are not critical criteria, but merely because they are not unique to NGSS-aligned materials. Existing lists of essential criteria for quality instructional materials can and should be added to those in this document to help complete a more comprehensive review process if materials pass a screen with the PEEC-Alignment.

PEEC-Alignment can be used to evaluate a comprehensive science program (e.g., a school program based on different units), kit-based instructional materials (e.g., a kit program for elementary science), textbooks (e.g., a middle school Earth science textbook), or textbook series (e.g., a K–6 elementary program) to determine the degree to which they align with the NGSS. The target materials can include full programs (e.g., spanning several grade levels), year-long courses (e.g., high school biology), and support materials in print or digital formats. However, evaluation of programs that are built from several different sources (e.g., a combination of textbooks, kits, and digital supplements) will often be more challenging if there is not clear guidance for how the different components will be used together in classrooms.

PEEC-Alignment is designed for publishers, curriculum developers, educators, and administrators responsible for developing, revising, selecting, or purchasing comprehensive programs, textbooks, or textbook series based on the NGSS.

PEEC-Alignment can be used by publishers as:

- Standards-alignment specifications for designing a new comprehensive NGSS-based program; or
- Indications of changes required for the revision of a current program.

PEEC-Alignment can be used by educators for:

- Aiding decisions about the review, selection, and purchasing of school science textbooks, textbook series, and instructional materials that represent comprehensive programs; or
- Evaluation of current materials to identify adaptations and modifications to increase alignment with the NGSS.

Beginning on page 22, the accompanying Appendix describes and guides the PEEC-Alignment review process. The primary innovations from the *Framework* and the NGSS along with their implications for instructional materials and school programs are described below. However, this document does not substitute for the breadth and depth of information contained in the NGSS and the *Framework*, and a thorough knowledge of these documents is necessary before attempting to apply the PEEC-Alignment process to instructional materials.

NGSS INNOVATIONS

The architecture of the NGSS differs significantly from prior standards for science education. In the NGSS, the three dimensions of Science and Engineering Practices (SEPs), Disciplinary Core Ideas (DCIs), and Crosscutting Concepts (CCCs) are crafted into performance expectations that describe what is to be assessable following instruction. The NGSS performance expectations are therefore a measure of competency. The foundation boxes for each of the three dimensions provide additional information and clarity for the design or redesign of school programs.

Figure 1. Example of NGSS Architecture for Standards

2-PS1-1 Matter and Its Interactions		
Students who demonstrate understanding can:		
2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]		
The performance expectation above was developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> :		
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. <ul style="list-style-type: none"> Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. 	PS1.A: Structure and Properties of Matter <ul style="list-style-type: none"> Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. 	Patterns <ul style="list-style-type: none"> Patterns in the natural and human designed world can be observed.
Connections to other DCIs in second grade: <i>N/A</i>		
Articulation of DCIs across grade-levels:		
5.PS1.A		
Common Core State Standards Connections:		
<i>ELA/Literacy</i> —		
W.2.7	Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-1)	
W.2.8	Recall information from experiences or gather information from provided sources to answer a question. (2-PS1-1)	
<i>Mathematics</i> —		
MP.4	Model with mathematics. (2-PS1-1)	
2.MD.D.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-PS1-1)	

A comprehensive program should provide opportunities for students to develop their understanding of DCIs through their engagement in SEPs and their application of CCCs. This three-dimensional learning leads to eventual mastery of performance expectations. In this perspective, a quality program should clearly describe or show how the cumulative learning experience works coherently with previous and following experiences to build scientific literacy.

The following innovations in the NGSS are hallmarks of current thinking about how students learn science, and they set a vision for future science education. These innovations will not only cause a shift in instructional programs in American classrooms but should also affect and refocus the efforts of curriculum developers and the design of comprehensive school science programs.

Innovation 1: K–12 science education reflects three-dimensional learning.

In the NGSS, science is described as having three distinct dimensions, each of which represents equally important learning outcomes: (1) SEPs, (2) DCIs, and (3) CCCs (The Next Generation Science Standards 2013). The NGSS expectations for students include making connections among all three dimensions. Students develop and apply the skills and abilities described in the SEP, as well as learn to make connections between

different DCIs through the CCC to help gain a better understanding of the natural and designed world. Current research suggests that both knowledge (DCIs and CCCs) and practice (SEPs) are necessary for a full understanding of science.

Each NGSS standard integrates one specific SEP, CCC, and DCI into a performance expectation that details what students should be proficient in by the end of instruction. In past standards the separation of skills and knowledge often led to an emphasis (in both instruction and assessment) on science concepts and an omission of inquiry and practices. It is important to note that the NGSS performance expectations do not specify or limit the intersection of the three dimensions in classroom instruction. Multiple SEPs, CCCs, and DCIs that blend and work together in several contexts will be needed to help students build toward competency in the targeted performance expectations. For example, if the end goal (the performance expectation) for students is to plan an investigation to determine the causes and effects of plant growth (2-LS2-1), they can build toward this goal through asking good questions about patterns that they have seen in plant growth and engaging in argument about what kinds of data would be important to collect in an investigation to answer these questions.

It should also be noted that one performance expectation should not be equated to one lesson. Performance expectations define the three-dimensional learning expectations for students, and it is unlikely that a single lesson would provide adequate opportunities for a student to demonstrate proficiency in every dimension of a performance expectation. A series of high-quality lessons or a unit in a program are more likely to provide these opportunities.

For more information about these three dimensions, see the NRC *Framework*, [pages 29-33](#). Evaluating materials for three-dimensional learning is described in the [EQuIP professional development module 6](#). Three-dimensional assessment of student learning is described in the document [Developing Assessments for the Next Generation Science Standards](#) (NRC 2014).

School programs must change:

From: providing discrete facts and concepts in science disciplines, with limited application of practice or the interconnected nature of the disciplines. Where crosscutting

themes were included, they were implicit and not noticed or used by the student. Assessments within the programs exclusively addressed disciplinary concepts of science; neither the processes, inquiry, or SEPs nor the CCCs, unifying themes, or big ideas were included in the assessments.

To: providing learning experiences for students that blend multiple SEPs, CCCs, and DCIs — even those SEPs, CCCs, and DCIs not specified within the targeted performance expectations — with the goal that students are actively engaged in scientific processes to develop an understanding of each of the three dimensions. CCCs are included explicitly, and students learn to use them as tools to make sense of phenomena and make connections across disciplines. Assessments within the programs reflect each of the three distinct dimensions of science and their interconnectedness.

Innovation 2: Students engage in explaining phenomena and designing solutions.

In educational programs aligned to the NGSS, the goal of instruction is not solely for students to memorize content. Content becomes meaningful to students when they see its usefulness — when they need it to answer a question. Therefore, in programs aligned to the NGSS, an important component of instruction is to pique students' curiosity to help them see a need for the content.

The ultimate goal of an NGSS-aligned science education is for students to be able to explain real-world phenomena and to design solutions to problems using their understanding of the DCIs, CCCs, and SEPs. Students also develop their understanding of the DCIs by engaging in the SEPs and applying the CCCs. These three dimensions are tools that students can acquire and use to answer questions about the world around them and to solve design problems.

School programs must change:

From: focusing on disconnected topics, with content treated as an end in itself.

To: focusing on engaging students with meaningful phenomena or problems that can be explained or solved through the application of SEPs, CCCs, and DCIs. Instructional units that focus on students explaining relevant phenomena can provide the motivation students need to become invested in their own learning.

Innovation 3: The NGSS incorporate engineering design and the nature of science as SEPs and CCCs.

The NGSS include engineering design (see Appendices [I](#) and [J](#)) and the nature of science (see [Appendix H](#)) as significant elements. Some of the unique aspects of engineering design (e.g., identifying and designing solutions for problems), as well as common aspects of both science and engineering (e.g., designing investigations and communicating information), are incorporated throughout the NGSS as expectations for students from kindergarten through high school. In addition, unique aspects of the nature of science (e.g., scientific investigations use a variety of methods; scientific knowledge is based on empirical evidence; science is a way of knowing; science is a human endeavor) are included as SEPs and CCCs throughout the grade bands.

School programs must change:

From: presenting engineering design and the nature of science as supplemental or as disconnected from science learning (e.g., design projects that do not require science knowledge to complete successfully), with neither included in assessments.

To: incorporating learning experiences that include the DCIs of engineering design as well as the SEPs and CCCs of both engineering and the nature of science, with both included in assessments. Both engineering design and the nature of science are taught in an integrated manner with science disciplines (e.g., design projects require science knowledge in order to develop a good solution; the engineering process contributes to building science knowledge).

Innovation 4. SEPs, DCIs, and CCCs build coherent learning progressions from kindergarten to grade 12.

The NGSS provide for sustained opportunities from elementary through high school for students to engage in and develop a progressively deeper understanding of each of the three dimensions. Students require coherent learning progressions both within a grade level and across grade levels so they can continually build on and revise their knowledge to expand their understanding of each of the three dimensions by grade 12.

See NGSS appendices [E](#), [F](#), and [G](#) for more information about the learning progressions for each dimension and how they build over time.

School programs must change:

From: a curriculum that lacks coherence in knowledge and experiences; provides repetitive, discrete knowledge that students memorize at each grade level; and often misses essential knowledge that has to be filled at later grade levels.

To: providing learning experiences for students that develop a coherent progression of knowledge and skills from elementary through high school. The learning experiences focus on a smaller set of disciplinary concepts that build on what has been learned in previous grades and provide the foundation for learning at the next grade span as detailed in the NGSS learning progressions.

Innovation 5. The NGSS connect to English language arts (ELA) and mathematics.

The NGSS not only provide for coherence in science teaching and learning but also unite science with other relevant classroom subjects: mathematics and ELA. This connection is deliberate because science literacy requires proficiency in mathematical computations and in communication skills. In fact, there are many inherent overlaps in the mathematics, ELA, and science practices (e.g., [see the Stanford Understanding Language Initiative's Venn diagram](#)). Therefore as the NGSS were being drafted, the writers ensured alignment to and identified some possible connections with the Common Core State Standards for ELA/literacy and mathematics as an example of ways to connect the three subjects. In instruction within the science classroom, mathematical and linguistic skills can be applied and enhanced to ensure a symbiotic pace of learning in all content areas. This meaningful and substantive overlapping of skills and knowledge helps provide all students equitable with access to the learning standards for science, math, and literacy (e.g., see [NGSS Appendix D Case Study 4](#)). The fact that science can be connected to the “basics” should not go unnoticed. Indeed, it presents science as a basic!

School programs must change:

From: providing siloed science knowledge that students learn in isolation from reading, writing, and arithmetic — the historical “basic” knowledge.

To: providing science learning experiences for students that explicitly connect to mathematics and ELA learning in meaningful and substantive ways and that provide broad and deep conceptual understanding in all three subject areas.

Figure 2 summarizes the NGSS innovations and components for the reform of comprehensive school science programs.

Figure 2. NGSS Innovations and Design of Instructional Materials

FROM	TO	CHANGE IN SCHOOL PROGRAMS
Sole focus on discrete content	Integration of three dimensions (SEP, DCI, CCC)	Curriculum, instruction, and assessment
Learning content as the goal of lessons	Explaining phenomena through application of content as the goal of lessons	Curriculum and instruction
Engineering design and/or nature of science as supplemental	Engineering design and nature of science incorporated throughout science programs	Curriculum, instruction, and assessment
Concepts disconnected from prior learning	K–12 learning progressions	Curriculum, instruction, and assessment
Few connections to other subjects	Explicit connections to and alignment with ELA and mathematics	Curriculum and instruction

The implementation of NGSS-based reform has implications for all components of the school program and education system. The next sections discuss implications and recommendations for student materials, teacher materials and support, assessments within instructional materials, and how instructional materials can foster equitable opportunities to learn.

NGSS AND KEY COMPONENTS OF SCIENCE INSTRUCTIONAL MATERIALS

The quality of science instructional materials depends on many different aspects of the materials. This document will not attempt to describe all the important criteria for quality — for example, adherence to accessibility standards for design of student materials is critical but is beyond the scope of this document. Instead, the key components of quality materials listed below are merely a potential second step to a review process that begins with the PEEC-Alignment evaluation. If sufficient evidence is found for the presence of the NGSS innovations in instructional materials, then additional criteria should be considered to aid in an evaluation of quality.

Student Materials

A quotation from the *Framework* sets the stage for this section.

The learning experiences provided for students should engage them with fundamental questions about the world and how scientists have investigated and found answers to those questions. Throughout grades K–12, students should have the opportunity to carry out scientific investigations and engineering design projects related to the disciplinary core ideas. (*A Framework for K-12 Science Education* 2012)

The first sentence makes it clear that the activities in student materials should focus on fundamental questions about real-world phenomena and engage students in SEPs as they develop answers and scientific knowledge related to those questions. Later, the *Framework* introduces the innovations that student instructional materials should incorporate to facilitate student learning of the three dimensions (i.e., SEPs, DCIs, and CCCs) and the processes and products of science and engineering. Here is an example from the *Framework*:

Instructional materials must provide a research-based, carefully designed sequence of learning experiences that develop students’ understanding of the three dimensions and also deepen their insights in the ways people work to seek explanations about the world and

improve the built world. (*A Framework for K-12 Science Education* 2012)

Contemporary themes of focus, rigor, and coherence can be used to summarize key features of high-quality student instructional materials.

Focus: Student materials should focus on the limited number of DCIs in the NGSS, not numerous disconnected factoids and details. Focus should be on the core ideas in the NGSS — those that are most important for all students to learn. This focus will allow more time for students and teachers to explore core ideas in greater depth, so they can engage in SEPs to achieve deeper understanding of real-world phenomena and to explore the practical use of engineering design.

Rigor: Student instructional materials should support rigorous instruction for each of the three dimensions to allow for conceptual understanding, procedural skills, and applications of the NGSS. Knowledge and practice must be intertwined in learning experiences to support the depth of understanding that is needed to engage in scientific inquiry and engineering design. Learning experiences must provide opportunities for thought, discourse, and practice in an interconnected and social context so that students develop deep conceptual understanding and the ability to evaluate knowledge claims.

Coherence: Student materials should provide strong links among the three dimensions of the NGSS within and between each unit, grade level, and grade span for a unified learning experience. Learning experiences should form a progression in which students actively engage in SEPs and apply CCCs to continually build on and revise their knowledge and abilities in each field's DCIs over multiple years. Student materials must provide clear guidance that (1) helps teachers support students' engagement in science and engineering to develop explanations for phenomena and design solutions to problems and (2) helps students develop increasingly sophisticated ideas within a grade level and across grades K–12. Student science learning experiences must also align well to their learning in mathematics and ELA.

Additional key recommendations for student materials include the following:

- A focus on the central idea behind each SEP, CCC, and DCI for the target grade level.

- Support for learning experiences that facilitate three-dimensional learning (i.e., each of the three dimensions is learned in the context of the other two — not on its own). These three-dimensional learning experiences go beyond the specific combination of the three dimensions in an individual performance expectation.
- Learning experiences that are framed by contexts that are engaging and meaningful to the students and are centered on real-world phenomena and design problems.
- Coherent units and instructional sequences that introduce material in a logical manner, without requiring students to use concepts before they have been taught. For example, [NGSS Appendix K](#) describes some sample course arrangements for middle and high school that provide vertical coherence.
- Grade level-appropriate learning experiences that explicitly involve the application of knowledge and skills learned in prior grades or earlier in the year.
- Instructional sequences that provide multiple opportunities and contexts in which to explicitly encounter each idea (including each of the three dimensions) and skill, as well as adequate time to build toward student proficiency as described by the [NGSS Evidence Statements](#) by the end of the year or end of the unit.
- Instructional sequences that have clear purposes for students' experiences (e.g., teach new knowledge, expose current misconceptions, build skills and abilities).
- Learning goals (including for each of the three dimensions) that are explicit for students and provide opportunities for students to reflect on their learning.
- Scientific accuracy and grade-level appropriateness.
- Adherence to safety rules and regulations.
- Thorough materials lists as needed. Such lists should identify expendable and permanent materials needed for both instruction and assessment.

- High-quality (e.g., durable, dependable, functioning as intended) materials, equipment in kits, technological components, or online resources, where applicable.
- Technological system requirements, where applicable.

Teacher Materials and Support

Teacher materials are a fundamental aspect of science classroom instruction. Components of teacher materials typically include annotated student texts, ancillary student materials designed to enhance or remediate, manuals of worksheets, yearly maps of content, suggestions for developing daily lessons, and lists of lab equipment used in the program. These components of the teacher materials have been and will continue to be useful for teachers in planning and supporting their instruction. However, the NRC's *Framework* and the subsequent NGSS have set a new vision of science education for K–12 students. This vision includes defining the knowledge and practices critical for understanding the natural world. The vision set forth by the NGSS and the NRC's *Framework* provides new challenges for those developing teacher materials. One challenge will be how to support teachers as they translate the new ideas into classroom practices. Research recognizes that expert teachers and leaders are perhaps the most important resources for improving student learning (Darling-Hammond 2000). Teacher materials will be necessary in this work but will need to be redesigned to facilitate both teacher understanding and ability to instruct their students.

NGSS-aligned instructional materials must focus on the three dimensions: SEPs, CCCs, and DCIs. Understanding each dimension and how they interact with each other will be critical for teachers as they begin to design instruction that intertwines and builds deeper understanding of the dimensions. Instructional materials developers can aid in increasing understanding of the three dimensions by providing ample annotations and suggestions on how to combine the three dimensions to engage students in developing explanations and constructing conceptual models of the natural world. Carefully planned authentic exploration of phenomena and a wide variety of instructional strategies will enable teachers to provide classroom experiences that will help students experience three-dimensional learning. In addition, the materials will need to develop articulated

conceptual flows or learning progressions of content not only within each grade level but also across grade levels to aid the teacher’s understanding and instruction of the three dimensions.

Some key ideas, strategies, and components to consider in developing instructional materials to aid teachers include the following:

- Grade-appropriate background information for each of the three dimensions and an explanation of how the three disciplines interact within the grade, unit, and lesson levels.
- A detailed yearlong map of the suggested learning progressions that could be used in planning the day-to-day instruction. Additionally, showing how the grade levels connect for coherence and build for greater sophistication of student understanding will be helpful.
- Strategies that include appropriate and integral connections between science and other subject areas (e.g., mathematics, ELA, history/social science, visual and performing arts, career and technical education).
- Guidance on strategies to interweave some of the “hands-on” practices (e.g., carrying out investigations, designing solutions) with science learning activities that use other practices (e.g., asking questions; engaging in argument; obtaining, evaluating, and communicating information) to bring about integrated instructional units.
- Embedded instructional strategies throughout the instructional materials (e.g., scaffolding, note booking, think-pair-share, quick writes, open-ended questioning, cooperative learning, Socratic seminars, direct instruction, small-group instruction).
- Strategies to identify the reason(s) that student may have difficulty in mastering or demonstrating their mastery of the three dimensions of the NGSS.
- Strategies that effectively assess student knowledge and skills related to the three dimensions of the NGSS.
- Strategies including alternative approaches and delivery mechanisms (e.g., computer-based instruction, web-based materials) that will assist in

differentiating instruction to meet the needs of all students (e.g., English language learners, special needs students, advanced learners, struggling students) and adapt to different learning styles.

- Strategies that help identify ways in which activities or learning experiences can be contextualized to the school environment.
- An annotated list of resource materials, both expendable (e.g., cotton balls, pinto beans) and permanent (e.g., lab equipment), that are to be used throughout the program, including possible safety practices and room arrangements.
- Suggestions on types of professional development and learning experiences necessary for successful implementation.

Assessment in Instructional Materials

Classroom assessments are an integral part of instruction and learning and should include both formative and summative tasks. Formative tasks are those that are specifically designed to guide instructional decision making and lesson planning. Summative tasks are those that are specifically designed to assess student learning at the end of an instructional sequence, unit, grade level, or grade band (National Research Council 2014). Curriculum developers, assessment developers, and others who create resource materials aligned to the NGSS should ensure that assessment activities included in materials (such as formative assessment suggestions to teachers, mid- and end-of-chapter activities, tasks for unit assessments, and online activities) engage students in SEPs that demonstrate their understanding of DCIs and CCCs. These assessment materials also should reflect multiple dimensions of diversity (e.g., by connecting with students' cultural and linguistic identities). In designing instructional materials that include formative and summative assessments, development teams should include experts in science, science learning, assessment design, equity, diversity, and science teaching (National Research Council 2014).

Assessment tasks must be designed to provide evidence of students' ability to use the SEPs, to apply their knowledge of CCCs, and to draw on their understanding of DCIs, all in the context of addressing specific problems or answering certain questions

(National Research Council 2014). Instruction and assessments must be designed to support and monitor students as they develop increasing sophistication in their ability to use SEPs, apply CCCs, and understand DCIs as they progress through the year and across the grade levels. An example of creating and assessing these smaller scale learning goals can be found in “Planning Instruction to Meet the Next Generation Science Standards” (Krajcik et al. 2014). Assessment developers should draw on the idea of developing understanding as they structure tasks for different levels and purposes and build this idea into the scoring rubrics for the tasks (National Research Council 2014). Although factual knowledge is fundamental and understanding the language and terminology of science is very important, tasks that demand only declarative knowledge about practices or isolated facts would be insufficient to measure performance expectations in the NGSS (National Research Council 2014).

Effective evaluation of three-dimensional science learning requires more than a one-to-one mapping between the NGSS performance expectations and assessment tasks. It is important to note that more than one assessment task may be required to adequately assess students’ mastery of some performance expectations, and any given assessment task may assess aspects of more than one performance expectation. In addition, to assess both understanding of core knowledge and facility with a practice, assessments may need to probe students’ use of a given practice in more than one disciplinary context. To adequately cover the three dimensions, assessment tasks will generally need to contain multiple components (e.g., a set of interrelated questions). Developers might focus on individual SEPs, DCIs, or CCCs in some components of an assessment task, but together, the components need to support inferences about students’ three-dimensional science learning as described in a given performance expectation. Assessment tasks that attempt to test practices in strict isolation likely will not be as meaningful as assessments of the three-dimensional science learning called for by the NGSS (National Research Council 2014).

Key points regarding classroom assessments to support the NGSS:

- Assessments are aligned with the NGSS; are authentic; and include pre-assessments, formative assessments, summative assessments, and self-monitoring measures.

- Assessments collect data on all three dimensions of the NGSS and on how the students are using the different dimensions in concert with one another.
- Assessments have explicitly stated purposes and are consistent with the decisions they are designed to inform.
- Assessments are embedded throughout instruction materials as tools for students' learning and teachers' monitoring of instruction.
- Assessments reflect only knowledge and skills that have been covered adequately in the instructional materials.
- Assessments use varied methods, language, representations, and examples that are unbiased and accessible to all students and provide teachers with a range of data to inform instruction.

For more information regarding classroom assessment and the NGSS, see the following in the NRC's report, [*Developing Assessments for the Next Generation Science Standards \(2014\)*](#):

- Chapter three provides in-depth information about how to design NGSS-appropriate assessment tasks and includes examples.
- Chapter four illustrates the types of assessment tasks that can be used in the classroom to meet the goals of the NRC's *Framework* and the NGSS.

Equitable Opportunity to Learn in Instructional Materials

The NGSS offer a vision of science teaching and learning that presents both opportunities and demands for ALL students. The NGSS highlight issues related to equity and diversity and offer specific guidance for fostering science learning for diverse groups (see NGSS, [Appendix D](#)). Issues related to equity and diversity become even more important when standards are translated into curricular and instructional materials and assessments. Opportunity to learn is a crucial component in the design of resources and includes instructional time, equipment, materials, and well-prepared teachers.

Instructional resources should support teachers in meeting the needs of diverse students and in identifying, drawing on, and connecting with the advantages their diverse experiences give them for learning science (National Research Council 2014). The focus

on engaging real-world phenomena and design problems offers multiple entry points to build and deepen understanding for all students. The SEPs offer rich opportunities for language learning while they support science learning for all students (National Research Council 2012).

All students bring their own knowledge and understanding about the world when they come to school. Their knowledge and understanding is based on their experiences, culture, and language (National Research Council 2007). Their science learning will be most successful if curriculum, instruction, and assessments draw on and connect with these experiences and are accessible to students linguistically and culturally (Rosebery et al. 2010; Rosebery and Warren 2008; Warren and Ogonowski 2005; Warren, Ballenger, et al. 2001; National Research Council 2014). Researchers who study English language learners also stress the importance of a number of strategies for engaging those students, and they note that these strategies can be beneficial for all students. For example, techniques used in literacy instruction can be used in the context of science learning. These strategies promote comprehension and help students build vocabulary so they can learn content at high levels while their language skills are developing (Lee and Maerten-Rivera 2012; Lee, Quinn, and Valdez 2013; National Research Council 2014).

Key points regarding instructional materials that support equitable opportunity to learn the NGSS:

- The materials provide guidance for teaching diverse student groups, including visually impaired students, hearing impaired students, students with special needs, talented and gifted students, and English language learners.
- Students have adequate opportunities to demonstrate their understandings and abilities in a variety of ways and appropriate contexts.
- The focus phenomena for each course, unit, or lesson are chosen carefully, taking into account the interest and prior experiences of diverse students. When phenomena are not relevant or clear to some students (e.g., crop growth on farms), alternate engaging phenomena are suggested to the teacher.

- The materials provide extensions consistent with the learning progression for students with high interest or who have already met the performance expectations. The NGSS assessment boundaries are intended to limit large-scale assessment and not to limit extension opportunities for students.
- The texts recognize the needs of English language learners and help them both access challenging science and develop grade-level language. For example, materials might include annotations to help with comprehension of words, sentences, and paragraphs and give examples of the use of words in other situations. Modifications to language should neither sacrifice the science content nor avoid necessary language development.
- The language used to present scientific information and assessments is carefully considered and should change with the grade level and across science content.
- The materials provide the appropriate reading, writing, listening, and/or speaking modifications (e.g., translations, front-loaded vocabulary word lists, picture support, graphic organizers) for students who are English language learners, have special needs, or read below the grade level.
- The materials provide extra support for students who are struggling to meet the performance expectations.

For more information regarding equitable learning opportunities, research-based strategies for effective implementation, context for student diversity, and the NGSS, see the following:

- Next Generation Science Standards [Appendix D, “All Standards, All Students.”](#)
- [Seven case studies](#) that illustrate science teaching and learning of nondominant student groups as they engage in the NGSS.

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APPENDIX: SAMPLE EVALUATION GUIDANCE

The most effective application of PEEC-Alignment requires a thorough understanding of the NRC's *A Framework for K-12 Science Education*, the NGSS, and the NGSS innovations. Therefore, the first step in the review process is to increase familiarity with these documents, including reviewing the preceding document describing the innovations.

The second step involves conducting a thorough review of the instructional materials themselves and identifying examples of alignment with the NGSS and clear omissions of critical innovations. This evaluation is evidence based, with examples providing evidence of the degree of alignment or lack of alignment and the need for modifications or additions.

The third step, described on page 40, entails summarizing the degree of alignment and recommendations for adapting or making additions to the current program. The second and third steps are the focus of this Appendix.

A full review of instructional materials for quality will require additional criteria and procedures that are beyond the scope of this document. For example, if instructional materials seem to be adequately aligned to the NGSS innovations, they could then be reviewed for the presence of key components of instructional materials (e.g., page 10 of this document) as well as for any other criteria that are relevant in a local context.

Due to the large differences between the NGSS and previous science standards documents, it is likely that very few materials that were written for those previous science standards will contain adequate evidence of the NGSS innovations. The design (or redesign) of quality instructional materials takes no small investment of time and resources. Therefore, in the recommendations section in step three, consider whether a material's deficiencies in the NGSS innovations could be temporarily addressed through teacher modifications or supplemental materials while publishers work to design new materials.

CONDUCTING A REVIEW OF INSTRUCTIONAL MATERIALS

After becoming familiar with the NGSS, the *Framework*, and the five innovations described in the preceding document, the second step in the PEEC-Alignment process is to evaluate the comprehensive program using the five NGSS innovations. The five innovations represent essential features of NGSS-based programs. Because the five innovations may be located in different sections of the program, identifying evidence (i.e., examples) for the innovations requires different procedures and, in some cases, sampling.

The review asks for an appraisal of the degree to which there (1) is evidence of each innovation and (2) are recommendations that would increase the alignment with the NGSS, if appropriate. The processes summarized in Figure 3 and described more fully in the following pages are examples of ways to help identify and determine the extent to which the NGSS innovations are present in the instructional materials program. Other possible sampling methods or evaluation procedures could also be used to make this initial determination about alignment to the NGSS.

Figure 3. Evidence-Based Evaluations of the Innovations

NGSS INNOVATIONS	IDENTIFY EVIDENCE FOR THE INNOVATION
Integrating Three Dimensions	<p>Part A: Check instruction for three dimensional learning opportunities</p> <p>(1) Sample three sequences of instruction consisting of four to five activities per sequence. Identify the three dimensions (i.e., SEPs, DCIs, CCCs) from grade band-appropriate bullets in Appendices E, F, and G.</p> <p>(2) Identify evidence of opportunities to learn the three dimensions simultaneously.</p> <p>Part B: Check assessments [embedded and/or end of unit] for three dimensional assessment opportunities.</p> <p>(3) Identify three dimensions (i.e., SEPs, DCIs, CCCs) from grade band appropriate bullets in Appendices E, F, and G.</p> <p>(4) Identify evidence of opportunities to assess three dimensions simultaneously.</p>
Focus on Engaging Phenomena	<p>(1) Sample instructional sequences to determine if each sequence is centered on a driving real-world phenomenon or design problem.</p> <p>(2) Describe evidence that the phenomenon or problem is engaging for and meaningful to the target students.</p>
Engineering Design and the Nature of Science	<p>(1) Locate components of engineering design and the nature of science in student materials.</p>

	<p>(2) Identify for each grade level and discipline an instructional sequence that includes engineering design or the nature of science in SEPs or CCCs — including adequate time, and opportunity for learning.</p> <p>(3) Identify for each grade level and discipline an instructional sequence that includes ETS DCIs alongside DCIs from other science disciplines — in addition to the performance expectations with asterisks.</p>
K–12 Learning Progression	<p>(1) Within a grade: Sample three sequences of instruction to look for evidence of a progression of each dimension within the grade level. Check for evidence that multiple different grade levels also have this within-grade progression.</p> <p>(2) Across grades: Use the NGSS charts (Appendix E, F, G, H, I) to identify content for SEPs, DCIs, and CCCs at the different grade levels and determine the degree to which the content in each dimension represents an appropriate learning progression.</p>
Connections to ELA and Mathematics	<p>Examine instructional sequences to identify any evidence of integration with and/or connections to ELA and mathematics standards.</p>

DRAFT

PEEC-ALIGNMENT
INTEGRATING THREE DIMENSIONS PART A: INSTRUCTIONAL SEQUENCES

NGSS INNOVATION	CRITERIA	SAMPLING PROCESS
<p>Integrating Three Dimensions</p>	<p>SEPs, DCIs, and CCCs blend and work together to support students in three-dimensional learning about natural phenomena or engineering solutions.</p> <p>Students have time and opportunities to:</p> <ul style="list-style-type: none"> ▪ Understand, construct, and use specific elements of the SEPs; ▪ Understand, construct, and use specific elements of the DCIs; ▪ Understand, construct, and use specific elements of the CCCs; and ▪ Blend all three dimensions together to support student learning. <p>Use the following as guidance for evaluating the four categories/samples:</p> <ul style="list-style-type: none"> ▪ No Evidence: This is self-evident. You cannot find any evidence for the NGSS innovation. ▪ Inadequate Evidence: You can identify one or two instances of the innovation, but they do not constitute adequate time or opportunity for students to learn the content or develop the ability. ▪ Adequate Evidence: You can identify three or four instances of the innovation, and they constitute adequate time and opportunity for average students to learn the content and develop the abilities. ▪ Excellent Evidence: You can identify five or more instances of the innovation, and they constitute adequate time and opportunity for most students to learn the content and develop the abilities. 	<p>Sample three sequences of instruction consisting of four to five activities per sequence. Identify SEPs, DCIs, and CCCs as well as evidence of opportunities to learn each of the three dimensions and specific elements of the dimensions (i.e., specific bullets from Appendices E, F, and G). Identify evidence of opportunities to learn the three dimensions simultaneously.</p>

EVIDENCE FOR THE INNOVATION: INTEGRATING THREE DIMENSIONS PART A

Students have time and opportunities to:

- Understand, construct, and use specific elements of the SEPs.

		SEPs			
SAMPLE 1	page (s) _____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
SAMPLE 2	page (s) _____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
SAMPLE 3	page (s) _____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence

Students have time and opportunities to:

- Understand, construct, and use specific elements of the DCIs.

		DCIs			
SAMPLE 1	page (s) _____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
SAMPLE 2	page (s) _____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
SAMPLE 3	page (s) _____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence

EVIDENCE FOR THE INNOVATION: INTEGRATING THREE DIMENSIONS PART A

Students have time and opportunities to:

- Understand, construct, and use specific elements of the CCCs.

		CCCs			
SAMPLE 1	page (s)_____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
SAMPLE 2	page (s)_____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
SAMPLE 3	page (s)_____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence

Students have time and opportunities to:

- Blend all three dimensions together to support student learning.

BLENDING OR INTEGRATION OF THREE DIMENSIONS

SAMPLE 1	page _____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
SAMPLE 2	page _____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
SAMPLE 3	page _____.	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence

SUMMARY AND RECOMMENDATIONS

Use the evidence from the program under review for the summary relative to this innovation. Answer the following questions.

1) To what degree does the program meet the criteria for integrating three dimensions?

- Materials incorporate the innovation.
- Materials partially incorporate the innovation.
- Materials do not incorporate the innovation.

2) Do the materials meet an adequate level of acceptance? YES NO

3) If the materials meet an adequate level, describe specific changes that would improve the program further.

**PEEC-ALIGNMENT
INTEGRATING THREE DIMENSIONS PART B: ASSESSMENTS**

NGSS INNOVATION	CRITERIA	SAMPLING PROCESS
Performance Expectation	Assessments are: <ul style="list-style-type: none"> ▪ Aligned to three dimensions (SEP, DCI, CCC) and assess at least two dimensions simultaneously; ▪ Include performance-based items; ▪ Include formative assessments throughout the program; and ▪ Include summative measures for the program. 	Identify assessments in three to four units. Identify an assessment for the program.

EVIDENCE FOR THE INNOVATION: INTEGRATING THREE DIMENSIONS PART B

Formative assessments provided throughout the program: Yes No

- Aligned to three dimensions.

SEPs

Yes No

DCIs

Yes No

CCCs

Yes No

- Assess at least two dimensions simultaneously.

Yes No

- Include performance-based items.

Yes No

- Include other types of items.

Yes No

Summative measures for the program:

- Aligned to three dimensions.

SEPs

Yes No

DCIs

Yes No

CCCs

Yes No

- Assess at least two dimensions simultaneously.

Yes No

- Include performance-based items.

Yes No

- Include other types of items.

Yes No

SUMMARY AND RECOMMENDATIONS

Use the evidence from the program under review for the summary relative to this innovation. Answer the following questions.

1) To what degree does the program meet the criteria for assessing performance expectations?

- Materials incorporate the innovation.
- Materials partially incorporate the innovation.
- Materials do not incorporate the innovation.

2) Do the materials meet an adequate level of acceptance? YES NO

3) If the materials meet an adequate level, describe specific changes that would improve the program further.

**PEEC-ALIGNMENT
FOCUS ON ENGAGING PHENOMENA**

NGSS INNOVATION	CRITERIA	SAMPLING PROCESS
Focus on Engaging Phenomena	The focus of instructional materials is on engaging students with (1) meaningful phenomena that can be explained through the application of SEPs, CCCs, and DCIs or (2) meaningful problems that can be solved through the application of SEPs, CCCs, and DCIs.	(1) Sample instructional sequences to determine if each sequence is centered on a driving real-world phenomenon or design problem. (2) Describe evidence that the phenomenon or problem is engaging for and meaningful to the target students.

EVIDENCE FOR THE INNOVATION: FOCUS ON ENGAGING PHENOMENA

The lesson is centered on engaging phenomena or problems.

SAMPLE 1 page(s) _____.

No Evidence

Inadequate
Evidence

Adequate
Evidence

Excellent
Evidence

SAMPLE 2 page(s) _____.

No Evidence

Inadequate
Evidence

Adequate
Evidence

Excellent
Evidence

SAMPLE 3 page(s) _____.

No Evidence

Inadequate
Evidence

Adequate
Evidence

Excellent
Evidence

SUMMARY AND RECOMMENDATIONS

Use the evidence from the program under review for the summary relative to this innovation. Answer the following questions.

1) To what degree does the program meet the criteria for a focus on engaging phenomena or problems?

- Materials incorporate the innovation.
- Materials partially incorporate the innovation.
- Materials do not incorporate the innovation.

2) Do the materials meet an adequate level of acceptance? YES NO

3) If the materials meet an adequate level, describe specific changes that would improve the program further.

**PEEC-ALIGNMENT
ENGINEERING DESIGN AND THE NATURE OF SCIENCE**

NGSS INNOVATION	CRITERIA	SAMPLING PROCESS
Engineering Design and the Nature of Science	Components of engineering design and the nature of science are evident in the SEPs and CCCs of lessons, activities, and units. Additionally, ETS DCIs are integrated with science DCIs.	(1) Locate components of engineering design and the nature of science in student materials. (2) Identify for each grade level and discipline an instructional sequence that includes engineering design or the nature of science in SEPs or CCCs — including adequate time and opportunity for learning. (3) Identify a minimum of three examples for each — engineering design and nature of science. (4) Identify for each grade level and discipline an instructional sequence that includes ETS DCIs alongside DCIs from other science disciplines — in addition to the performance expectations with asterisks.

EVIDENCE FOR THE INNOVATION: ENGINEERING DESIGN AND THE NATURE OF SCIENCE			
(1) Engineering design and/or nature of science are incorporated in the program materials.			
	Engineering Design	Nature of Science	
Student Materials	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Teacher Materials	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Supplemental Materials	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
(2) Specifically in the SEPs and CCCs?			
	SEPs	CCCs	
Engineering Design	Yes page (s)____. No <input type="checkbox"/>	Yes page (s)____. No <input type="checkbox"/>	
Nature of Science	Yes page (s)____. No <input type="checkbox"/>	Yes page (s)____. No <input type="checkbox"/>	

(3) Additional samples in SEPs and CCCs

Engineering Design

SAMPLE 1 page (s)_____. No

SAMPLE 2 page (s)_____. No

SAMPLE 3 page (s)_____. No

Nature of Science

SAMPLE 1 page (s)_____. No

SAMPLE 2 page (s)_____. No

SAMPLE page (s)_____. No

(4) Engineering design is incorporated as a DCI.

DCIs

Yes page (s)_____. No

SUMMARY AND RECOMMENDATIONS

Use the evidence from the program under review for the summary relative to this innovation. Answer the following questions.

1) To what degree does the program meet the criteria for incorporating engineering design and the nature of science?

- Materials incorporate the innovation.
- Materials partially incorporate the innovation.
- Materials do not incorporate the innovation.

2) Do the materials meet an adequate level of acceptance? YES NO

3) If the materials meet an adequate level, describe specific changes that would improve the program further.

**PEEC-ALIGNMENT
K-12 LEARNING PROGRESSION**

NGSS INNOVATION	CRITERIA	SAMPLING PROCESS
K-12 Learning Progression	SEPs, DCIs, CCCs build coherently within a grade and across the grades in a coherent program.	<p>(1) Within a grade, sample three sequences of instruction to look for evidence of a progression of student knowledge and skill in each dimension within the grade level. Check for evidence that multiple different grade levels also have this within-grade progression.</p> <p>(2) Across grade spans, use the NGSS charts (Appendix E, F, G, H, I) to identify content for SEPs, DCIs, and CCCs at the different grade levels and determine the degree to which the content in each dimension represents an adequate learning progression.</p>

EVIDENCE FOR THE INNOVATION: K-12 LEARNING PROGRESSION

GRADE-LEVEL PROGRESSION

Within a grade level, SEPs, DCIs, and CCCs build coherently.

SAMPLE 1 page(s) _____.

SEPs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	No Evidence	Inadequate Evidence	Adequate Evidence	Excellent Evidence
DCIs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	No Evidence	Inadequate Evidence	Adequate Evidence	Excellent Evidence
CCCs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	No Evidence	Inadequate Evidence	Adequate Evidence	Excellent Evidence

SAMPLE 2 page(s) _____.

SEPs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
DCIs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
CCCs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence

SAMPLE 3 page(s) _____.

SEPs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
DCIs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
CCCs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence

EVIDENCE FOR THE INNOVATION: K-12 LEARNING PROGRESSION

GRADE-SPAN PROGRESSION

Across the grades, SEPs, DCIs, and CCCs build coherently
(use a consistent discipline, e.g., life sciences, and district grade spans, e.g., K-2, 3-4, 6-8).

SAMPLE 1 grade _____.
page(s) _____.

SEPs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
DCIs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
CCCs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence

SAMPLE 2 grade _____.
page(s) _____.

SEPs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
DCIs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
CCCs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence

SAMPLE 3 grade _____.
page(s) _____.

SEPs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
DCIs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
CCCs	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence

SUMMARY AND RECOMMENDATIONS

Use the evidence from the program under review for the summary relative to this innovation. Answer the following questions.

1) To what degree does the program meet the criteria for K–12 learning progressions?

- Materials incorporate the innovation.
- Materials partially incorporate the innovation.
- Materials do not incorporate the innovation.

2) Do the materials meet an adequate level of acceptance? YES NO

3) If the materials meet an adequate level, describe specific changes that would improve the program further.

**PEEC-ALIGNMENT
CONNECTIONS TO ELA AND MATHEMATICS**

NGSS INNOVATION	CRITERIA	SAMPLING PROCESS
Connections to ELA and Mathematics	Instructional materials include grade-appropriate connection(s) to education standards for mathematics and/or ELA	Examine instructional sequences to identify evidence of integration with and/or connections to mathematics and/or ELA.

EVIDENCE FOR THE INNOVATION: CONNECTIONS TO ELA AND MATHEMATICS				
SAMPLE 1 page(s) _____.				
ELA	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
Mathematics	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
SAMPLE 2 page(s) _____.				
ELA	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence
Mathematics	<input type="checkbox"/> No Evidence	<input type="checkbox"/> Inadequate Evidence	<input type="checkbox"/> Adequate Evidence	<input type="checkbox"/> Excellent Evidence

SAMPLE 3 page(s) _____.

ELA

No Evidence

Inadequate
Evidence

Adequate
Evidence

Excellent
Evidence

Mathematics

No Evidence

Inadequate

Adequate

Excellent

SUMMARY AND RECOMMENDATIONS

Use the evidence from the program under review for the summary relative to this innovation. Answer the following questions.

1) To what degree does the program meet the criteria for connections to ELA and mathematics?

- Materials incorporate the innovation.
- Materials partially incorporate the innovation.
- Materials do not incorporate the innovation.

2) Do the materials meet an adequate level of acceptance? YES NO

3) If the materials meet an adequate level, describe specific changes that would improve the program further.

STEP 3: OVERALL EVALUATION

This summary should use the evidence and recommendations from the review. The summary takes the form of an initial claim that the program PRESENTS AN ADEQUATE ALIGNMENT WITH THE NGSS INNOVATIONS. This is followed by a short response and then a description of evidence supporting the response. Finally, there are recommendations for improvement, as appropriate.

PEEC-ALIGNMENT: A SUMMARY

CLAIM
TITLE OF PROGRAM: _____ provides adequate and appropriate opportunities for students to meet the performance expectations in the NGSS.
EVIDENCE-BASED RESPONSE
RECOMMENDATIONS