SCIENCE GRADES K-5

EVIDENCE GUIDES

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GATEWAY 1

Gateway 1, Criterion 1: **Three-Dimensional Learning–** Do materials integrate the three dimensions within the designed student learning experiences?

Guidance for Indicator 1a.

Criterion: Three-Dimensions are integrated throughout the design of the materials for students to understand and use.

Indicator 1a. Materials are designed to integrate the Science and Engineering Practices (SEP), Disciplinary Core Ideas (DCI), and Crosscutting Concepts (CCC) into student learning.

What is the purpose of this indicator?

"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." (2015 Achieve NGSS Innovations)

"The performance expectations in the NGSS are targets for assessment. For students to achieve such performances, they will need regular opportunities to engage in learning that blend all three dimensions of the standards throughout their classroom experiences, from kindergarten through high school (K-12)." (Guide to Implementing the Next Generation Science Standards, p. 25)

"To capture the vision in the Framework, students should be assessed on the extent to which they have achieved a coherent scientific worldview by recognizing similarities among core ideas in science or engineering that may at first seem very different, but are united through crosscutting concepts." (NGSS Appendix G: Crosscutting Concepts, p. 3)

"...the framework and its resulting standards have a number of implications for implementation, one of which involves the need for curricular and instructional materials that embody all three dimensions: scientific and engineering practices, crosscutting concepts, and disciplinary core ideas." (Framework, p. 316)

This indicator

- supports the Next Generation Science Standards (NGSS) innovation related to integration of the three dimensions in learning experiences for students.
- examines the materials to determine if individual lessons or activities are designed including the three dimensions.

- examines the materials to determine if learning sequences (collections of lessons or activities) are designed to integrate the three dimensions.
- examines the materials to determine if learning sequences are designed to support student sensemaking of the three dimensions.
- does not look for exact matches of designed learning experiences to the performance expectations.

Research Connection

"…learning about science and engineering involves integration of the knowledge of scientific explanations (i.e., content knowledge) and the practices needed to engage in scientific inquiry and engineering design. Thus the framework seeks to illustrate how knowledge and practice must be intertwined in designing learning experiences in K–12 science education." (Framework, p. 11)

"The framework is designed to help realize a vision for education in the sciences and engineering in which students, over multiple years of school, actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields." (Framework, p. 10)

"That is, during instruction, students' engagement in the practices should always occur in the context of a core idea and, when possible, should also connect to crosscutting concepts. Both practices and crosscutting ideas are viewed as tools for addressing new problems as well as topics for learning in themselves. Students need to experience the use of these tools in multiple contexts in order to develop the capacity to wield them flexibly and effectively in new problem contexts—an important goal of science learning (National Research Council, 2000, 2007)." (BOTA Report, p. 31)

"Curricula based on the framework and resulting standards should integrate the three dimensions—scientific and engineering practices, crosscutting concepts, and disciplinary core ideas—and follow the progressions articulated in this report." (Framework, p. 246)

Evidence Collection

Review the units, chapters, and lessons in both student and teacher materials across the grade.

Review progression documents and standards as needed:

- Appendix E: Disciplinary Core Idea Progressions,
- Appendix F: Science and Engineering Practices,
- Appendix G: Crosscutting Concepts

In the instructional materials for the series being reviewed:

- Look for evidence where students "actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields." (Framework, p. 10)
    - within learning opportunities (individual lessons, activities, or investigations) throughout the series
    - within each learning sequence (multiple related lessons, activities) throughout the series
- Look across lessons and activities to find meaningful and intentional presence of two-dimensional integration of SEPs and DCIs, CCCs and DCIs, or CCCs and SEPs. Meaningful and intentional integration of SEPs are usually easier to find than CCCs and can often be found in singular lessons or activities. Sometimes presence of CCC doesn't arise until across multiple activities or lessons in a learning sequence.
- Look across each learning sequence to find meaningful and intentional use of three-dimensional integration of SEPs, CCCs, and DCIs where all three dimensions support student sensemaking.
- Record the specific examples of units, learning sequences, and lessons or activities that include integrated dimensions, across the series, whether two-dimensional or three-dimensional.
- Provide a summary of how the students engage in the three dimensions and whether the three dimensions are meaningfully integrated to support student sensemaking ; reference the unit, lesson or activity.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Are the materials designed for students to actively engage in the SEPs and CCCs to deepen understanding of DCIs?
- Are the CCCs present and do students use/apply them to deepen understanding of DCIs and/or SEPs? Do the materials engage all students in learning experiences that integrate all three dimensions in meaningful ways to support student sensemaking?
- Do the materials include three-dimensional learning at the unit, learning sequence, or lesson/activity level?

During Discussion:

- Which SEPs are present and focal? Are they present so that students use them to understand DCIs? Are students actually engaging in the practice?
- Which CCCs are present? Are they present so that students apply/use them to understand DCIs and/or SEPs?
- To what degree of frequency does the series focus on integration of three dimensions, and at what level (unit, learning sequence, and/or lesson/activity)?
- To what degree do the materials support students' intentional and meaningful use of all three dimensions to support sensemaking?
- Specifically focus on what is present and not what is inferred.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring: 1a.i. Materials consistently integrate the three dimensions in student learning opportunities.

4 points:

- Throughout the grade, all learning sequences include three dimensions and consistently integrate SEPs, CCCs, and DCIs in student learning opportunities.

2 points:

- Throughout the grade, some learning sequences include three dimensions and consistently integrate SEPs, CCCs, and DCIs in student learning opportunities.

0 points:

- Throughout the grade, few to no learning sequences include three dimensions and consistently integrate SEPs, CCCs, and DCIs in student learning opportunities.

Scoring: 1a.ii. Materials consistently support meaningful student sensemaking with the three dimensions.

4 points:

- Materials are designed for SEPs **and** CCCs to meaningfully support student sensemaking with the other dimensions in nearly all learning sequences.

2 points:

- Materials are designed for SEPs **or** CCCs to meaningfully support student sensemaking with the other dimensions in nearly all learning sequences.

0 points:

- Materials are not designed for SEPs **and** CCCs to meaningfully support student sensemaking with the other dimensions.

What is the purpose of Indicators 1b and 1c?

This criterion focuses on three dimensions being integrated into assessment tasks for two purposes. One purpose is to see if and how assessments are designed to determine what students have achieved and the other is to determine if and how assessments are designed to guide the instructional process. It is important to note that prior knowledge and experience are related topics that are addressed in indicators 1b and 1h. Further, there is a category around general assessment in Gateway 3, Criterion 4: Assessment Design and Supports that focuses on supports and design of materials for using assessments, scoring, and ensuring equity.

This Criterion

- supports the NGSS innovation related to integration of the three dimensions in learning experiences for students.
- examines the materials to determine if assessments integrate the three dimensions.
- examines the materials to determine how assessments are structured (formative/summative).

Resources:

- Designing 3D Assessment: http://ngss.nsta.org/Documents/NGSSForumAssessment.pptx
- Formative 3D Assessment: http://stemteachingtools.org/brief/18

Research Connection

"Assessment tasks, in turn, have to be designed to provide evidence of students' ability to use the practices, to apply their understanding of the crosscutting concepts, and to draw on their understanding of specific disciplinary ideas, all in the context of addressing specific problems." (BOTA Report, p. 32)

"Assessment designers are faced with the challenge of finding a balance among three competing priorities: (1) using assessment as a tool for supporting and promoting an ambitious vision for all students, (2) obtaining accurate measures of what students have actually learned, and (3) supporting equity of opportunity for disadvantaged students." (BOTA Report, p. 27)

"The key difference between assessments used for formative purposes and those used for summative purposes is in how the information they provide is to be used: to guide and advance learning (usually while instruction is under way) or to obtain evidence of what students have learned for use beyond the classroom (usually at the conclusion of some defined period of instruction). Whether intended for formative or summative purposes, evidence gathered in the classroom should be closely linked to the curriculum being taught. This does not mean that the assessment must use the formats or exactly the same material that was presented in instruction, but rather that the assessment task should directly address the concepts and practices to which the students have been exposed." (BOTA Report, p. 85)

"CONCLUSION 2-1 Measuring the three-dimensional science learning called for in the Framework and the Next Generation Science Standards requires assessment tasks that examine students' performance of scientific and engineering practices in the context of crosscutting concepts and disciplinary core ideas. To adequately cover the three dimensions, assessment tasks will generally need to contain multiple components (e.g., a set of interrelated questions). It may be useful to focus on individual practices, core ideas, or crosscutting concepts in the various 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." (BOTA Report, p. 44)

"CONCLUSION 2-4 Effective evaluation of three-dimensional science learning requires more than a one-to-one mapping between the Next Generation Science Standards (NGSS) performance expectations and assessment tasks. More than one assessment task may be needed 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. Assessment tasks that attempt to test practices in strict isolation from one another may not be meaningful as assessments of the three-dimensional science learning called for by the NGSS." (BOTA Report, p. 46)

Guidance for Indicator 1b.

Indicator 1b. Materials are designed to elicit direct, observable evidence **for** the three-dimensional learning in the instructional materials.

What is the purpose of this Indicator?

"Assessments used for **formative purposes** occur during the course of a unit of instruction and may involve both formal tests and informal activities conducted as part of a lesson. They may be used to identify students' strengths and weaknesses, assist educators in planning subsequent instruction, assist students in guiding their own learning by evaluating and revising their own work, and foster students' sense of autonomy and responsibility for their own learning (Andrade and Cizek, 2010, p. 4)." (BOTA Report, p. 84)

This indicator

- examines whether the materials elicit evidence **for** students' three-dimensional learning of the targeted three-dimensional learning objectives.
- elicits student understanding of the three dimensions to guide the instructional process.

Boundaries with other indicators:

- Gateway 3, Criterion 4: There is a criterion around general assessment in Gateway 3, Criterion 4: Assessment Design and Supports that focuses on supports likes scoring and interpreting assessment information (G3C4-3x). Indicator 1b does not address how materials are designed to support interpretation of student responses.
- Indicators 1h: Prior knowledge and experience are related topics that are covered in indicator 1h which targets leveraging students' prior knowledge and experience. Indicator 1b does not address how materials are designed to support instructional response to evidence collected through the formative process.
- Gateway 1, Criterion 2: There is a criterion specifically focused on phenomena and problems driving student learning. Indicator 1b does not address connections to phenomena or problems.
- Indicator 1c: Indicator 1c deals with three-dimensional summative assessment. Indicator 1b focuses on aspects of three-dimensional formative assessment.

Evidence Collection

Review the units, chapters, and lessons in both student and teacher materials across the grade.

Review progression documents and standards as needed:

- **Appendix E: Disciplinary Core Idea Progressions**,
- **Appendix F: Science and Engineering Practices**,
- **Appendix G: Crosscutting Concepts**

In the instructional materials for the series being reviewed:

- Determine whether the materials provide learning objectives at the lesson level and whether the objectives build towards three-dimensional objectives for the larger learning sequence.
- Focus on the assessments that obtain accurate measures of what students are learning to guide the instructional process.
    - Will need to relate to the instructional objective and the associated three dimensions.
- Look at lessons (and units) to see how the formative assessment process is included to provide diagnostic feedback to teachers and students during course of instruction.

- Document when and how formative assessment process contains multiple component tasks (e.g., a set of interrelated questions) incorporating three dimensions
    - Individual SEPs, DCIs, or CCCs may be individually present in each of the various components of an assessment task within the formative process, but, together, they help diagnose what students know and can do at the intersection of the three dimensions, related to the targeted learning objective.
    - Do not look only at single items, but at the collection of formative processes and tasks throughout each learning sequence. Evidence should characterize the larger picture and focus on the formative assessment tasks across the sequence not just evaluating single tasks.
- Do not pull evidence for items addressing outside of the grade-band three dimensions.
- Do not focus on supports for interpreting assessments or for informing instruction, as these are covered in Gateway 3, Criterion 4.

Discussion Points for Cluster Meeting

Questions to think about as you prepare for the team discussion:

- Do the materials provide learning objectives at the lesson level?
- Are the lesson objectives three-dimensional, or do they build to three-dimensional objectives for the larger learning sequence?
- Which types of assessments are used to support the formative process? Where are they present? Are they always consistent in form and function, or do they vary?
- Are the assessment tasks within the formative process designed with the three dimensions included within and across multiple components?
- Are the assessment tasks within the formative process connected to the learning objectives for the unit?

During Discussion:

- To what degree do the materials provide learning objectives at the lesson level?
- To what degree are the lesson objectives three-dimensional, or do they build to three-dimensional objectives for the larger learning sequence?
- Are the lesson objectives three-dimensional, or do they build to three-dimensional objectives for the larger learning sequence? To what degree are the assessment tasks within the formative process including and integrating the three dimensions?
- Are there specific connections between the lesson, assessments and targeted learning objectives? If so, understanding that each assessment task within the formative process might only be building toward an objective, are the materials designed so objectives are consistently being assessed in a way that showcases student progress toward mastery of each objective?
- Specifically focus on what is present and not what is inferred.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

4 points:

- Materials consistently provide three-dimensional learning objectives at the lesson level that build toward the three-dimensional objectives of the larger learning sequence. **AND**
- Lessons and units have assessment tasks that are consistently designed to reveal student knowledge and use of the three dimensions to support the targeted three-dimensional learning objectives. **AND**
- Lessons and units consistently incorporate tasks for purposes of supporting the instructional process.

2 points:

- Materials consistently provide three-dimensional learning objectives at the lesson level that build toward the three-dimensional objectives of the larger learning sequence. **AND**
- Lessons and units have assessment tasks that are consistently designed to reveal student knowledge and use of the three dimensions to support the targeted three-dimensional learning objectives. **AND**
- Lessons and units incorporate tasks for purposes of supporting the instructional process, but not consistently.

0 points:

- Materials provide few or no three-dimensional learning objectives at the lesson level that build toward the three-dimensional objectives of the larger learning sequence. **OR**
- Lessons and units have assessment tasks that are designed to reveal student knowledge and use of the three dimensions to support the targeted three-dimensional learning objectives, but not consistently and/or lessons and units incorporate tasks for purposes of supporting the instructional process, but not consistently.

Guidance for Indicator 1c.

Indicator 1c. Materials are designed to elicit direct, observable evidence **of** the three-dimensional learning in the instructional materials.

What is the purpose of this indicator?
"CONCLUSION 4-1 Tasks designed to assess the performance expectations in the Next Generation Science Standards will need to have the following characteristics: ● multiple components that reflect the connected use of different scientific practices in the context of interconnected disciplinary ideas and crosscutting concepts;" (BOTA Report, p. 130) "RECOMMENDATION 4-2 Curriculum developers, assessment developers, and others who create resource materials aligned to the science framework and the Next Generation Science Standards should ensure that assessment activities included in such materials (such as mid- and end-of-chapter activities, suggested tasks for unit assessment, and online activities) require students to engage in practices that demonstrate their understanding of core ideas and crosscutting concepts." (BOTA Report, p. 131) This indicator ● examines whether the materials are designed to elicit evidence **of** three-dimensional learning of the targeted three-dimensional learning objectives.
Evidence Collection
Review the units, chapters, and lessons in both student and teacher materials across the grade. Review progression documents and standards as needed: ● **Appendix E: Disciplinary Core Idea Progressions**, ● **Appendix F: Science and Engineering Practices**, ● **Appendix G: Crosscutting Concepts** **In the instructional materials for the series being reviewed:** ● Determine whether the materials provide three-dimensional objectives for the larger learning sequence or unit. ● Focus on the summative assessments that obtain accurate measures of what students learn as it relates to the objectives. o Will need to relate student achievement to the objectives and the associated three dimensions. ● Look at lessons (and units) to see how the summative assessments provide information about student achievement of objectives to teachers and students following the course of instruction. ● Document when and how summative assessments contains multiple component tasks (e.g., a set of interrelated questions) incorporating three dimensions o Individual SEPs, DCIs, or CCCs may be individually present in each of the various components of an assessment task within the summative assessments, but, together, they help diagnose what students know and can do at the intersection of the three dimensions, related to the targeted learning objective. o Do not look only at single items, but at the collection of summative tasks throughout each learning sequence. Evidence should characterize the larger picture and focus on the summative assessment tasks across the sequence not just evaluating single tasks.

- Do not pull evidence for items addressing objectives outside of the grade-band three dimensions.
- Do not focus on supports for interpreting assessments, as these are covered in Gateway 3, Criterion 4.

Discussion Points for Cluster Meeting

Questions to think about as you prepare for the team discussion:

- Which types of **summative** assessments are used to determine student achievement (performance tasks, multiple choice questions, written/constructed responses, etc.)? Where are they present? Are they always consistent in form and function or do they vary?
- Are the individual SEPs, DCIs, and CCCs present in the summative assessment task(s)?
- Are the summative assessments designed with the three dimensions included within and across multiple components?
- Are the summative assessment tasks connected to the learning objectives for the unit?
- Are summative assessment tasks present that are designed to integrate the three dimensions for specific PEs and/or learning objectives?
- Do summative assessments directly assess the PEs and/or three-dimensional learning objectives or are grade-band elements of each dimension assessed independently of the PE or learning objectives?

During Discussion:

- To what degree are the summative assessments including and integrating the three dimensions?
- To what degree are the summative assessment tasks connected to the learning objectives for the unit?
- Are there specific connections between summative assessments and grade-level PEs? If so, understanding that each summative assessment task might only be building toward a targeted learning objective, are the materials designed so objectives are consistently being assessed in a way that showcases student progress toward mastery of all objectives?
- Specifically focus on what is present and not what is inferred.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

4 points:

- Materials consistently provide three-dimensional learning objectives for the learning sequence. **AND**
- Summative tasks are consistently designed to measure student achievement of the targeted three-dimensional learning objectives.

2 points:

- Materials consistently provide three-dimensional learning objectives for the learning sequence. **AND**
- Summative tasks are designed to measure student achievement of the targeted three-dimensional learning objectives, but not consistently.

0 points:

- Materials provide three-dimensional learning objectives for the learning sequence, but not consistently. **OR**
- Few to no summative assessment tasks are three-dimensional in design. **OR**
- Few to no summative assessment tasks connect to the targeted three-dimensional learning objectives.

Gateway 1, Criterion 2: **Phenomena and Problems Drive Learning:** Are the materials designed to use phenomena and problems to drive student learning of the three dimensions?

Consider the purpose and research connection for Criterion 2 when looking for evidence to support indicators 1d-1i.

What is the purpose of this criterion?
A major goal for NGSS-designed 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. By doing so, students 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." (2015 Achieve NGSS Innovations) This criterion ● supports the NGSS innovation related to using phenomena and problems to drive instruction. ● examines the materials to determine the extent that students are engaged in making sense of natural phenomena or solving design problems in meaningful ways. ● examines whether phenomena or problems are used as more than just an attention grabber or hook; the phenomenon or problem is what is used to drive instruction and connect student sensemaking to the three dimensions (DCIs, SEPs, CCCs) within and across lessons.
Research Connection
"… the goal of science is to develop a set of coherent and mutually consistent theoretical descriptions of the world that can provide explanations over a wide range of phenomena. For engineering, however, success is measured by the extent to which a human need or want has been addressed." (Framework, p. 48) "Asking students to demonstrate their own understanding of the implications of a scientific idea by developing their own explanations of phenomena, whether based on observations they have made or models they have developed, engages them in an essential part of the process by which conceptual change can occur." (Framework, p. 68) "Learning to explain phenomena and solve problems is the central reason students engage in the three dimensions of the NGSS. Students explain phenomena by developing and applying the Disciplinary Core Ideas (DCIs) and Crosscutting Concepts (CCCs) through use of the Science and Engineering Practices (SEPs)." (Using Phenomena in NGSS-Designed Lessons and Units) Other resources to support the vision and criteria for using phenomena or problems to drive instruction of lessons or activities: ● Using Phenomena in NGSS-Designed Lessons and Units: a handout that describes how educators can use phenomena to drive three-dimensional teaching and learning, from NGSS. ● Criteria for Evaluating Phenomena: a tool used in NGSS@NSTA professional learning experiences. ● Qualities of a Good Anchor Phenomenon: a resource from the Research + Practice Collaboratory

Guidance for Indicator 1d.

Indicator 1d. Phenomena and/or problems are connected to grade-level Disciplinary Core Ideas

What is the purpose of this indicator?
This indicator ● examines whether phenomena or problems within the series connect student sensemaking to the DCIs.
Evidence Collection
Review the units, chapters and lessons in both student and teacher materials across the grade. Review the grade and series scope and sequence. Review progression documents and standards as needed for Appendix E: Disciplinary Core Idea Progressions, **In the instructional materials for the series being reviewed:** ● Look for evidence throughout the grade to determine where phenomena and/or problems are used to connect student sensemaking to one or more DCIs (Physical, Life, and Earth/Space Sciences). ● Record the specific examples throughout the grade that connect phenomena and/or problems to DCIs. ● Record the specific examples throughout the grade that use phenomena and/or problems to develop understanding of DCIs.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● Do the materials engage all students in learning experiences about phenomena and/or problems that are not separated from the DCIs? ● Can the phenomena and/or problems in the series be explained through the application of targeted grade-level appropriate DCIs? ● Does student engagement of phenomena and/or problems develop understanding of the DCIs? ● Do the materials engage students in phenomena and/or problems across DCIs in all disciplines (earth/space, life, physical science) within the grade? **During Discussion:** ● Identify evidence that phenomena and/or problems link to DCIs. ● Identify evidence that student engagement with phenomena and/or problems develop understanding or require application of DCIs. ● Explain the strategy/reasoning used as you collected evidence for this indicator. ● Share any generalizations that you noted as you looked at materials, with specific examples noted to support your generalizations. ● Look for consensus on whether the indicator was met fully or partially. ● Agree on final ratings.

Scoring:

2 points:

- Materials consistently connect phenomena and problems to grade-level appropriate DCIs or their elements.

1 point:

- Few phenomena are connected to grade-level DCIs or their elements. **OR**
- Few problems are connected to grade-level DCIs or their elements.

0 points:

- Phenomena are not present. **OR**
- Problems are not present. **OR**
- Phenomena are not connected to grade-level DCIs or their elements. **OR**
- Problems are not connected to grade-level DCIs or their elements.

Guidance for Indicator 1e.

Indicator 1e. Phenomena and/or problems are presented to students as directly as possible

What is the purpose of this indicator?
"…opportunities for students to engage in direct observations of phenomena illustrate the process of basic scientific research." (Taking Science to School, pp. 13-14)" "By using familiar materials and phenomena, students can more readily conjure up their own ideas and experiences and tap into these as they build explanations. This makes it possible for every student to participate in a more meaningful way." (Ready Set Science, p. 93) Many phenomena can be observed first-hand by students, but some can't be due to scale (physical size or timeframe), geographic location, frequency of occurrence, safety, or a variety of other factors. This indicator is designed to determine if the materials present phenomena and/or problems as directly (or as close to first-hand) as possible: Examples: ● If a phenomenon can be readily observed first-hand (shadows changing shape and position throughout the day, a spoon in a glass of water appearing to bend), do the materials require students to make first-hand observations or do the materials present the phenomena and/or problems in a less direct or engaging way? ● If it isn't possible or feasible to observe a phenomenon first-hand (volcano erupting, changes in climate), do the materials present the phenomenon and/or problem as directly or engaging as possible, such as using multimedia or computer simulations instead of written text only? This indicator ● examines the materials to determine whether phenomena and/or problems in the grade are presented to students as directly as possible.
Evidence Collection
Review the units, chapters and lessons in both student and teacher materials across the grade. Review the grade and series scope and sequence. **In the instructional materials for the series being reviewed:** ● Look for evidence throughout the grade to determine how phenomena and/or problems are being presented to students. ● Record the specific examples of lessons or activities that include phenomena and/or problems and how they are presented to students.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- How do the materials present or initially introduce phenomena and/or problems to students (direct observation, observation by video or other multimedia, simulations, teacher demonstration, pictures, reading about them, etc.)?
- Are students observing, or interacting with the phenomena and/or problems in ways other than being told about it or reading about it in text?
- Do students have opportunities to engage with phenomena and/or problems in ways that evoke or encourage them to ask their own questions?
- Would it be practical or reasonable to present or introduce the phenomenon and/or problem first hand?
- Are phenomena and/or problems that are not appropriate for first-hand observation presented using multimedia, simulations, or other rich resources?

During Discussion:

- Identify evidence of phenomena and problems within the grade.
- To what extent are the phenomena and problems presented to students as directly as possible?
- To what extent do the students engage in understanding the phenomena or solving the problems as directly as possible?
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials consistently present phenomena and/or problems to students as directly as possible.

1 point:

- Materials present phenomena and/or problems to students as directly as possible in multiple instances.

0 points:

- Phenomena and/or problems are not presented to students as directly as possible.

Guidance for Indicator 1f.

Indicator 1f. Phenomena and/or problems drive individual lessons or activities using key elements of all three dimensions.

What is the purpose of this indicator?

This indicator

- examines the materials to determine if individual lessons or activities are designed to engage students in making sense of natural phenomena or solving design problems in meaningful ways.
- examines whether lessons and activities use phenomena or problems to drive instruction for the lesson or activity and connect student sensemaking to the three dimensions (DCIs, SEPs, CCCs).

Evidence Collection

Review the units, chapters and lessons in both student and teacher materials across the grade.
Review the grade and series scope and sequence.

In the instructional materials for the series being reviewed:

- Look for evidence within individual lessons or activities throughout the grade to determine where phenomena and/or problems are used to drive three-dimensional student learning.
- Record the specific examples of lessons or activities that include phenomena and/or problems.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials include phenomena and problems at the lesson or activity level?
- Do the phenomena and/or problems in the lessons or activities serve as a central component (drive student learning) of learning and can they be explained through the application of targeted grade-appropriate SEPs, CCCs, and DCIs?
- Do the materials engage students in phenomena and/or problems across DCIs in all disciplines (earth/space, life, physical science) across the grade?
- Do the materials engage all students in learning experiences that connect phenomena and/or problems with the three dimensions and are not separated from the DCIs?
- Does student engagement of phenomena and/or problems develop understanding of just the DCIs, or does it also develop understanding of CCCs and SEPs?

During Discussion:

- Identify evidence of phenomena and problems in individual lessons or activities.
- To what extent is the phenomenon or problem in a lesson or activity used to drive student learning (serve as a central component of learning)?
- To what degree does the series use a phenomenon or problem in lessons or activities to develop student understanding of all three dimensions?
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:
2 points: ● Materials consistently provide lessons or activities within the grade that use phenomena or problems to drive student learning. **AND** ● Materials consistently provide lessons or activities within the grade that use phenomena or problems to engage with all three dimensions. **1 point:** ● Materials provide multiple lessons or activities within the grade that use phenomena or problems to drive student learning. **AND** ● Materials provide multiple lessons or activities within the grade that use phenomena or problems to engage with all three dimensions. **0 points:** ● Materials provide no or few lessons or activities within the grade that use phenomena or problems to drive student learning. **OR** ● Materials provide no or few lessons or activities within the grade that use phenomena or problems to engage with all three dimensions.

Guidance for Indicator 1g.

Indicator 1g. Materials are designed to include both phenomena and problems.

What is the purpose of this indicator?
This indicator ● Provides a narrative report of the presence, structure, and proportional number of activities at each grade that focus on understanding phenomena and solving problems.
Evidence Collection
Review the units, chapters and lessons in both student and teacher materials across the grade. Review the grade and series scope and sequence. **In the instructional materials for the series being reviewed:** ● Look for evidence within the grade to determine when and where the materials engage students in figuring out phenomena. ● Look for evidence within each grade to determine when and where the materials engage students in solving problems. Note how the ETS standards support student engagement in solving problems. ● Record the specific examples of lessons or activities that include phenomena and/or problems. ● Describe the comparative proportional relationship of phenomena vs. problems.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● What proportion of the materials (and instructional time) engage students in figuring out phenomena? ● What proportion of the materials (and instructional time) engage students with defining and designing solutions to problems? **During Discussion:** ● Identify evidence in the materials where students engage in figuring out phenomena. ● Identify evidence in the materials where students engage with defining and designing solutions to problems. ● What is the proportion of materials that engage students with phenomena and problems? ● Explain the strategy/reasoning used as you collected evidence for this indicator. ● Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations. ● Reach consensus and write narrative to explain ratio of phenomena and problems for the grade.
Scoring:
This indicator is not scored – Narrative Information Only

Guidance for Indicator 1h.

Indicator 1h. Materials intentionally leverage students' prior knowledge and experiences related to phenomena or problems.

What is the purpose of this indicator?
"When people enter into the practices of science or engineering, they do not leave their cultural worldviews at the door. Instruction that fails to recognize this reality can adversely affect student engagement in science." (Framework, p. 284). "Everyday experience provides a rich base of knowledge and experience to support conceptual changes in science. Students bring cultural funds of knowledge that can be leveraged, combined with other concepts, and transformed into scientific concepts over time. Everyday contexts and situations that are important in children's lives not only influence their repertoires of practice but also are likely to support their development of complex cognitive skills." (Framework, p. 284). "To advance students' conceptual understanding, prior knowledge and questions should be evoked and linked to experiences with experiments, data, and phenomena." (Taking Science to School, page 251) "As instruction taps their entering knowledge and skills, students must reconcile their prior knowledge and experiences with new, scientific meanings of concepts, terms, and practices." (Taking Science to School, p. 264) "Children's understandings of the world sometimes contradict scientific explanations. These conceptions about the natural world can pose obstacles to learning science. However, their prior knowledge also offers leverage points that can be built on to develop their understanding of scientific concepts and their ability to engage in scientific investigations. Thus, children's prior knowledge must be taken into account in order to design instruction in strategic ways that capitalize on the leverage points and adequately address potential areas of misunderstanding." (Taking Science to School, pp. 337-338) "Conclusion 4: Students' knowledge and experience play a critical role in their science learning, influencing all four strands of science understanding. Children's concepts can be both resources and barriers to emerging understanding. These concepts can be enriched and transformed by appropriate classroom experiences." Science learners require instructional support to engage in scientific practices and to interpret experience and experiments in terms of scientific ideas." (Taking Science to School, p. 337) This indicator ● examines each grade to determine if the materials are designed to leverage students' prior knowledge and experiences to support sensemaking when engaging with phenomena or solving problems.

Evidence Collection

Review the student and teacher materials across the grade.
Review the grade and series scope and sequence.

In the instructional materials for the series being reviewed:

- Look for evidence throughout the grade to determine where the materials elicit students' prior knowledge and experience about phenomena and/or problems.
- Look for evidence throughout the grade to determine where the materials explicitly leverage students' prior knowledge and experience to make sense of phenomena and/or solve problems.
- Record specific examples of designed learning experiences that elicit and leverage students' prior knowledge and experience to make sense of phenomena and/or solve problems.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials elicit students' prior knowledge and experience to adequately addresses potential areas of misunderstanding and to support making connections to what they are learning?
- Do the materials leverage students' prior knowledge and experience as resources to allow for meaningful learning of phenomena and/or solving problems in a way that allows them to build from their own knowledge and experiences?
- Do the materials accommodate different entry points to the learning of phenomena and/or solving problems?
- Do the materials make explicit connections between foundational knowledge and practice from prior grades?

During Discussion:

- Identify evidence of where materials account for students' prior knowledge and experience related to understanding phenomena and/or solving problems.
- To what extent is student prior knowledge and experience elicited to address potential areas of misunderstanding and to support making connections to what they are learning?
- To what extent do the materials leverage students' prior knowledge and experience as resources to allow for meaningful learning of phenomena and/or solving problems in a way that allows them to build from their own knowledge and experiences?
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:
2 points: ● Materials consistently elicit and leverage students' prior knowledge and experience to phenomena or problems across the grade. **1 point:** ● Materials elicit and leverage students' prior knowledge and experience for a limited range of phenomena or problems across the grade. **AND/OR** ● Materials elicit but do not leverage students' prior knowledge and experience to phenomena or problems across the grade. **0 points:** ● Materials do not address students' prior knowledge and experience related to phenomena or problems.

Guidance for Indicator 1i.

Indicator 1i. Materials embed phenomena or problems across multiple lessons for students to use and build knowledge of all three dimensions.

What is the purpose of this indicator?
This indicator ● examines the materials to determine if units, chapters, or learning modules are designed to engage students in making sense of natural phenomena or solving design problems in meaningful ways, across multiple lessons. ● examines the materials to determine if units, chapters, or learning modules provide multimodal opportunities for students to develop, evaluate, and revise their thinking as they figure out phenomena and define/solve problems. ● examines whether units, chapters, or learning modules containing multiple lessons use phenomena or problems to drive instruction for the lesson or activity and connect student sensemaking to the three dimensions (DCIs, SEPs, CCCs)
Evidence Collection
Review the units, chapters and lessons in both student and teacher materials across the grade. Review the grade and series scope and sequence. **In the instructional materials for the series being reviewed:** ● Look for evidence within units, chapters, or learning modules throughout the series to determine where phenomena and/or problems are used in multiple lessons to drive three-dimensional student learning. ● Look for evidence within units, chapters, or learning modules to determine where the materials provide multimodal opportunities for students to develop, evaluate, and revise their thinking as they figure out phenomena and define/solve problems. ● Record the specific examples of units, chapters, or learning modules that include phenomena and/or problems.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● Do the materials include phenomena and problems at the unit, chapter, or learning module level? ● Do the materials provide multimodal opportunities for students to develop, evaluate, and revise their thinking as they figure out phenomena and define/solve problems? ● Do the phenomena and/or problems set out for the learning sequences serve as a central component (drive student learning) of learning across multiple lessons or activities and can they be explained through the application of targeted grade-appropriate SEPs, CCCs, and DCIs? ● Do the materials engage students in phenomena and/or problems across DCIs in all disciplines (earth/space, life, physical science) across the grade? ● Do the materials engage all students in learning experiences that connect phenomena and/or problems with the three dimensions and are not separated from the DCIs? ● Does student engagement of phenomena and/or problems develop understanding of just the DCIs, or does it also develop understanding of CCCs and SEPs? **During Discussion:** ● Identify evidence of phenomena and problems used across multiple lessons or activities. ● To what extent is the phenomenon or problem in unit, chapter, or learning module used to drive student learning (serve as a central component of learning) across multiple lessons?

- To what extent do the materials provide multimodal opportunities for students to develop, evaluate, and revise their thinking as they figure out phenomena and define/solve problems?
- To what degree does the series use phenomena or problems in units, chapters, or learning modules across multiple lessons to develop student understanding of all three dimensions?
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

4 points:

- Materials consistently provide units, chapters, or learning modules across the grade that use phenomena or problems to drive student learning across multiple lessons. **AND**
- Materials consistently provide units, chapters, or learning modules across the grade that use phenomena or problems to engage with all three dimensions across multiple lessons. **AND**
- Materials consistently provide multimodal opportunities for students to develop, evaluate, and revise their thinking as they figure out phenomena and define/solve problems.

2 points:

- Materials provide numerous units, chapters, or learning modules across the grade that use phenomena or problems to drive student learning across multiple lessons. **AND**
- Materials provide numerous units, chapters, or learning modules across the grade that use phenomena or problems to engage with all three dimensions across multiple lessons. **AND**
- Materials provide multimodal opportunities for students to develop, evaluate, and revise their thinking as they figure out phenomena and define/solve problems, but not consistently.

0 points:

- Materials provide no or few units, chapters, or learning modules across the grade that use phenomena or problems to drive student learning across multiple lessons. **OR**
- Materials provide no or few units, chapters, or learning modules across the grade that use phenomena or problems to engage with all three dimensions across multiple lessons. **OR**
- Materials do not provide multimodal opportunities for students to develop, evaluate, and revise their thinking as they figure out phenomena and define/solve problems.

Science Grades K-5
Evidence Guides

GATEWAY 2

Gateway 2, Criterion 1: Coherence and Full Scope of the Three Dimensions: Are the materials coherent in design, scientifically accurate, and do they support grade-level expectations of all three dimensions?

Consider the purpose and research connection for Criterion 1 when looking for evidence to support indicators 2a-2g.

What is the purpose of this criterion?

"The Framework's vision is that students will acquire knowledge and skill in science and engineering through a carefully designed sequence of learning experiences. Each stage in the sequence will develop students' understanding of particular scientific and engineering practices, crosscutting concepts, and disciplinary core ideas while also deepening their insights into the ways in which people from all backgrounds engage in scientific and engineering work to satisfy their curiosity, seek explanations about the world, and improve the built world." (Framework, p. 247)

"A major goal for NGSS-designed science education is for students to be able to 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." (2015 Achieve NGSS Innovations)

The NGSS were designed in a coherent manner with progressions for each dimension building from grades K-12. The progressions for the DCIs, CCCs, and SEPs are displayed in separate appendices for the NGSS (appendices E, F, and G, respectively). The progressions appendices for Grades K-5 showcase the end of grade-band expectation for each dimension. Since the progressions are grade-banded, materials can be developed in a variety of ways including a range of learning progressions that can occur in various grades that may or may not build toward the end of grade-band expectation. Therefore, it is important for a review to examine how materials are designed to purposefully build student's knowledge and use of each dimension over the course of the series.

This criterion

- examines the materials to determine the extent that students are engaged in learning accurate and appropriate grade-level and/or grade-band science.
- examines the materials to determine the extent that all DCIs and associated elements are included within the series.
- examines the materials to determine the extent that each science and engineering practice is included at each grade and the associated elements of each practice are included within the series.
- examines the materials to determine the extent that each crosscutting concept is included at each grade and the associated elements of each crosscutting concept are included within the series.

Research Connection

"To develop a thorough understanding of scientific explanations of the world, students need sustained opportunities to work with and develop the underlying ideas and to appreciate those ideas' interconnections over a period of years rather than weeks or months... This sense of development has been conceptualized in the idea of learning progressions... If mastery of a core idea in a science discipline is the ultimate educational destination, then well-designed learning progressions provide a map of the routes that can be taken to reach that destination. Such progressions describe both how students' understanding of the idea matures over time and the instructional supports and experiences that are needed for them to make progress. Learning progressions may extend all the way from preschool to 12th grade and beyond—indeed, people can continue learning about scientific core ideas their entire lives. Because learning progressions extend over multiple years, they can prompt educators to consider how topics are presented at each grade level so that they build on prior understanding and can support increasingly sophisticated

learning. Hence, core ideas and their related learning progressions are key organizing principles for the design of the framework." (Framework, p. 28)

"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." (Innovations, pg. 3)

"…K-12 science and engineering education should focus on a limited number of disciplinary core ideas and crosscutting concepts, be designed so that students continually build on and revise their knowledge and abilities over multiple years, and support the integration of such knowledge and abilities with the practices needed to engage in scientific inquiry and engineering design." (Framework, p. 2)

"A coherent and consistent approach throughout grades K-12 is key to realizing the vision for science and engineering education embodied in the Framework: that students, over multiple years of school, actively engage in science and engineering practices and apply crosscutting concepts to deepen their understanding of each field's disciplinary core ideas." (Framework, p. 2)

"Every science unit or engineering design project must have as one of its goals the development of student understanding of at least one disciplinary core idea. In addition, explicit reference to each crosscutting concept will recur frequently and in varied contexts across disciplines and grades. These concepts need to become part of the language of science that students use when framing questions or developing ways to observe, describe, and explain the world." (Framework, p. 247)

Guidance for Indicator 2a.

Indicator 2a. Materials are designed for students to build and connect their knowledge and use of the three dimensions across the series.

What is the purpose of this indicator?

"The Framework's vision is that students will acquire knowledge and skill in science and engineering through a carefully designed sequence of learning experiences. Each stage in the sequence will develop students' understanding of particular scientific and engineering practices, crosscutting concepts, and disciplinary core ideas while also deepening their insights into the ways in which people from all backgrounds engage in scientific and engineering work to satisfy their curiosity, seek explanations about the world, and improve the built world." (Framework, p. 247)

"Science concepts build coherently across K–12. The emphasis of the NGSS is a focused and coherent progression of knowledge from grade band to grade band, allowing for a dynamic process of building knowledge throughout a student's entire K–12 science education." (The Next Generation Science Standards, p. xiii)

"Conclusion 5: Proficiency in science involves having knowledge of facts and concepts as well as how these ideas and concepts are related to each other. Thus, to become more expert in science, students need to learn key ideas and concepts, how they are related to each other, and their implications and applications within the discipline. This entails a process of conceptual development that in some cases involves large-scale reorganization of knowledge and is not a simple accumulation of information." (Taking Science to School, p. 338-339)

"Curriculum units need to be sequenced across a year so that students can build ideas across time in coherent learning progressions, in which questions or challenges, gaps in models, and new phenomena motivate developing deeper disciplinary core and crosscutting ideas." (Guide to Implementing NGSS, p. 53)

"Across units, students encounter the different dimensions of a core idea within different science and engineering practices, and they encounter crosscutting concepts across investigations of different core ideas. Over time, moreover, students' understanding of core ideas and crosscutting concepts develops so that they can be presented with more complex phenomena and design challenges, and their increasing grasp of practice supports their ability to engage with these phenomena and challenges." (Developing NGSS-Aligned Curriculum Materials, p. 11)

This indicator

- Examines whether the materials connect student learning and use of the three dimensions within or between units and across the series.
- Examines whether materials are designed with an intentional sequence or suggested sequence and/or guidance on how to intentionally sequence (when modular in design). (see 3l for rationale)

Evidence Collection

Review the units in both student and teacher materials across the series.
Review the grade and series scope and sequence.

In the instructional materials for the series being reviewed:
2a.i

- Look for and record evidence of how the materials demonstrate how the dimensions connect from unit to unit

- Look for evidence that the materials describe or reference connections in the students materials
- Look for evidence that the materials provide teacher supports to help students understand the connections between units.
- Look for and record evidence of how the materials are designed to build and connect each dimension over time.
    - Focus on how the materials connect DCIs across units (or grades) to help students build and connect knowledge.
    - Focus on how the materials connect SEPs across units (or grades) to help students build and connect knowledge.
    - Focus on how the materials connect CCCs across units (or grades) to help students build and connect knowledge.

2a.ii

- Look for and record evidence that materials are designed with an intentional or suggested sequence.
- Look for and record evidence that student tasks related to explaining phenomena and/or solving problems increase in sophistication across the series.

Record the specific examples that provide evidence of how each dimension connects or builds across units, grade(s), and/or the series.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

2a.i

- Do the materials provide information to help students understand how the dimensions connect from unit to unit?
    - Do the materials make clear (to the students) the connections of the three dimensions across units to connect prior, current, and future learning?
    - Do the materials provide teacher supports designed to help students understand the connections between units?
    - How do the materials connect DCIs, SEPs, and/or CCCs from unit to unit (within or across grades) to help students build and connect knowledge.

2a.ii

- Are the materials designed with an intentional sequence?
    - If the materials are modular, do the materials provide a suggested sequence as implementation guidance? (Indicator 3l looks for rationale of how the sequence is designed.)
- Do student tasks related to explaining phenomena and/or solving problems increase in sophistication across the series?
    - Do the student tasks change over time?
    - Do student tasks get more complex and involve deeper use of the SEPs as students explain phenomena or solve problems?
    - Do the explanations of phenomena or the solutions to problems increase in complexity across the series?

During Discussion:

2a.i

- Identify evidence of where and how the materials provide information to help students understand how the dimensions connect from unit to unit.

- Identify where the materials make clear (to the students) the connections of the three dimensions across units to connect prior, current, and future learning.
- Identify where the materials provide teacher supports designed to help students understand the connections between units.
- Identify how and where the materials connect DCIs, CCCs, and/or SEPs from unit to unit (within or across grades) to help students build and connect knowledge.

2a.ii

- Identify evidence that the materials are designed with an intentional sequence (or suggested sequence if modular)
- Identify evidence that the student tasks related to explaining phenomena and/or solving problems increase in sophistication across the series
  - Identify when and where student tasks change over time.
  - Identify when and where student tasks get more complex and involve deeper use of the CCCs and SEPs as students figure out phenomena or solve problems within a grade or across the grade band (K-2 or 3-5).
  - Identify evidence that the ways students engage in figuring out phenomena or solving problems increases in complexity within a grade or across the grade band (K-2 or 3-5).
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring: 2a.i. Students understand how the materials connect the dimensions from unit to unit

2 points:

- Materials consistently demonstrate how the dimensions connect from unit to unit by describing connections for students and/or providing supports for teachers to help students understand connections.

1 point:

- Materials demonstrate how the dimensions connect from unit to unit by describing connections for students and/or providing supports for teachers to help students understand connections, but not consistently.

0 points:

- Materials do not demonstrate how the dimensions connect from unit to unit.

Scoring: 2a.ii. Materials have an intentional sequence where student tasks increase in sophistication

2 points:

- Materials are designed with an intentional or suggested sequence and student tasks related to explaining phenomena and/or solving problems increase in sophistication across the grade band.

1 point:

- Materials are designed with an intentional or suggested sequence but student tasks related to explaining phenomena and/or solving problems do not increase in sophistication across the grade band.

0 points:

- Materials are not designed with an intentional sequence, nor do they provide a suggested sequence.

Guidance for Indicator 2b.

Indicator 2b. Materials present Disciplinary Core Ideas (DCI), Science and Engineering Practices (SEP), and Crosscutting Concepts (CCC) in a way that is scientifically accurate.*

What is the purpose of this indicator?
Scientific rigor and accuracy of what students learn is paramount; the materials need to accurately communicate important DCIs, SEPs, and CCCs. "...science content standards should be clear, detailed, and complete; reasonable in scope; rigorously and scientifically correct; and based on sound models of student learning." (Framework, p. 298) This indicator ● examines whether materials present DCIs, SEPs, and CCCs in a scientifically accurate way within and across lessons, activities, and units/learning modules and as students make sense of phenomena and solve problems. ● examines whether materials present disciplinary core ideas, SEPs, and CCCs in a scientifically accurate way within assessments.
Evidence Collection
Review the units, chapters and lessons in both student and teacher materials across the grade. Review the grade and series scope and sequence. Review progression documents and standards as needed: ● Appendix E: Disciplinary Core Idea Progressions ● Appendix F: Science and Engineering Practices ● Appendix G: Crosscutting Concepts **In the instructional materials for the series being reviewed:** ● Look for and record evidence to determine whether the materials present DCIs and associated elements in a scientifically accurate way. ● Look for and record evidence to determine whether the materials present SEPs and associated elements in a scientifically accurate way. ● Look for and record evidence to determine whether the materials present CCCs and associated elements in a scientifically accurate way. ● Look for and record evidence to determine whether the materials combine dimensions for two-dimensional and three-dimensional learning in a scientifically accurate way. ● Look for and record evidence that assessments present DCIs, SEPs, and CCCs in a scientifically accurate way.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials present each dimension and its elements in a scientifically accurate way?
- Do the materials combine dimensions for two-dimensional and three-dimensional learning in a scientifically accurate way?
- Do the assessments present DCIs, SEPs, and CCCs in a scientifically accurate way?

During Discussion:

- Identify evidence that the materials present each dimension and its elements in a scientifically accurate way.
- Identify evidence that the materials combine dimensions for two-dimensional and three-dimensional learning in a scientifically accurate way.
- Identify evidence that the assessments present DCIs, SEPs, and CCCs and their associated elements in a scientifically accurate way.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials consistently present all three dimensions in a scientifically accurate way. **AND**
- Assessments consistently present all DCIs, SEPs, and CCCs in a scientifically accurate way.

1 point:

- Materials and assessments consistently present all DCIs in a scientifically accurate way. **AND**
- Materials contain a few minor errors (not fully accurate) when presenting SEPs or CCCs. **AND/OR**
- Assessments contain a few minor errors (not fully accurate) when assessing SEPs or CCCs.

0 points:

- Materials contain numerous minor errors (not fully accurate) in presenting any of the dimensions. **OR**
- Materials present any of the dimensions in a scientifically inaccurate way. **OR**
- Assessments present any of the dimensions in a scientifically inaccurate way.

* **NOTE**: This indicator is non-negotiable; instructional materials being reviewed must score above zero points to have an opportunity to advance past Gateway 2.

Guidance for Indicator 2c.

Indicator 2c. Materials do not inappropriately include scientific content and ideas outside of the grade-level Disciplinary Core Ideas.*

What is the purpose of this indicator?

Science is both a body of knowledge that represents current understanding of natural systems and the process whereby that body of knowledge has been established and is being continually extended, refined, and revised. Both elements are essential: one cannot make progress in science without an understanding of both. Likewise, in learning science one must come to understand both the body of knowledge and the process by which this knowledge is established, extended, refined, and revised. (Taking Science to School, p. 27)

…through discussion and reflection, students can come to realize that scientific inquiry embodies a set of values. These values include respect for the importance of logical thinking, precision, open-mindedness, objectivity, skepticism, and a requirement for transparent research procedures and honest reporting of findings. (Framework, p. 248)

The continuing expansion of scientific knowledge makes it impossible to teach all the ideas related to a given discipline in exhaustive detail during the K-12 years. But given the cornucopia of information available today virtually at a touch— people live, after all, in an information age—an important role of science education is not to teach "all the facts" but rather to prepare students with sufficient core knowledge so that they can later acquire additional information on their own. (Framework, pp. 31-32)

This indicator

- examines whether materials inappropriately label non-scientific content or ideas (e.g., moral, societal, aesthetic, religious, existential) as DCIs in science.
- examines whether materials inappropriately label scientific content or ideas outside of the DCIs as DCIs in science.
- examines whether materials inappropriately include DCIs from below the grade band with no meaningful connections to the grade-level DCIs.
- examines whether materials inappropriately include DCIs from above the grade with no meaningful connections to the grade-level DCIs or supports for extending the grade-level learning.

Evidence Collection

Review the units, chapters and lessons in both student and teacher materials across the grade.
Review the grade and series scope and sequence.

In the instructional materials for the series being reviewed:

- Look for and record evidence throughout the grade to determine whether the materials include non-scientific content or ideas (e.g., moral, societal, aesthetic, religious, existential) as science.
- Look for and record evidence throughout the grade to determine whether the materials inappropriately include scientific content or ideas outside of the DCIs.

- Look for and record evidence throughout the grade to determine whether the materials inappropriately include DCIs from below the grade with no meaningful connections to the grade-level DCIs.
- Look for and record evidence throughout the grade to determine whether the materials inappropriately include DCIs from above the grade with no meaningful connections to the grade-level DCIs or supports for extending the grade-level learning.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials include non-scientific content or ideas (e.g., moral, societal, aesthetic, religious, existential) as science?
- Do the materials inappropriately include scientific content or ideas outside of the DCIs?
- Do the materials inappropriately include DCIs from below the grade with no meaningful connections to the grade-level DCIs?
- Do the materials inappropriately include DCIs from above the grade with no meaningful connections to the grade-level DCIs or supports for extending the grade-level learning? (Note: CCCs and SEPs are addressed in indicator 2a)

During Discussion:

- Identify evidence of instances where the materials include non-scientific content or ideas (e.g., moral, societal, aesthetic, religious, existential) as science.
- Identify evidence of instances where the materials inappropriately include scientific content or ideas without making meaningful connections to grade-level DCIs.
- Identify evidence of instances where the materials inappropriately include DCIs from below the grade with no meaningful connections to the grade-level DCIs.
- Identify evidence of instances where the materials inappropriately include DCIs from above the grade with no meaningful connections to the grade-level DCIs or supports for extending the grade-level learning?
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials contain no instances where non-scientific content or ideas (e.g., moral, societal, aesthetic, religious, existential) are included as science ideas. **AND**
- Materials contain no instances where scientific content or ideas are included without meaningful connections to grade-level DCIs. **AND**
- Materials contain no instances of DCIs from below the grade that are included without meaningful connections made to the grade-level DCIs. **AND**
- Materials contain no instances of DCIs from above the grade that are included without meaningful connections made to the grade-level DCIs or supports for extending the grade-level learning.

1 point:

- Materials contain no instances where non-scientific content or ideas (e.g., moral, societal, aesthetic, religious, existential) are included as science ideas. **AND**
- Materials contain few instances where scientific content or ideas are included without meaningful connections to grade-level DCIs. **AND/OR**
- Materials contain few instances of DCIs from below the grade that are inappropriately included with no meaningful connections to the grade-level DCIs. **AND/OR**
- Materials contain few instances of DCIs from above the grade that are inappropriately included with no meaningful connections to the grade-level DCIs or supports for extending the grade-level learning.

0 points:

- Materials contain multiple instances where non-scientific content or ideas (e.g., moral, societal, aesthetic, religious, existential) are included as science ideas. **OR**
- Materials contain multiple instances where scientific content or ideas are included without meaningful connections to grade-level DCIs. **OR**
- Materials contain multiple instances of DCIs from below the grade that are inappropriately included with no meaningful connections to the grade-level DCIs. **OR**
- Materials contain multiple instances of DCIs from above the grade that are inappropriately included with no meaningful connections to the grade-level DCIs or supports for extending the grade-level learning.

* **NOTE**: This indicator is non-negotiable; instructional materials being reviewed must score above zero points to have an opportunity to advance past Gateway 2.

Guidance for Indicator 2d.

Indicator 2d. Materials incorporate all grade-level Disciplinary Core Ideas (also see indicator 2e):

What is the purpose of this indicator?

"Conclusion 5: Proficiency in science involves having knowledge of facts and concepts as well as how these ideas and concepts are related to each other. Thus, to become more expert in science, students need to learn key ideas and concepts, how they are related to each other, and their implications and applications within the discipline. This entails a process of conceptual development that in some cases involves large-scale reorganization of knowledge and is not a simple accumulation of information. " (Taking Science to School pp. 338-339)

“An education focused on a limited set of ideas and practices in science and engineering should enable students to evaluate and select reliable sources of scientific information and allow them to continue their development well beyond their K-12 school years as science learners, users of scientific knowledge, and perhaps also as producers of such knowledge.”(Framework, p. 31)

“In organizing Dimension 3, we grouped disciplinary ideas into four major domains: the physical sciences; the life sciences; the earth and space sciences; and engineering, technology, and applications of science. At the same time, true to Dimension 2, we acknowledge the multiple connections among domains. Indeed, more and more frequently, scientists work in interdisciplinary teams that blur traditional boundaries. As a consequence, in some instances core ideas, or elements of core ideas, appear in several disciplines (e.g., energy, human impact on the planet).” (Framework, p. 31).

“…by building a strong base of core knowledge and competencies, understood in sufficient depth to be used, students will leave school better grounded in scientific knowledge and practices—and with greater interest in further learning in science—than when instruction “covers” multiple disconnected pieces of information that are memorized and soon forgotten once the test is over.” (Framework, pp. 32-33)

This indicator

- examines the materials to determine if all grade-level DCIs and their elements are included across the grade.
    - Physical Sciences (2d.i)
    - Life Sciences (2d.ii)
    - Earth and Space Sciences (2d.iii)
    - Engineering, Technology, and Applications of Science (2d.iv)

Evidence Collection

Review the units, chapters and lessons in both student and teacher materials across the grade.
Review the grade and series scope and sequence.
Review progression documents and standards as needed:

- **Appendix E: Disciplinary Core Idea Progressions**
- **Appendix I: Engineering Design in the NGSS**
- **Appendix J: Science, Technology, Society, and the Environment**

In the instructional materials for the series being reviewed:

- Look for evidence within individual lessons or activities across the series to determine where students develop grade-level understanding of each of the four DCIs and their components.
- Look for evidence within individual lessons or activities across the series to determine where students develop understanding of each grade-level appropriate element of each Disciplinary Core Idea. Note if an element is fully met by the materials or partially met.
- Look for evidence across the series to determine where DCIs connect across lessons, units, and/or grades in a way that allows students to use and build DCI-related knowledge to reach grade-level expectations.
- Record the specific examples of lessons or activities that include each disciplinary core idea and associated elements.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials incorporate all grade-level DCIs and their components, based on the PEs for the grade? For the ETS DCIs (2d.iv), look at individual grades and across the entire grade band.
- Do the materials incorporate all grade-level elements for each DCI across the grade level? Note if an element is fully met by the materials or partially met. For the ETS DCIs (2d.iv), look at individual grades and across the entire grade band.

During Discussion:

- Identify evidence of each DCI, components, and associated elements within the grade.
    - Physical Sciences (2d.i)
    - Life Sciences (2d.ii)
    - Earth and Space Sciences (2d.iii)
    - Engineering, Technology, and Applications of Science (2d.iv)
        - Because the ETS DCIs are written for the grade-band and not individual grade levels, this report looks for evidence of the grade-band DCIs across the entire band and looks for grade-level evidence of ETS DCIs embedded in physical, life, or earth and space science PEs. The 2d.iv report will include all three grades within the band.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially. Scoring note: If all of the elements are present but a few elements are only partially met, this still meets the criteria for all elements incorporated.
- Agree on final ratings.

Scoring: 2d.i: Physical Sciences

2 points:

- Materials incorporate all grade-level components and associated elements of the Physical Science DCIs.

1 point:

- Materials incorporate all grade-level components and nearly all the associated elements of the Physical Science DCIs.

0 points:

- Materials do not incorporate all grade-level components of the Physical Science DCIs. **OR**
- Materials exclude multiple grade-level elements of the Physical Science DCIs.

Scoring: 2d.ii: Life Sciences

2 points:

- Materials incorporate all grade-level components and associated elements of the Life Science DCIs.

1 point:

- Materials incorporate all grade-level components and nearly all the associated elements of the Life Science DCIs.

0 points:

- Materials do not incorporate all grade-level components of the Life Science DCIs. **OR**
- Materials exclude multiple grade-level elements of the Life Science DCIs.

Scoring: 2d.iii: Earth and Space Sciences

2 points:

- Materials incorporate all grade-level components and associated elements of the Earth and Space Science DCIs.

1 point:

- Materials incorporate all grade-level components and nearly all the associated elements of the Earth and Space Science DCIs.

0 points:

- Materials do not incorporate all grade-level components of the Earth and Space Science DCIs. **OR**
- Materials exclude multiple grade-level elements of the Earth and Space Science DCIs.

Scoring: 2d.iv: Engineering, Technology, and Applications of Science
Note: This is a single report that includes all three grades within the band.

2 points:

- Materials incorporate all grade-band components and associated elements of the Engineering, Technology, and Applications ofScience DCIs.
- Materials incorporate all grade-level components and associated elements of the Engineering, Technology, and Applications of Science DCIs.

1 point:

- Materials incorporate all grade-band components and nearly all the associated elements of the Engineering, Technology, and Applications of Science DCIs. **AND**
- Materials incorporate nearly all the associated grade-level elements of the Engineering, Technology, and Applications of Science DCIs.

0 points:

- Materials do not incorporate all grade-band or grade-level components of the Engineering, Technology, and Applications of Science DCIs. **OR**

- Materials exclude multiple grade-band or grade-level elements of the Engineering, Technology, and Applications of Science DCIs.

Guidance for Indicator 2e.

Indicator 2e. Materials incorporate all grade-band Science and Engineering Practices.

What is the purpose of this indicator?

"Engaging in the practices of science helps students understand how scientific knowledge develops; such direct involvement gives them an appreciation of the wide range of approaches that are used to investigate, model, and explain the world. Engaging in the practices of engineering likewise helps students understand the work of engineers, as well as the links between engineering and science. Participation in these practices also helps students form an understanding of the crosscutting concepts and disciplinary ideas of science and engineering; moreover, it makes students' knowledge more meaningful and embeds it more deeply into their worldview." (Framework, p. 42)

"Although not every such practice will occur in every context, the curriculum should provide repeated opportunities across various contexts for students to develop their facility with these practices and use them as a support for developing deep understanding of the concepts in question and of the nature of science and of engineering." (Framework, p. 247)

"Students in grades K-12 should engage in all eight practices over each grade band. All eight practices are accessible at some level to young children; students' abilities to use the practices grow over time. However, the NGSS only identifies the capabilities students are expected to acquire by the end of each grade band (K-2, 3-5, 6-8, and 9-12). Curriculum developers and teachers determine strategies that advance students' abilities to use the practices." (NGSS Appendix F, p. 2)

This indicator

- examines the materials to determine if the grade-level appropriate SEPs and their associated elements are included in each grade.
    - Asking Questions and Defining Problems
    - Developing and Using Models
    - Planning and Carrying Out Investigations
    - Analyzing and Interpreting Data
    - Using Mathematics and Computational Thinking (not addressed in K-2 PEs)
    - Constructing Explanations and Designing Solutions
    - Engaging in Argument from Evidence
    - Obtaining, Evaluating, and Communicating Information
- examines the materials to determine if SEPs from outside of the grade band are included within the grade.
- examines the materials to determine if the grade-band SEPs and their associated elements are included in each grade band.

Evidence Collection

Review the units, chapters and lessons in both student and teacher materials across the grade.
Review the grade and series scope and sequence.
Review progression documents and standards as needed: Appendix F: Science and Engineering Practices

In the instructional materials for the series being reviewed:
2e.i

- For each grade, look for evidence within individual lessons or activities to determine where students develop and use grade-level appropriate SEPs and their elements. Note if an element is fully met by the materials or partially met.
- Detail how the SEPs are organized. Note how the SEPs build and connect across the grade level (to support the narrative report).

2e.ii

- Across the band (K-2 or 3-5), determine if all grade-band appropriate SEPs are addressed.
- Record the specific examples of lessons or activities across the grades to detail incorporation of all grade band SEPs and associated elements.
- Across the band (K-2 or 3-5), determine how students repeatedly use grade-band appropriate SEPs across various contexts.
- Detail how the SEPs are organized. Note how the SEPs build and connect across the grade band (to support the narrative report).
-

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials incorporate the grade-level appropriate SEPs within the grade?
- Do the materials incorporate all grade-level elements for each SEP across the grade? Note if an element is fully met by the materials or partially met.
- Do the materials incorporate repeated opportunities across various contexts for students to use multiple SEPs that are grade-band appropriate?
- Do the SEPs build and connect across the grade level and grade band (to support the narrative report)?

During Discussion:

- Identify evidence of each grade-level appropriate SEP and associated elements within the grade.
- Identify SEP elements from outside the grade level, but within the grade band. (Note for narrative report.)
- Identify SEP elements from outside the grade band and discuss if these instances lead to grade-band appropriate work.
- Discuss how the SEPs are organized within and across the grade levels and if repeated opportunities exist for students to use grade-band appropriate SEPs across various contexts.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials within the grade, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially. Scoring note: If all of the elements are

present but a few elements are only partially met, this still meets the criteria for all elements incorporated.
- Agree on final ratings.

Scoring: 2e.i - Materials incorporate grade-level appropriate SEPs within each grade.

4 points:
- Materials incorporate all grade-level SEPs and nearly all the associated grade-level elements. **AND**
- Materials provide repeated opportunities for students to use grade-level appropriate SEPs across various contexts throughout the level.

2 points:
- Materials incorporate all grade-level SEPs and nearly all the associated grade-level elements. **OR**
- Materials provide repeated opportunities for students to use grade-level appropriate SEPs across various contexts throughout the level.

0 points:
- Materials do not incorporate all grade-level SEPs within the grade. **OR**
- Materials include numerous elements of SEPs from above or below the grade band without connecting to the grade-level appropriate SEP. **OR**
- Materials exclude multiple grade-level elements of the SEPs.

Scoring: 2e.ii - Materials incorporate all SEPs across the grade band.

4 points:
- Materials incorporate all SEPs and associated elements within the grade band. **AND**
- Materials provide repeated opportunities for students to use grade-band appropriate SEPs across various contexts throughout the band.

2 points:
- Materials incorporate all SEPs and nearly all the associated elements within the grade band. **AND**
- Materials provide repeated opportunities for students to use grade-band appropriate SEPs across various contexts throughout the band.

0 points:
- Materials do not incorporate all SEPs within the grade band. **OR**
- Materials exclude multiple grade-band elements of the SEPs. **OR**
- Materials do not provide repeated opportunities for students to use grade-band appropriate SEPs across various contexts throughout the band.

Guidance for Indicator 2f.

Indicator 2f. Materials incorporate all grade-band Crosscutting Concepts.

What is the purpose of this indicator?
"…[Crosscutting concepts] bridge disciplinary boundaries, having explanatory value throughout much of science and engineering. These crosscutting concepts were selected for their value across the sciences and in engineering. These concepts help provide students with an organizational framework for connecting knowledge from the various disciplines into a coherent and scientifically based view of the world." (Framework, p. 83) This indicator ● examines the materials to determine if the grade-level appropriate CCCs and their associated elements are included within the grade band. ○ Patterns ○ Cause and effect: Mechanism and explanation ○ Scale, proportion, and quantity ○ Systems and system models ○ Energy and matter ○ Structure and function ○ Stability and change
Evidence Collection
Review the units, chapters and lessons in both student and teacher materials across the grade. Review the grade and series scope and sequence. Review progression documents and standards as needed: Appendix G: Crosscutting Concepts **In the instructional materials for the series being reviewed:** ● Across the band (K-2 or 3-5), determine if all grade-level appropriate CCCs are addressed. ● Record the specific examples of lessons or activities across the grades to detail incorporation of all grade band CCCs and associated elements. ● Across the band (K-2 or 3-5), determine how students repeatedly use grade-band appropriate CCCs across various contexts.
Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials incorporate the grade-level appropriate CCCs within the grade band?
- Do the materials incorporate all grade-level elements for each CCC across the grade band? Note if an element is fully met by the materials or partially met.
- Do the materials incorporate repeated opportunities across various contexts for students to use the CCCs?

During Discussion:

- Identify evidence of each grade-level appropriate CCC and associated elements within the grade band.
- Identify CCC elements from outside the grade band and discuss if these instances lead to grade-band appropriate work.
- Discuss how the CCCs are organized within and across the grade band and if repeated opportunities exist for students to use grade-band appropriate CCCs across various contexts.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials within the grade, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially. Scoring note: If all of the elements are present but a few elements are only partially met, this still meets the criteria for all elements incorporated.
- Agree on final ratings.

Scoring: 2f - Materials incorporate all grade-band Crosscutting Concepts.

8 points:

- Materials incorporate all CCCs and associated elements within the grade band. **AND**
- Materials provide repeated opportunities for students to use grade-band appropriate CCCs across various contexts throughout the band.

4 points:

- Materials incorporate all CCCs and nearly all the associated elements within the grade band. **AND**
- Materials provide repeated opportunities for students to use grade-band appropriate CCCs across various contexts throughout the band.

0 points:

- Materials do not incorporate all CCCs within the grade band. **OR**
- Materials exclude multiple grade-band elements of the CCCs. **OR**
- Materials do not provide repeated opportunities for students to use grade-band appropriate CCCs across various contexts throughout the band.

Guidance for Indicator 2g.

Indicator 2g. Materials incorporate NGSS Connections to Nature of Science and Engineering.

What is the purpose of this indicator?

"…[Crosscutting concepts] bridge disciplinary boundaries, having explanatory value throughout much of science and engineering. These crosscutting concepts were selected for their value across the sciences and in engineering. These concepts help provide students with an organizational framework for connecting knowledge from the various disciplines into a coherent and scientifically based view of the world. "(Framework, p. 83)

"Additionally, eight understandings with appropriate grade-level outcomes are included as extensions of the science and engineering practices and crosscutting concepts, not as a fourth dimension of standards. (NGSS Appendix H, p. 1)

"There is a broad consensus that these two core ideas belong in the NGSS but a majority of state teams recommended that these ideas could best be illustrated through their connections to the natural science disciplines. There are a number of performance expectations that require students to demonstrate not only their understanding of a core idea in natural science, but also how that idea is supported by evidence derived from certain technological advances. The connection between these core ideas and specific performance expectations is shown in the crosscutting concept foundation box. (NGSS Appendix J, p. 3)

This indicator

- examines the materials to determine if NGSS Connections to Nature of Science and Engineering are included in each grade band (K-2 or 3-5).
    - Nature of Science elements associated with SEPs
    - Nature of Science elements associated with CCCs
    - Engineering elements associated with CCCs

Evidence Collection

Review the units, chapters and lessons in both student and teacher materials across the grade band (K-2 or 3-5).
Review the grade and series scope and sequence.
Review progression documents and standards as needed:

- Appendix H: Nature of Science
- Appendix I: Engineering Design in the NGSS
- Appendix J: Science, Technology, Society, and the Environment

In the instructional materials for the series being reviewed:

- Look for evidence within individual lessons or activities to determine where students develop and use the grade-band appropriate NGSS Connections to Nature of Science and Engineering.
- Look for evidence to determine where students develop understanding of grade-band elements of NGSS Connections to Nature of Science and Engineering.
- Record the specific examples of lessons or activities for the grade that include NGSS Connections to Nature of Science and Engineering and associated grade-band elements.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials incorporate grade-band NGSS Connections to Nature of Science and Engineering elements?

During Discussion:

- Identify evidence of each NGSS Connection to Nature of Science and Engineering and associated elements within the grade band.
    - Nature of Science elements associated with SEPs
    - Nature of Science elements associated with CCCs
    - Engineering elements associated with CCCs
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials incorporate grade-band NGSS Connections to Nature of Science and Engineering within individual lessons or activities across the series. Elements from all three of the following categories are included in the materials for the grade band:
    - grade-band Nature of Science elements associated with SEPs
    - grade-band Nature of Science elements associated with CCCs
    - grade-band Engineering elements associated with CCCs

1 point:

- Materials incorporate grade-band NGSS Connections to Nature of Science and Engineering within individual lessons or activities across the series. Elements from two of the following categories are included in the materials for the grade band:
    - grade-band Nature of Science elements associated with SEPs
    - grade-band Nature of Science elements associated with CCCs
    - grade-band Engineering elements associated with CCCs

0 points:

- Materials do not incorporate grade-band NGSS Connections to Nature of Science and Engineering within individual lessons or activities across the series. Elements from zero or one of the following categories are included in the materials for the grade band:
    - grade-band Nature of Science elements associated with SEPs
    - grade-band Nature of Science elements associated with CCCs
    - grade-band Engineering elements associated with CCCs

Science Grades K-5
Evidence Guides

GATEWAY 3

Note: This version will be used until 12/31/20. In 2021, the revised Gateway 3 indicators will be incorporated into the evidence guides.

Criterion 1: Design to Facilitate Teacher Learning: Are the materials designed to support teachers not only in using the materials, but also in understanding the expectations of the standards?

Consider the purpose and research connection for Criterion 1 when looking for evidence to support indicators 3a-3d.

What is the purpose of this criterion?
This criterion examines how the materials support teachers: ● in understanding the integration of the three dimensions and how to support students in engaging in the three dimensions in increasingly sophisticated ways. ● in understanding how the targeted dimensions support students in explaining phenomena or solving problems. ● in engaging students in discourse to support students in using the three dimensions. ● in planning and providing effective learning experiences that engage students in understanding phenomena and solving problems. ● in delivering the student materials, ancillary materials, and embedded technology, if applicable. ● in understanding the instructional approaches of the program and identification of the research-based strategies.
Research Connection
"Curricula based on the Framework and resulting standards should integrate the three dimensions—scientific and engineering practices, crosscutting concepts, and disciplinary core ideas—and follow the progressions articulated in this report. In order to support the vision of this Framework, standards-based curricula in science need to be developed to provide clear guidance that helps teachers support students engaging in scientific practices to develop explanations and models [5, 21-24]. In addition, curriculum materials need to be developed as a multiyear sequence that helps students develop increasingly sophisticated ideas across grades K-12 [5, 25, 26]." (Framework, p. 246) Teacher materials can support teachers in understanding the connection between instructional activities and three-dimensional learning goals by highlighting how activities support the learning goals. (BSCS NGAL, p. 21) Materials should be evaluated by how well they help teachers see when and how activities or text contribute to the learning goals across instructional sequences or book chapters and supplemental resources (BSCS NGAL, p. 21)

Guidance for Indicator 3a

Indicator 3a. Materials include background information to help teachers support students in using the three dimensions to explain phenomena and solve problems (also see indicators 3b and 3l)

What is the purpose of this indicator?

"Teacher materials can support teachers in understanding the connection between instructional activities and three-dimensional learning goals by highlighting how activities support the learning goals." (BSCS NGAL, p. 21)

"Materials should be evaluated by how well they help teachers see when and how activities or text contribute to the learning goals across instructional sequences or book chapters and supplemental resources." (BSCS NGAL, p. 21)

This indicator examines whether teacher materials provide guidance that explains:

- how to engage students in three-dimensional learning.
- the program design and the purpose of activities.
- how to support students in using the three dimensions to explain phenomena and solve problems.

Boundaries with other indicators:

- Indicators 1e and 1i: These indicators focus on opportunities for students to build their understanding of each of the dimensions by explaining phenomena and solving problems. Indicator 3a focuses on educative features to help teachers understand how students build understanding of the three dimensions by explaining phenomena or solving problems.
- Indicator 3b: Provides instructional supports for teachers to help students to explain phenomena and solve problems. Indicator 3a focuses on educative features to help teachers understand how the materials are designed to engage students in the three dimensions so that they can understand, make sense of, explain and solve phenomena and problems.
- Indicator 3l. Educative features that provide the rationale for how units are sequenced to build coherence and student understanding is covered in Indicator 3l.
- Gateway 2, Criterion 1: Indicator 2a focuses on opportunities for students to build their understanding of each of the dimensions with increasing sophistication. Indicator 3l focuses on educative features to help teachers understand the design of the series.

Evidence Collection

Review teacher materials across the series.
Review the grade and series scope and sequence.

In the teacher materials for the series being reviewed:

- Record specific examples of how the materials support teachers in understanding student learning of the dimensions (including engineering and nature of science) through phenomena and/or problems.
- Look for and record evidence of annotations or suggestions:
    - on how to support three-dimensional integration of SEPs, CCCs, and DCIs and their elements.
    - to help teachers understand how the materials integrate the three dimensions and support three-dimensional learning.
    - that clearly connect the purpose of activities to support students as they engage in three-dimensional learning to explain phenomena or solve problems.
- Look for and record evidence of annotations or suggestions:
    - that clearly explain what students should understand about the targeted phenomenon or problem.
    - that support teachers in understanding how students build understanding of each of the targeted dimensions as they explain phenomena and/or solve problems.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- How do the materials support teachers in understanding how students build understanding of each of the targeted dimensions by explaining phenomena and/or solving problems?
    - How do the materials support teachers to comprehend what students should understand about the targeted phenomenon or problem?
    - Do the teacher materials explicitly state the phenomenon or problem that is the focus of the student learning?
    - Do the teacher materials provide explanations to the teacher for how the phenomenon or problem is connected to the dimensions (including engineering and nature of science elements) targeted in the instruction?
    - How well do the materials support teachers in helping students make the connections between the phenomenon or problem, the instructional activities and the three dimensions?
- Do the teacher materials explain how activities within lessons are designed to enhance development of SEPs, CCCs, and as students explain phenomena or solve problems?
    - How well do the materials support teachers in integrating the three dimensions or in helping students make the connections?

During Discussion:

- Discuss how well the materials support teachers in understanding how students build understanding of each of the targeted dimensions by explaining phenomena and/or solving problems?
    - Discuss how the materials support teachers in understanding what students should understand about the targeted phenomenon or problem.

    - Discuss how the teacher materials indicate the phenomenon or problem that is the focus of the student learning.
    - Discuss how the teacher materials provide explanations to the teacher for how the phenomenon or problem is connected to the dimensions (including engineering and nature of science elements) targeted in the instruction.
    - Discuss how well the materials support teachers in helping students make the connections between the phenomenon or problem, the instructional activities and the three dimensions.
- Discuss whether the teacher materials explain how activities within lessons are designed to enhance development of SEPs, CCCs, and as students explain phenomena or solve problems.
    - Discuss how well the materials support teachers in integrating the three dimensions or in helping students make the connections?
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

4 points:

- Materials consistently support teachers by making explicit connections between the phenomenon or problem, the instructional activities, and the three dimensions. **AND**
- Materials consistently explain how the phenomena and/or problems drive student learning of the targeted dimensions.

2 points:

- Materials support teachers by making explicit connections between the phenomenon or problem, the instructional activities, and the three dimensions., but not consistently. **AND/OR**
- Materials explain how the phenomena and/or problems drive student learning of the targeted dimensions, but not consistently

0 points:

- Materials do not or rarely support teachers by making explicit connections between the phenomenon or problem, the instructional activities, and the three dimensions. **OR**
- Materials do not or rarely explain how the phenomena and/or problems drive student learning of the targeted dimensions.

Guidance for Indicator 3b.

Indicator 3b. Materials provide guidance that supports teachers in planning and providing effective learning experiences to engage students in figuring out phenomena and solving problems.

What is the purpose of this indicator?
This indicator focuses on providing guidance to **help teachers in planning** instructional practices for students to explain phenomena; indicator 3a focuses on educative features to **help teachers understand** how the dimensions support student understanding of phenomena and problems. This indicator differs from Gateway 1, Criterion 2 in that this indicator focuses on providing instructional supports to **help teachers in planning** instructional practices for students to explain phenomena; Indicators 1f and 1i focus on **opportunities for students** to build their understanding of each of the dimensions by explaining phenomena and solving problems. This indicator examines the teacher materials to determine whether they provide: ● guidance to support teachers in planning and providing effective learning experiences, including student discourse, related to understanding phenomena and solving problems. ● guidance or supports for engaging students in understanding phenomena and solving problems. ● guidance to support students to express, clarify, justify, interpret, and represent their ideas and to respond to peer and teacher feedback orally and/or in written form as their thinking and reasoning changes over time. ● multiple modalities that move students from using everyday language to developing and using more specialized language over time as they figure out phenomena and solve problems.
Evidence Collection
Review teacher materials across the series. Review the grade and series scope and sequence. **In the teacher materials for the series being reviewed:** ● Look for and record evidence that the materials provide guidance to support teachers in planning and providing effective learning experiences, including opportunities for student discourse, related to understanding phenomena and solving problems . ● Look for and record evidence to determine where there are guidance or supports to help teachers engage students in understanding phenomena and solving problems. ● Look for and record evidence that the materials provide guidance to support students to express, clarify, justify, interpret, and represent their ideas and to respond to peer and teacher feedback orally and/or in written form as their thinking and reasoning changes over time. ● Look for and record evidence that the materials provide multiple modalities that move students from using everyday language to developing and using more specialized language over time as they figure out phenomena and solve problems.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the teacher materials provide guidance or supports for engaging students in understanding phenomena and solving problems?
    - Do the materials provide supports for teachers to help engage students in understanding phenomena or solving problems through student thinking, reasoning, sensemaking, problem-solving, and metacognition?
    - Do the materials provide guidance to support students to express, clarify, justify, interpret, and represent their ideas and to respond to peer and teacher feedback orally through discourse and/or in written form as their thinking and reasoning changes over time?
- Do the materials provide multiple modalities that move students from using everyday language to developing and using more specialized language over time as they figure out phenomena and solve problems?
- Are the supports generic and/or specifically crafted for specific learning opportunities for students? Note this to support writing of the narrative.

During Discussion:

- Discuss how well the teacher materials provide supports for planning and providing effective learning experiences related to understanding phenomena and solving problems. Focus on what helps teachers set up the learning experiences to be deeply connected to the phenomenon or problem at hand.
- Discuss how well the teacher materials provide supports for engaging students in understanding phenomena and solving problems. These supports should include discourse and helping students understand and take ownership in the direction of the learning.
- Discuss how well the teacher materials provide guidance to support students to express, clarify, justify, interpret, and represent their ideas and to respond to peer and teacher feedback orally and/or in written form as their thinking and reasoning changes over time.
- Discuss how well the materials provide multiple modalities that move students from using everyday language to developing and using more specialized language over time as they figure out phenomena and solve problems.
- Discuss the ease of finding the needed resources and the time commitment it would require gathering these resources to ensure that they would be useful.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

4 points:

- Teacher materials consistently provide guidance or supports for engaging students in understanding phenomena and solving problems. **AND**
- Teacher materials consistently provide guidance to support students to express, clarify, justify, interpret, and represent their ideas and to respond to peer and teacher feedback orally and/or in written form as their thinking and reasoning changes over time. **AND**
- The materials consistently provide multiple modalities that move students from using everyday language to developing and using more specialized language over time as they figure out phenomena and solve problems.

2 points:

- Teacher materials provide guidance or supports for engaging students in understanding phenomena and solving problems, but not consistently. **AND**
- Teacher materials provide guidance to support students to express, clarify, justify, interpret, and represent their ideas and to respond to peer and teacher feedback orally and/or in written form as their thinking and reasoning changes over time, but not consistently. **AND**
- The materials provide multiple modalities that move students from using everyday language to developing and using more specialized language over time as they figure out phenomena and solve problems, but not consistently.

0 points:

- Teacher materials do not or rarely provide guidance or supports for engaging students in understanding phenomena and solving problems. **OR**
- Teacher materials do not or rarely provide guidance to support students to express, clarify, justify, interpret, and represent their ideas and to respond to peer and teacher feedback orally and/or in written form as their thinking and reasoning changes over time. **OR**
- The materials do not or rarely provide multiple modalities that move students from using everyday language to developing and using more specialized language over time as they figure out phenomena and solve problems.

Guidance for Indicator 3c.

Indicator 3c. Materials contain teacher guidance with sufficient and useful annotations and suggestions for how to enact the student materials and ancillary materials. Where applicable, materials include teacher guidance for the use of embedded technology to support and enhance student learning.

What is the purpose of this indicator?
This indicator ● examines the teacher materials to determine whether they contain teacher guidance with sufficient and useful annotations and suggestions for how to enact the student materials and ancillary materials. ● examines the teacher materials to determine whether they provide teacher guidance for the use of embedded technology to support and enhance student learning. where applicable.
Evidence Collection
Review the teacher materials across the series. Review the grade and series scope and sequence. **In the teacher materials for the series being reviewed:** ● Look for and record evidence showing the extent that the teacher materials include overview sections, annotations, narrative information, or other documents that will assist the teacher in presenting the student material or ancillary materials. ● Look for and record evidence showing the extent that the teacher materials provide guidance for the use of embedded technology to support and enhance student learning, where applicable.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● Do the teacher materials provide overview sections and/or annotations that contain narrative information that will assist the teacher in presenting the student material? ● Do the teacher materials explicitly state and clearly describe learning goals so teachers understand the goals for instruction? ● Do the teacher materials highlight key instructional activities, support the overall development of the learning goals, and provide guidance for making learning goals explicit throughout the instructional sequence? ● Do the teacher materials provide guidance for when and how adaptations could be made without detracting from the learning goals? ● Do the teacher materials provide background content knowledge that is accurate, understandable, and gives true assistance to all educators using the materials? ● Are there embedded technology links that will enhance the learning for all students? ● If technology support is embedded, is it overarching and accessible to most?

During Discussion:

- Discuss how well the teacher materials provide overview sections and/or annotations that contain narrative information that will assist the teacher in presenting the student material.
- Discuss the extent that the teacher materials state learning goals so teachers understand the goals for instruction.
- Discuss the extent that the teacher materials highlight key instructional activities, support the overall development of the learning goals, and provide guidance for making learning goals explicit throughout the instructional sequence.
- Discuss how well the teacher materials provide background content knowledge that is accurate, understandable, and gives true assistance to all educators using the materials.
- Discuss whether technology links are embedded that will enhance the learning for all students, and if they are
- overarching and accessible.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Teacher materials consistently provide guidance with sufficient and useful annotations and suggestions that will assist the teacher in presenting the student materials and ancillary materials.

1 point:

- Teacher materials provide guidance with sufficient and useful annotations and suggestions that will assist the teacher in presenting the student materials and ancillary materials, but not consistently.

0 points:

- Teacher materials do not or rarely provide guidance with sufficient and useful annotations and suggestions that will assist the teacher in presenting the student materials and ancillary materials.

Guidance for Indicator 3d.

Indicator 3d. Materials contain explanations of the instructional approaches of the program and identification of the research-based strategies.

What is the purpose of this indicator?
This indicator ● examines the teacher materials to determine whether they explain the instructional approaches of the program. ● examines the teacher materials to determine whether they identify research-based strategies that have informed the design of the materials.
Evidence Collection
Review the teacher materials across the series. Review the grade and series scope and sequence. In the teacher materials for the series being reviewed: ● Look for and record evidence to determine where the teacher materials explain the instructional approaches of the program. ● Look for and record evidence to determine where the teacher materials identify research-based strategies that are used in the design.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● Do the materials explain the instructional approaches of the program? ● Do the materials identify research-based strategies used? **During Discussion:** ● Discuss how well the materials explain the instructional approaches of the program. ● Discuss how well the materials identify research-based strategies used in and throughout the program. ● Discuss how well the materials provide teacher guidance for implementing research-based strategies. ● Explain the strategy/reasoning used as you collected evidence for this indicator. ● Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations. ● Look for consensus on whether the indicator was met fully or partially. ● Agree on final ratings.

Scoring:
2 points: ● Teacher materials explain the instructional approaches of the program. **AND** ● Teacher materials include and reference research-based strategies. **1 point:** ● Teacher materials explain the instructional approaches of the program. **AND** ● Teacher materials do not include or reference research-based strategies. **0 points**: ● Teacher materials do not explain the instructional approaches of the program.

Criterion 2: **Support for All Students:** Are the materials designed to support all students in learning?

Consider the purpose and research connection for Criterion 2 when looking for evidence to support indicators 3e-3k.

What is the purpose of this criterion?
This criterion examines how the materials: ● leverage diverse cultural and social backgrounds of students. ● provide appropriate support, accommodations, and modifications for special populations that support regular and active participation in learning science and engineering. ● provide multiple access points for students at varying ability levels to make sense of phenomena and design solutions to problems. ● include multi-modal opportunities for students to share their thinking. ● represent people of various demographic and physical characteristics. ● provide opportunities for teachers to use a variety of grouping strategies. ● are made accessible by providing appropriate supports for different reading levels.
Research Connection
"Inclusive instructional strategies encompass a range of techniques and approaches that build on students' interests and backgrounds so as to engage them more meaningfully and support them in sustained learning. These strategies, which also have been shown to promote educational equity in learning science and engineering, must be attended to as standards are translated into curriculum, instruction, and assessment." (Framework, p. 283) "…students learn science in large part through their active involvement in the practices of science. A classroom environment that provides opportunities for students to participate in scientific and engineering practices engages them in tasks that require social interaction, the use of scientific discourse (that leverages community discourse when possible), and the application of scientific representations and tools. SEPs can actually serve as productive entry points for students from diverse communities—including students from different social and linguistic traditions, particularly second-language learners." (Framework, p. 283) "Everyday experience provides a rich base of knowledge and experience to support conceptual changes in science. Students bring cultural funds of knowledge that can be leveraged, combined with other concepts, and transformed into scientific concepts over time." (Framework, p. 283) "Conclusion 6: Race/ethnicity, language, culture, gender, and socioeconomic status are among the factors that influence the knowledge and experience children bring to the classroom. This diversity offers richness and opportunities in the classroom, and it also affects the kinds of support children need to learn science." (Taking Science to School, p. 340) Resources: ● See Appendix D: All Standards, All Students

Guidance for Indicator 3e.

Indicator 3e. Materials are designed to leverage diverse cultural and social backgrounds of students.

What is the purpose of this indicator?

"The diverse knowledge and skills that members of different cultural groups bring to formal and informal science learning contexts are assets to build on." (Framework, p. 288)

"Instructional materials can provide a motivating context to engage students by offering contexts that are personally or socio-culturally relevant to them, fostering learning through social and collaborative interactions, using project-based or place-based approaches, and providing activities, such as an engineering design problem, that allow students to experience a challenge and the satisfaction of overcoming the challenge. These kinds of activities situated in a relevant context promote students' engagement in the practice of science rather than experiencing science as a static set of facts or theories to be learned." (BSCS NGAL, p. 33)

"instruction that builds on prior interest and identity is likely to be as important as instruction that builds on knowledge alone. All students can profit from this approach, but the benefits are particularly salient for those who would feel disenfranchised or disconnected from science should instruction neglect their personal inclinations." (Framework, p. 287)

Related indicator 1h in Gateway 1 focuses on leveraging students prior knowledge and experiences related to phenomena and problems. This indicator is broader in nature and leverages students' cultural and social backgrounds as assets to increase relevance and student interest and motivation.

This indicator:

- examines whether materials are designed to leverage diverse cultural and social backgrounds of students.

Evidence Collection

Review teacher and student materials across the series.
Review the grade and series scope and sequence.

In the materials for the series being reviewed:

- Look for and record evidence within teacher and student materials for learning goals, instructional activities, text, and images situated in a context designed to leverage diverse cultural and social backgrounds of students.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- How well do the materials capitalize on diverse cultural and social backgrounds of students?
- How well do the materials help to promote equity and access (across genders, cultures, or countries of origin)?
- How well are the learning goals, instructional activities, text, and images presented in a context designed to leverage diverse cultural and social backgrounds of students?
- How well are the learning goals, instructional activities, text, images, problems, or phenomena likely to be relevant, interesting and/or motivating to students?
- How well do the materials connect to the students' funds of knowledge, culture, or community?

During Discussion:

- Discuss the extent that the materials capitalize on diverse cultural and social backgrounds of students.
- Discuss how well the learning goals, instructional activities, text, and images are presented in a context designed to leverage diverse cultural and social backgrounds of students.
- Discuss the extent that the learning goals, instructional activities, text, images, problems, or phenomena are likely to be relevant, interesting and/or motivating to students.

Scoring:

2 points:

- Materials are designed to consistently leverage diverse cultural and social backgrounds of students.

1 point:

- Materials are designed to leverage diverse cultural and social backgrounds of students, but not consistently.

0 points:

- Materials do not or rarely leverage diverse cultural and social backgrounds of students.

Guidance for Indicator 3f.

Indicator 3f. Materials provide appropriate support, accommodations, and/or modifications for numerous special populations that will support their regular and active participation in learning science and engineering.

What is the purpose of this indicator?
See **Appendix D: All Standards, All Students** This indicator ● examines whether teacher and student materials provide appropriate support, accommodations, and modifications for numerous special populations that will support their regular and active participation in learning science and engineering.
Evidence Collection
Review teacher and student materials across the series. Review the grade and series scope and sequence. In the teacher and student materials for the series being reviewed: ● Look for and record evidence of materials that provide appropriate support, accommodations, and modifications for numerous special populations that will support their regular and active participation in learning science and engineering. ● Look for and record evidence about strategies or materials provided for differentiated instruction. Include evidence of differentiation for all special populations (e.g., ELL, over/under proficiency, special education, students with physical and cognitive disabilities). There must be more than a statement at the beginning of the chapter or lesson that is generic or states that the same strategy could be used with every lesson. ● Look for and record specific strategies for support, accommodations, or modifications within the lessons or the assignments. ● Look for and record examples of advanced students working at a greater depth, noting any areas in the lessons or tasks for opportunities for advanced (not more) work.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials provide appropriate supports, accommodations, and modifications for special populations to support their regular and active participation in learning science and engineering?
    - How well do the materials include scaffolding for vocabulary or concepts?
    - How well do the materials provide specific suggestions about how teachers can modify activities for students with special needs?
    - How well do the materials provide extensions or greater depth for advanced students?
- Do the materials provide specific resources and strategies for differentiated instruction? Include evidence of differentiation for multiple special populations, including ELL, over/under proficiency, special education, students with physical and cognitive disabilities.
    - How is the instruction differentiated, and what does it look like in lessons or in problems?
    - Do the differentiation strategies extend beyond a statement at the beginning of the chapter or lesson?
    - Are the differentiation resources and strategies varied based on the special population and learning outcome?
    - Do differentiation strategies extend beyond a generic statement that the same strategy could be used across the series?
    - Are differentiated tasks modified to ensure work is on grade band but accessible to special populations of students, including advanced students?

During Discussion:

- Identify evidence of where materials provide appropriate support, accommodations, and modifications for special populations that will support their regular and active participation in learning science and engineering.
- Identify evidence of specific resources and strategies for differentiated instruction.
- Identify evidence of differentiation for all special populations.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

4 points:

- The materials consistently provide appropriate supports, accommodations, and modifications (scaffolding of concepts and practices, extensions at greater depth), for special populations to support their regular and active participation in learning science and engineering. **AND**
- The materials consistently provide specific resources and strategies for differentiated instruction for all students to engage in grade-band work.

2 points:

- The materials provide appropriate supports, accommodations, and modifications (scaffolding of grade-band vocabulary and concepts, extensions at greater depth), for special populations to support their regular and active participation in learning science and engineering, but not consistently. **AND/OR**
- The materials provide specific resources and strategies for differentiated instruction for all students to engage in grade-band work, but not consistently.

0 points:

- The materials provide no or few supports, accommodations, and modifications (scaffolding of grade-band vocabulary and concepts, extensions at greater depth), for special populations to support their regular and active participation in learning science and engineering. **OR**
- The materials provide no or few specific resources and strategies for differentiated instruction for all students to engage in grade-band work.

Guidance for Indicator 3g.

Indicator 3g. Materials provide multiple access points for students at varying ability levels and backgrounds to make sense of phenomena and design solutions to problems.

What is the purpose of this indicator?
"Arguably, the most pressing challenge facing U.S. education is to provide all students with a fair opportunity to learn." (Framework, p. 282) "Science and engineering practices can actually serve as productive entry points for students from diverse communities..." (Framework, p. 283) "When people enter into the practices of science or engineering, they do not leave their cultural worldviews at the door. Instruction that fails to recognize this reality can adversely affect student engagement in science. …. Everyday experience provides a rich base of knowledge and experience to support conceptual changes in science. Students bring cultural funds of knowledge that can be leveraged, combined with other concepts, and transformed into scientific concepts over time." (Framework, p. 284) This indicator ● examines the materials to determine whether the materials provide multiple access points for students at varying ability levels to make sense of phenomena and design solutions to problems.
Evidence Collection
Review student materials across the series. Review the grade and series scope and sequence. **In the instructional materials for the series being reviewed:** ● Look for and record evidence within individual lessons or activities throughout the series to determine where the materials provide multiple access points for students at varying ability levels to make sense of phenomena and design solutions to problems. ● Look for and record evidence within individual lessons or activities throughout the series to determine where the materials provide multiple access points for students with varying backgrounds to make sense of phenomena and design solutions to problems.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● Do the materials include learning goals, instructional activities, and text that provide access points for students at varying ability levels? ● Do the materials include learning goals, instructional activities, and text that provide access points for students with varying backgrounds (are phenomena and problems relevant and accessible from cultural, geographic, or socioeconomic perspectives)? ● Do the materials include learning goals, instructional activities, and text that allow multiple approaches to explaining phenomena or solving problems based on varying backgrounds (cultural, geographic, or socioeconomic perspectives)? ● Do the materials provide strategies to help teachers validate students' relevant personal or social experiences with scientific ideas?

During Discussion:

- Discuss the extent that the materials provide access points for students at varying ability levels.
- Discuss the extent that the materials provide access points for students with varying backgrounds.
- Discuss the extent that the materials allow multiple approaches to explaining phenomena or solving problems based on varying backgrounds.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials consistently provide access points for students at varying ability levels and backgrounds and allow multiple approaches to explaining phenomena or solving problems.

1 point:

- Materials provide access points for students at varying ability levels and backgrounds and allow multiple approaches to explaining phenomena or solving problems, but not consistently.

0 points:

- Materials provide no or few access points for students at varying ability levels and backgrounds to explain phenomena or solve problems. **OR**
- Materials do not or rarely allow multiple approaches to explaining phenomena or solving problems.

Guidance for Indicator 3h.

Indicator 3h. Materials include opportunities for students to share their thinking and apply their understanding in a variety of ways.

What is the purpose of this indicator?
"For students who need to take more time to express their understanding (e.g., if they learned English as their second language), opportunities to edit or to display their knowledge in less language-embedded tasks would help level the playing field." (Framework, p. 289) "…developers should highlight how students can demonstrate competence through multiple means of expression and in multiple contexts." (Framework, p. 290) "As students wrestle with meaningful scientific problems they (1) engage in social interaction, (2) appropriate the language of science, and (3) use scientific representations and tools. These are features that are central to scientific practice and require that teachers and instructional materials provide clear guidance and support for learners as they acquire these practices." (Taking Science to School, p. 265) This indicator ● Examines the materials to determine whether students have opportunities to share their thinking, compare their thinking, and apply their understanding in new contexts.
Evidence Collection
Review the units, chapters and lessons in both student and teacher materials across the series. Review the grade and series scope and sequence. **In the instructional materials for the series being reviewed:** ● Look for and record evidence throughout the series to determine where the materials provide opportunities for students to share their thinking. ● Look for and record evidence throughout the series to determine where students have opportunities to share their thinking, to compare their thinking with other students or with new ideas presented in the learning opportunities, and to apply their understanding in new contexts.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- How do the materials provide multi-modal opportunities for students to share their thinking?
- What are the different opportunities used across to series for students to share their thinking?
- Do the materials suggest multiple or alternative formats (e.g. spoken and written language; diagrams and pictures; algebraic, geometric, and graphical representations of mathematics; mechanical, mathematical, and computer-based modeling; and representations of phenomena) for students to express their ideas during instruction and/or assessment?
- Do students have opportunities to share their thinking, compare their thinking with other students or with new ideas presented in the learning opportunities?
- Do students have opportunities to apply their understanding in new contexts?

During Discussion:

- Discuss the extent that materials provide multi-modal opportunities for students to share their thinking in a variety of ways, compare their thinking with other students or with new ideas presented in the learning opportunities, and to apply their understanding in new contexts.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Reach consensus and write narrative to explain ratio of phenomena and problems within the series.

Scoring:

2 points:

- Materials consistently provide multi-modal opportunities throughout each learning sequence for students to share their thinking. **AND**
- Materials consistently provide opportunities throughout each learning sequence for students to compare their thinking with other students' thinking and/or with new ideas presented in the materials. **AND**
- Materials consistently provide opportunities for students to apply their understanding in new contexts.

1 point:

- Materials consistently provide multi-modal opportunities throughout each learning sequence for students to share their thinking. **AND**
- Materials consistently provide opportunities throughout each learning sequence for students to compare their thinking with other students' thinking and/or with new ideas presented in the materials. **AND**
- Materials do not provide opportunities for students to apply their understanding in new contexts.

0 points:

- Materials consistently provide multi-modal opportunities throughout each learning sequence for students to share their thinking. **OR**
- Materials consistently provide opportunities throughout each learning sequence for students to compare their thinking with other students' thinking and/or with new ideas presented in the materials. **OR**
- Materials consistently provide opportunities for students to apply their understanding in new contexts.

Guidance for Indicator 3i.

Indicator 3i. Materials include a balance of images or information about people, representing various demographic and physical characteristics.

What is the purpose of this indicator?
"The diverse knowledge and skills that members of different cultural groups bring to formal and informal science learning contexts are assets to build on." (Framework, p. 288) "When appropriate and relevant to the science issue at hand, standards documents should explicitly represent the cultural particulars of diverse learning populations throughout the text (e.g., in referenced examples, sample vignettes, performance expectations). Similarly, an effort should be made to include significant contributions of women and of people from diverse cultures and ethnicities. We acknowledge the challenge of creating a set of standards that attempts to represent all salient cultural groups, but that should not be an excuse for excluding them all." (Framework, p. 288) This indicator ● examines the series to determine if the materials include a balance of images or information about people, representing various demographic and physical characteristics.
Evidence Collection
Review the student materials across the series. Review the grade and series scope and sequence. **In the instructional and assessment materials for the series being reviewed:** ● Look for and record evidence throughout the series to determine whether the materials provide examples of various demographic and physical characteristics.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Within the student materials and assessments do scientist biographies, names used in assessments, or images throughout the materials depict different genders, races, ethnicities, and other physical characteristics?
- Are depictions of demographics or physical characteristics balanced across the series, or is one demographic represented more than others?
- Do the materials avoid stereotypes or language that might be offensive to a particular group?
- Are depictions of demographics or physical characteristics portrayed positively across the series, or is one demographic represented more positively than others? For example, do assessment items proportionately use male, female, and gender neutral names for both correct and incorrect responses, or is one gender predominately used for incorrect responses?

During Discussion:

- Identify evidence of where materials and assessments depict different individuals of different genders, races, ethnicities, and other physical characteristics.
- Identify the extent that the materials and assessments balance positive portrayals of demographics or physical characteristics.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials provide numerous examples of various demographic and physical characteristics, and balance positive portrayals and representations throughout the materials.

1 point:

- Materials provide some examples of various demographic and physical characteristics, and balance positive portrayals and representations throughout the materials.

0 points:

- Materials provide no or few examples of various demographic and physical characteristics. **OR**
- Materials do not balance positive portrayals and representations throughout the materials.

Guidance for Indicator 3j.

Indicator 3j. Materials provide opportunities for teachers to use a variety of grouping strategies.

What is the purpose of this indicator?
This indicator ● examines the series to determine if the materials provide opportunities for teachers to use a variety of grouping strategies.
Evidence Collection
Review the student and teacher materials across the series. Review the grade and series scope and sequence. **In the instructional materials for the series being reviewed:** ● Look for and record evidence throughout the series to determine where the materials provide grouping strategies for students. ● Look for and record evidence throughout the series to determine where the materials provide for interaction among students and the types of interactions provided.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● To what extent do the materials provide a variety of grouping strategies? ● To what extent do the materials balance whole group, small group, and individual instruction to provide interaction among students? **During Discussion:** ● Identify evidence of where materials provide different grouping strategies. ● Identify evidence of where materials balance whole group, small group, and individual instruction to provide for interaction among students. ● Explain the strategy/reasoning used as you collected evidence for this indicator. ● Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations. ● Look for consensus on whether the indicator was met fully or partially. ● Agree on final ratings.

Scoring:
2 points: ● Materials provide opportunities for teachers to use a variety of grouping strategies across the series. **1 point:** ● Materials provide opportunities for teachers to use grouping strategies across the series, but the variety of strategies is limited. **0 points:** ● Materials provide no or few opportunities for teachers to use grouping strategies across the series.

Guidance for Indicator 3k.

Indicator 3k. Materials are made accessible to students by providing appropriate supports for different reading levels.

What is the purpose of this indicator?
"Students' preparation in other subjects, especially literacy and mathematics, also affects their achievement in science. If some groups of students fail to become effective readers and writers by late elementary school, teachers have difficulty helping them to make progress—not only in science but also across all subject areas. These students fall further behind, and the problem for teachers grows more complex and challenging. Such dynamics can, in effect, reinforce the low-expectation tracking of students as they move through school, thereby significantly reducing their access to science and engineering pathways through K-12 and limiting the possibility of their going to college." (Framework, p. 279) Related indicators focus increasing accessibility with multiple access points (indicator 3g) or supports, accommodations, and modifications (indicator 3f). This indicator focuses on increasing accessibility by providing supports specifically related to different reading levels. This indicator ● examines the series to determine if the materials provide all students, including those who read, write, speak, or listen below grade level, or in a language other than English, with opportunities to work with grade-level text and content.
Evidence Collection
Review the student and teacher materials across the series. Review the grade and series scope and sequence. **In the instructional materials for the series being reviewed:** ● Look for and record evidence throughout the series to determine where the materials provide all students, including those who read, write, speak, or listen below grade level, or in a language other than English, opportunities to work with grade-level text. ● Look for and record evidence throughout the series to determine where the materials provide all students, including those who read, write, speak, or listen below grade level, or in a language other than English, opportunities to work with grade-level content for three-dimensional learning, explaining phenomena, and solving problems.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- How well do the materials include specific supports or strategies (graphic organizers, note-taking, pronunciation guides, etc.) to support, accommodate, or modify lessons or activities for students who read, write, speak, or listen below grade level, or in a language other than English?
- How well do the materials scaffold vocabulary or concepts to support readers below grade level?
- How well do the specific supports or strategies within the materials support grade-level content for three-dimensional learning, explaining phenomena, and solving problems?

During Discussion:

- Identify evidence of where the materials include specific supports or strategies to support, accommodate, or modify lessons or activities for students who read, write, speak, or listen below grade level, or in a language other than English.
- Identify evidence of where the materials scaffold vocabulary or concepts to support readers below grade level.
- Identify evidence of where the specific supports or strategies within the materials support grade-band content for three-dimensional learning, explaining phenomena, and solving problems.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials provide consistent supports or strategies to support students who read below grade level in accessing grade-level content.

1 point:

- Materials provide supports or strategies to support students who read below grade level in accessing grade-level content.

0 points:

- Materials provide no or few supports or strategies to support students who read below grade level in accessing grade-level content.

Criterion 3: Documentation of Design and Usability: Are the materials designed to support teachers not only in using the materials, but also in understanding how the materials are designed? Are the materials usable?

Consider the purpose and research connection for Criterion 3 when looking for evidence to support indicators 3l-3s.

What is the purpose of this criterion?

This criterion

- examines for documentation of design related to:
  - how the materials document how each lesson and unit align to NGSS and the Common Core State Standards.
  - how the materials are sequenced to build coherence and student understanding.
- examines usability for:
  - whether student resources are clear and free of errors.
  - whether materials include a comprehensive list of materials.
  - whether materials embed clear science safety information that is consistent with science safety rules and regulations.
  - whether materials designated for each grade are feasible for one school year.
  - whether materials contain strategies for informing students, parents, or caregivers regarding how they can help support student progress and achievement.

Guidance for Indicator 3l.

Indicator 3l. The teacher materials provide a rationale for how units across the series are intentionally sequenced to build coherence and student understanding.

What is the purpose of this indicator?

"Curriculum units need to be sequenced across a year so that students can build ideas across time in coherent learning progressions, in which questions or challenges, gaps in models, and new phenomena motivate developing deeper disciplinary core and crosscutting ideas." (Guide to Implementing NGSS, p. 53)

"Teachers will need to understand their part in the multiyear scope and sequence and support students in building on their prior knowledge, while they learn new topics or deepen their understanding of those they have taught before." (Guide to Implementing NGSS, p. 54)

This indicator

- examines whether teacher materials clearly explain the design principles behind the sequencing of the materials within the series.
- examines whether teacher materials help teachers explain the sequencing of the materials within the series to students.
- is focused on the NGSS innovation related to ensuring progressions, if attended to, are apparent to teachers.

Evidence Collection

Review teacher materials across the series.
Review the grade and series scope and sequence.

In the teacher materials for the series being reviewed:

- Look for and record evidence of annotations or suggestions that clearly explain the design principles behind the sequence of the activities and how they support coherence and student understanding.
- Look for and record evidence that unit, chapter, or lesson overviews explain the progression of the content and how it connects to previous and upcoming instructional activities
- Look for and record evidence within unit, chapter, or lesson overviews that help teachers communicate to students the progression of the content and how it connects to previous and upcoming instructional activities.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the teacher materials explain how learning experiences are sequenced?
    - Do the teacher materials clearly explain the design principles behind the sequencing of the student activities?
    - Look for a conceptual framework and sequence of ideas, practices, and learning experiences within learning sequences and across sequences.
    - Do the teacher materials help teachers explain to students how learning experiences are sequenced?

- Do chapter, unit, or lesson overviews explain the progression of the content and how this specific content connects to previous and upcoming content?
    - Look for guidance that links student experiences across lessons to ensure that student sensemaking and/or problem-solving is focused on phenomena or problems, and is linked to learning across all three dimensions.
    - Do the teacher materials explain how learning experiences support productive and well-sequenced engagement with each dimension and their elements?
- If the materials provide a pacing guide, does it provide a rationale for how the sequence of units connects to one another and builds over time?
- Do the materials provide supports for making instructional decisions about modifications to the materials when instructional time is short (while still maintaining coherence)?
- Are learning experiences (units) sequenced in a conceptual and developmental way that will likely make sense to students?
- How well do the learning experiences within and across instructional sequences help to create a clear and meaningful flow of ideas for students?

During Discussion:

- Discuss the extent that teacher materials explain how learning experiences are sequenced.
- Discuss the extent that teacher materials explain how learning experiences support productive and well-sequenced engagement with each dimension, their elements, and explaining phenomena or solving problems.
- Discuss evidence of where the teacher materials explain how activities enhance development of SEPs, CCCs, DCIs, their associated elements, and engineering and nature of science within the grade and across the series.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Teacher materials clearly explain the design principles behind the sequencing of the materials within the series. **AND**
- Teacher materials clearly explain how the sequencing develops student understanding and use of SEPs, CCCs, and DCIs within the grade and across the series.

1 point:

- Teacher materials explain the design principles behind the sequencing of the materials within the series. **AND**
- Teacher materials do not clearly explain how the sequencing develops student understanding and use of SEPs, CCCs, and DCIs within the grade and across the series.

0 points:

- Teacher materials do not clearly explain the design principles behind the sequencing of the materials within the series.

Guidance for Indicator 3m.

Indicator 3m. Materials document how each lesson and unit align to NGSS.

What is the purpose of this indicator?

This indicator

- examines whether materials provide a list of lessons in the teacher's edition, cross-referencing the alignment to the performance expectations of the NGSS.

Evidence Collection

Review the table of contents, pacing guides, and scope and sequence, and other teacher materials.
Review the grade and series scope and sequence.

In the materials for the series being reviewed:

- Look for and record evidence that teacher materials provide documentation that addresses how specific lessons, tasks, and assessment items are aligned to the NGSS.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials explicitly state which standards are address by each lesson, chapter, or unit?
- Where in the teacher materials is the alignment to NGSS documented?

During Discussion:

- Discuss the extent that the materials explicitly state which NGSS standards are addressed by each lesson, chapter, or unit.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met.
- Agree on final ratings.

Scoring:

1 point:

- Materials consistently provide documentation of how each lesson and unit align to NGSS.

0 points:

- Materials do not or rarely provide documentation of how each lesson and unit align to NGSS.

Guidance for Indicator 3n.

Indicator 3n. Materials document how each lesson and unit align to English/Language Arts and Math Common Core State Standards, including the standards for mathematical practice.

What is the purpose of this indicator?

"Recommendation 12: The standards for the sciences and engineering should align coherently with those for other K-12 subjects. Alignment with the Common Core Standards in mathematics and English/language arts is especially important. " (Framework, p. 306)

It is important to note that a focus on student discourse is covered in Indicator 3b. While lesson that are aligned to Common Core State Standards in English Language Arts might include student engagement in discourse, this indicator looks at whether the teacher materials document alignment to Common Core State Standards in English Language Arts and Mathematics.

This indicator

- examines whether materials provide documentation of how each lesson and unit align to align to English/Language Arts Common Core State Standards.
- examines whether materials provide documentation of how each lesson and unit align to align to Math Common Core State Standards, including the standards for mathematical practice.
- Examines whether materials provide meaningful opportunities for science discourse and sensemaking supported by ELA and/or mathematics.

Evidence Collection

Review the table of contents, pacing guides, scope and sequence, and other teacher materials.

In the instructional materials for the series being reviewed:

- Look for and record evidence that teacher materials provide documentation that addresses how individual lessons or activities throughout the series are aligned to reading, writing, speaking, and/or listening (Common Core ELA Standards), as applicable.
- Look for and record evidence that teacher materials provide documentation that addresses how individual lessons or activities throughout the series are aligned to mathematical or computational concepts or practices (Common Core Mathematics), as applicable.
- Look for and record evidence that teacher materials connect meaningful opportunities for science discourse and sensemaking to the supporting ELA and/or mathematics standards.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials provide documentation that addresses how lessons or activities align to Common Core ELA standards?
- Do the materials provide documentation that addresses how lessons or activities align to mathematical or computational concepts or practices (Common Core Mathematics)?
- To what extent are the alignments made explicit to teachers?
- How well do materials support teachers in making the connections or in helping students make the connections to the Common Core Standards?
- To what extent do the materials connect meaningful opportunities for science discourse and sensemaking to the supporting ELA and/or mathematics standards?

During Discussion:

- Identify evidence of the extent to which the materials provide meaningful opportunities for science discourse and sensemaking supported by ELA and/or mathematics.
- Identify evidence of the extent to which the materials incorporate speaking, listening, writing and reading into lessons or activities in meaningful and productive ways.
- Identify evidence of the extent to which the materials incorporate mathematical or computational concepts or practices (Common Core Mathematics) in meaningful and productive ways.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met.
- Agree on final ratings.

Scoring: 3n.i: Materials document how each lesson and unit align to English/Language Arts Common Core State Standards.

2 points:

- Materials provide documentation of how each lesson and unit (as applicable) align to English/Language Arts Common Core State Standards. **AND**
- Connections to the English/Language Arts Common Core State Standards consistently support meaningful opportunities for science discourse and sensemaking.

1 point:

- Materials provide documentation of how each lesson and unit (as applicable) align to English/Language Arts Common Core State Standards. **AND**
- Connections to the English/Language Arts Common Core State Standards support meaningful opportunities for science discourse and sensemaking, but not consistently.

0 points:

- Materials do not provide documentation of how each lesson and unit align to English/Language Arts Common Core State Standards. **OR**
- Connections to the English/Language Arts Common Core State Standards do not or rarely support meaningful opportunities for science discourse and sensemaking.

Scoring: 3n.ii: Materials document how each lesson and unit align to Math Common Core State Standards, including the standards for mathematical practice.

2 points:

- Materials provide documentation of how each lesson and unit (as applicable) align to Math Common Core State Standards, including the standards for mathematical practice. **AND**
- Connections to the Math Common Core State Standards, including the standards for mathematical practice, consistently support meaningful opportunities for science discourse and sensemaking.

1 point:

- Materials provide documentation of how each lesson and unit (as applicable) align to Math Common Core State Standards, including the standards for mathematical practice. **AND**
- Connections to the Math Common Core State Standards, including the standards for mathematical practice, support meaningful opportunities for science discourse and sensemaking, but not consistently.

0 points:

- Materials do not provide documentation of how each lesson and unit align to Math Common Core State Standards, including the standards for mathematical practice. **OR**
- Connections to the Math Common Core State Standards, including the standards for mathematical practice, do not or rarely support meaningful opportunities for science discourse and sensemaking.

Guidance for Indicator 3o.

Indicator 3o. Resources (whether in print or digital) are clear and free of errors.

What is the purpose of this indicator?
Indicators 2b and 2c look for evidence that science content is accurate, grounded in current research, and explanations about science translate information into developmentally appropriate content without losing original meaning or distorting fact. This indicator focuses on determining whether the materials clearly provide information and whether they are free from errors external to the three dimensions that impact usability of materials, such as incorrect answer keys, inaccurate references between text and diagram labels, unclear or inaccurate directions, etc. This indicator ● examines resources to determine whether they clearly communicate information. ● examines resources to determine whether they contain any errors as they relate to usability.
Evidence Collection
Review the units, chapters and lessons in materials across the series. Review the grade and series scope and sequence. **In the instructional materials for the series being reviewed:** ● Look for and record evidence across the series to determine whether resources clearly communicate information. ● Look for and record evidence across the series to determine whether resources contain errors related to usability.
Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials contain directions that are ambiguous, unclear, or inaccurate?
- Do the assessments contain directions, questions, or answer keys that are ambiguous, unclear, or inaccurate?
- Are organizational features (Table of Contents, glossary, index, internal references, table headers, captions, etc.) in the materials clear, accurate, and error-free?
- Are all steps needed to complete an activity complete and accurate?

During Discussion:

- Identify evidence of any directions or information in instructional materials or assessments that are ambiguous, unclear, or inaccurate.
- Identify evidence of any organizational features within the series that are ambiguous, unclear, or inaccurate.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Resources contain no errors and are consistently clear.

1 point:

- Resources contain few errors and are mostly clear.

0 points:

- Resources are unclear or contain numerous errors.

Guidance for Indicator 3p.

Indicator 3p. Materials include a comprehensive list of materials needed.

What is the purpose of this indicator?
This indicator ● examines the series to determine if the materials contain a comprehensive list of materials needed.
Evidence Collection
Review the student materials across the series. Review the grade and series scope and sequence. In the instructional materials for the series being reviewed: ● Look for and record evidence throughout the series to determine whether a comprehensive list of required materials is provided. ● Look for and record evidence throughout the series to determine the ease of finding the needed resources and the time commitment it would require gathering these resources to ensure that they would be useful.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● To what extent does the series to provide a comprehensive list of required materials? ● To what extent are all lists of resources needed to complete an activity complete and accurate? ● How easily can needed resources be found and what time commitment would be required to gather needed resources? **During Discussion:** ● Discuss evidence that the series provides a comprehensive list of required materials. ● Discuss evidence that all lists of resources needed to complete an activity are complete and accurate. ● Discuss evidence that needed resources be easily be found and the time commitment that would be required to gather needed resources. ● Discuss the level of support needed in questioning, timeline, content assistance, etc. to ensure the teacher has the needed material to prepare students for the upcoming course. ● Explain the strategy/reasoning used as you collected evidence for this indicator. ● Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations. ● Look for consensus on whether the indicator was met fully or partially. ● Agree on final ratings.

Scoring:
2 points: ● Materials include a comprehensive list of materials needed. **1 point:** ● Materials include a list of materials needed, but it is not comprehensive. **0 points**: ● Materials do not include a list of materials needed.

Guidance for Indicator 3q.

Indicator 3q. Materials embed clear science safety guidelines for teacher and students across the instructional materials.

What is the purpose of this indicator?
"Teachers also need opportunities to develop the knowledge and practices to support these investigations, including how to prepare, organize, and maintain materials; implement safety protocols; organize student groups; and guide students as they collect, represent, analyze, discuss data, argue from evidence, and draw conclusions [80]." (Framework p. 258) This indicator ● examines the series to determine if the materials embed clear science safety guidelines for teacher and students across the instructional materials.
Evidence Collection
Review the student and teacher materials across the series. Review the grade and series scope and sequence. In the instructional materials for the series being reviewed: ● Look for and record evidence throughout the series to determine where the materials embed clear science safety guidelines for teacher and students across the instructional materials. ● Look for and record evidence throughout the series to determine where the materials provide information about maintenance and safe use of equipment and materials.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● Do the materials embed clear science safety guidelines for teacher and students across the instructional materials? ● Do the materials provide information about maintenance and safe use of equipment and materials? **During Discussion:** ● Identify evidence where the materials embed clear science safety guidelines for teacher and students across the instructional materials. ● Identify evidence where the materials provide information about maintenance and safe use of equipment and materials. ● Explain the strategy/reasoning used as you collected evidence for this indicator. ● Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations. ● Look for consensus on whether the indicator was met fully or partially. ● Agree on final ratings.

Scoring:
2 points: ● Materials embed clear science safety guidelines for teachers and students across the instructional materials. **1 point:** ● Materials embed science safety guidelines for teachers and students across the instructional materials, but they are not consistently clear. **0 points:** ● Materials do not embed science safety guidelines for teachers and students across the instructional material.

Guidance for Indicator 3r.

Indicator 3r. Materials designated for each grade are feasible and flexible for one school year.

What is the purpose of this indicator?
This indicator ● examines the materials to determine if the amount of time suggested in the materials for each grade is appropriate for a school year, if the expectations of the materials are reasonable for both teachers and students to complete in the suggested timeframe, and if the materials provide guidance to adjust to fit a range of instructional times or different schedules.
Evidence Collection
Review the student and teacher materials across the series. Review the grade scope and sequence. Review the table of contents, any pacing guides, and scope and sequence provided by the publisher. In the instructional materials for the series being reviewed: ● Look for and record evidence throughout the grade to determine whether the materials within each lesson or unit allow students to learn at an appropriate pace for the given grade. ● Look for and record evidence throughout the grade to determine whether students should be able to master ALL the content designated for the grade. ● Look for and record evidence throughout the grade to determine whether the materials document time needed to meet expectations, including detailed guidance on time needed for preparation, implementation of core product, and extension opportunities. ● Look for and record evidence throughout the grade to determine whether the materials provide guidance on adjustments to fit districts with different needs based on time restrictions, including rationale on what can be cut including tradeoffs. ● Look for and record evidence throughout the grade to determine whether the materials provide support for adjusting to fit different schedules and blocks available for teaching science.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials document time needed to meet expectations, including detailed guidance on time needed for preparation, implementation of core product, and extension opportunities?
- Can the instructional materials for each grade in the series be completed in a school year?
- Will students be able to master all the content designated for each grade by the end of the school year?
- How much time is designated for each lesson and unit according to the publisher?
- Is the timing suggested by the publisher viable for each lesson or unit?
- Do the requirements of the lessons seem reasonable for teachers and students to complete in the suggested amount of time?
- How many days are recommended for re-teaching or extensions?
- Do the materials provide guidance on adjustments to fit districts with different needs based on time restrictions, including rationale on what can be cut as well as tradeoffs?
- Do the materials provide support for adjusting to fit different schedules and blocks available for teaching science?

During Discussion:

- Consider if there is too much material or too little. Students should be able to master all the content designated for each grade by the end of the school year.
- Discuss the structure of the lessons and the amount of time dedicated to activities and assessments, according to the pacing guides or other publisher instructions.
- Note lessons marked as optional or supplementary but do not include these days in total days.
- Note whether the materials provide guidance for adjusting lessons to meet different schedules (for example, if the materials are developed around 45 minute lessons, look for guidance for adjusting to shorter or longer class periods).
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

1. The pacing of individual lessons and units is appropriate.
2. Materials document time needed to meet expectations, including detailed guidance on time needed for preparation, implementation of core product, and extension opportunities.
3. Materials provide guidance on adjustments to fit districts with different needs based on time restrictions, including rationale on what can be cut - including tradeoffs.
4. Materials provide support for adjusting to fit different schedules and blocks available for teaching science.

4 points:

- The materials include all four criteria above.

2 points:

- The materials include any three of the four criteria above.

0 points:

- The materials include two or fewer of the four criteria above.

Guidance for Indicator 3s.

Indicator 3s. Materials contain strategies for informing students, parents, or caregivers about the science program and suggestions for how they can help support student progress and achievement.

What is the purpose of this indicator?
This indicator ● examines the series to determine if the materials contain strategies for informing students, parents, or caregivers about the science program. ● examines the series to determine if the materials contain suggestions for how parents or caregivers can help support student progress and achievement.
Evidence Collection
Review the student and teacher materials across the series. Review the grade and series scope and sequence. Review beginning sections of the entire book, unit, chapter, or lesson that contains overview sections, teacher instruction pages, or ancillary supports for a narrative explanation of the content in each topic, paying attention to key instruction that will inform others that may be assisting the child in their progress at school. In the instructional materials for the series being reviewed: ● Look for and record evidence throughout the series to determine where the materials contain strategies for informing students, parents, or caregivers about the science program. ● Look for and record evidence throughout the series to determine where the materials the materials contain suggestions for how parents or caregivers can help support student progress and achievement. ● Note where suggestions are included in multiple languages to support writing of the narrative report.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials contain overview sections, teacher instruction pages, or ancillary supports that contain strategies for informing students, parents, or caregivers about the science program?
- Do the materials contain overview sections, teacher instruction pages, or ancillary supports that contain suggestions for how parents or caregivers can help support student progress and achievement?
- Are the suggestions provided in multiple languages? Note for narrative report.

During Discussion:

- Discuss the extent that the materials contain overview sections, teacher instruction pages, or ancillary supports that contain strategies for informing students, parents, or caregivers about the science program.
- Discuss the extent that the materials contain overview sections, teacher instruction pages, or ancillary supports that contain suggestions for how parents or caregivers can help support student progress and achievement.
- Discuss the ease of finding narrative explanations of the science content that can be used to inform others that may be assisting the child in their progress at school.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- The materials include strategies for informing students, parents, or caregivers about the science program. **AND**
- The materials include supports that contain suggestions for how parents or caregivers can help support student progress and achievement.

1 point:

- The materials include strategies for informing students, parents, or caregivers about the science program. **OR**
- The materials include supports that contain suggestions for how parents or caregivers can help support student progress and achievement.

0 points:

- The materials do not include supports that contain strategies for informing students, parents, or caregivers about the science program. **AND**
- The materials do not include suggestions for how parents or caregivers can help support student progress and achievement.

Criterion 4: **Assessment Design and Supports:** Are the materials designed to assess students and support the interpretation of the assessment results?

Consider the purpose and research connection for Criterion 4 when looking for evidence to support indicators 3t-3y.

What is the purpose of this criterion?
This criterion • examines how the materials provide for assessments through a variety of modalities. • examines how the materials measure individual student progress over time. • examines how the materials provide guidance to monitor and move student learning. • examines how the materials provide tools and guidance for scoring and interpreting assessments. • examines how the materials provide guidance for interpreting evidence of student understanding of the three dimensions as they explain phenomena or solve problems.
Research Connection
"Assessment activities will be critical supports for this instruction. Students will need guidance about what is expected of them and opportunities to reflect on their performance as they develop proficiencies. Teachers will need information about what students understand and can do so they can adapt their instruction. Instruction that is aligned with the framework and the NGSS will naturally provide many opportunities for teachers to observe and record evidence of students learning. The student activities that reflect such learning include developing and refining models; generating, discussing, and analyzing data; engaging in both spoken and written explanations and argumentation; and reflecting on their own understanding. Such opportunities are the basis for the development of assessments of three-dimensional science learning." (BOTA Report, p. 5) "…ensure that assessment activities included in such materials (such as mid- and end-of-chapter activities, suggested tasks for unit assessment, and online activities) require students to engage in practices that demonstrate their understanding of core ideas and crosscutting concepts. These materials should also attend to multiple dimensions of diversity (e.g., by connecting with students' cultural and linguistic resources)." (BOTA Report, pp. 5, 131-132) "Students will likely need repeated exposure to investigations and tasks aligned to the framework and the NGSS performance expectations, guidance about what is expected of them, and opportunities for reflection on their performance to develop these proficiencies, as discussed in Chapter 2. The kind of instruction that will be effective in teaching science in the way the framework and the NGSS envision will require students to engage in science and engineering practices in the context of disciplinary core ideas—and to make connections across topics through the crosscutting ideas. Such instruction will include activities that provide many opportunities for teachers to observe and record evidence of student thinking, such as when students develop and refine models; generate, discuss, and analyze data; engage in both spoken and written explanations and argumentation; and reflect on their own understanding of the core idea and the subtopic at hand (possibly in a personal science journal)." (BOTA Report, p. 87)

Guidance for Indicator 3t.

Indicator 3t. Assessments include a variety of modalities and measures.

What is the purpose of this indicator?
"Because NGSS-aligned instruction will naturally involve a range of activities, classroom assessment that is integral to instruction will need to involve a corresponding variation in the types of evidence it provides about student learning." (BOTA Report, p. 87) "...designing multiple and varied forms of assessment is key to appropriately determining student proficiency in science and using assessments to improve instruction." (STEM Teaching Tools, Brief 34) This indicator ● examines whether a variety of modalities and measures are included in assessments.
Evidence Collection
Review the student and teacher materials across the series. Review the grade and series scope and sequence. **In the instructional materials for the series being reviewed:** ● Look for evidence throughout the series to determine what different types of modalities (e.g., writing, illustrating, demonstrating, modeling, oral presentations, and performance tasks) are used for student assessments. ● Look for evidence throughout the series to determine what different types of measures (e.g., performance tasks, discussion questions, constructed response questions, project- or problem-based tasks, portfolios, justified multiple choice) are used for student assessments. ● Record the specific examples throughout the series of the different types of modalities and measures that are used for student assessments.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the assessments include a variety of modalities (e.g., writing, illustrating, demonstrating, modeling, oral presentations, and performance tasks)?
- Do the assessments include a variety of measures (e.g., performance tasks, discussion questions, constructed response questions, project- or problem-based tasks, portfolios, justified multiple choice)?
- Are multiple modalities and measures used within a single assessment?
- Are multiple modalities and measures used across assessments in each grade?
- Are multiple modalities and measures used across the series?

During Discussion:

- Identify evidence that the assessments use a variety of modalities.
- Identify evidence that the assessments use a variety of measures.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Assessments include a variety of modalities across the series. **AND**
- Assessments include a variety of measures across the series.

1 point:

- Assessments include a variety of modalities but a limited number of measures across the series. **OR**
- Assessments include a variety of measures but a limited number of modalities across the series.

0 points:

- Assessments do not include a variety of modalities across the series. **AND**
- Assessments do not include a variety of measures across the series.

Guidance for Indicator 3u.

Indicator 3u. Assessments offer ways for individual student progress to be measured over time.

What is the purpose of this indicator?
"For the purpose of making an appraisal of student learning, no single piece of evidence is likely to be sufficient; rather, the pattern of evidence across multiple components can provide a sufficient indicator of student understanding." (BOTA Report, p. 89) "The framework discusses the importance of seeing learning as a trajectory in which students gradually progress in the course of a unit or a year, and across the whole K-12 span, and organizing instruction accordingly." (BOTA Report, p. 90) This indicator: ● examines the materials to determine whether a path to assess and monitor each student's progress over time is provided.
Evidence Collection
Review the student and teacher materials across the series. Review the grade and series scope and sequence. **In the assessments materials for the series being reviewed:** ● Identify the different assessment types across the series. ● Look for evidence throughout the series to determine whether the materials provide a path to assess and monitor each student's progress. ● Record the specific examples of where the materials provide a path to assess and monitor each student's progress.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- What types of assessments are included in the materials?
- Do the assessments measure student progress?
- Do the materials provide systematic opportunities for assessment?
- How do the materials provide a path to assess and monitor each student's progress?

During Discussion:

- Identify evidence of types of assessments across the series.
- Identify evidence of the extent that assessments measure student progress over time.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials provide consistent and systematic opportunities for assessment. **AND**
- Materials consistently measure individual student progress over time.

1 point:

- Materials provide consistent opportunities for assessment, but they are not systematic. **AND**
- Materials measure individual student progress over time, but not consistently.

0 points:

- Materials do not provide consistent and systematic opportunities for assessment. **OR**
- Materials do not measure individual student progress over time.

Guidance for Indicator 3v.

Indicator 3v. Materials provide opportunities and guidance for oral and/or written peer and teacher feedback and self reflection, allowing students to monitor and move their own learning.

What is the purpose of this indicator?

"… uncovering students' incomplete forms of practice and understanding is critical: NGSS-aligned assessments will need to clearly define the forms of evidence associated with beginning, intermediate, and sophisticated levels of knowledge and practice expected for a particular instructional sequence. A key goal of classroom assessments is to help teachers and students understand what has been learned and what areas will require further attention. NGSS-aligned assessments will also need to identify likely misunderstandings, productive ideas of students that can be built upon, and interim goals for learning." (BOTA Report, p. 91)

"Classroom assessment probes will need to be designed to generate enough evidence about students' understandings so that their locations on the intended pathway can be reliably determined, and it is clear what next steps instructional activities) are needed for them to continue to progress." (BOTA Report, p. 91)

This indicator

- examines the opportunities for oral and/or written peer and teacher feedback.
- examines the opportunities for students to monitor and move their learning.

Evidence Collection

Review the student and teacher materials across the series.

Review the grade and series scope and sequence.

In the instructional materials for the series being reviewed:

- Look for and record evidence throughout the series to determine whether materials provide for ongoing review, practice, self-reflection, and feedback.
- Look for and record evidence throughout the series to determine whether materials provide multiple strategies, such as oral and/or written feedback, peer or teacher feedback, and self-reflection.
- Look for and record evidence throughout the series to determine whether materials provide a clear path for students to monitor and move their own learning.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials provide for ongoing review, practice, self-reflection, and feedback?
- Do the materials provide guidance for multiple feedback strategies, such as oral and/or written feedback?
- Do the materials provide guidance for multiple strategies for peer or teacher feedback?
- Do the materials provide opportunities for students to monitor their own progress based on feedback and self-reflection?
- Do the materials provide a clear path for students to monitor and move their own learning?

During Discussion:

- Identify evidence where the materials provide for ongoing review, practice, self-reflection, and feedback.
- Identify evidence where the materials provide guidance for multiple feedback strategies, such as oral and/or written feedback.

- Identify evidence where the materials provide guidance for multiple strategies for peer or teacher feedback.
- Identify evidence where the materials encourage students to monitor their own progress based on feedback and self-reflection.
- Identify evidence where the materials provide a clear path for students to monitor and move their own learning.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials consistently include opportunities and a path for students to monitor their own learning.

1 point:

- Materials sometimes include opportunities and a path for students to monitor their own learning.

0 points:

- Materials do not include opportunities or a path for students to monitor their own learning.

Guidance for Indicator 3w.

Indicator 3w. Tools are provided for scoring assessment items (e.g., sample student responses, rubrics, scoring guidelines, and open-ended feedback).

What is the purpose of this indicator?
Scoring tools ensure that assessments provide accurate and consistent information about a student's understanding of the lesson or standards. Answer keys, scoring guides and rubrics are examples of tools that provide criteria to score student work. "It is possible to design assessment tasks and scoring rubrics that assess three-dimensional science learning. Such assessments provide evidence that informs teachers and students of the strengths and weaknesses of a student's current understanding, which can guide further instruction and student learning and can also be used to evaluate students' learning." (BOTA Report, conclusion 4-3, p. 130) This indicator ● examines the materials for tools to score assessment items (e.g., sample student responses, rubrics, scoring guidelines, and open-ended feedback).
Evidence Collection
Review the student and teacher materials across the series. Review the grade and series scope and sequence. **In the materials for the series being reviewed:** ● Look for and record evidence whether materials provide tools to score assessment items (e.g., sample student responses, rubrics, scoring guidelines, and open-ended feedback).

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials provide tools to score assessment items?
- What types of tools are provided for scoring assessment items?
- Is each scoring tool provided accurate and paired appropriately with the assessment item(s)?

During Discussion:

- Identify evidence where the materials provide tools to score assessment items.
- Identify evidence where the materials provide tools for different types of assessment items.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials consistently provide tools to score assessment items.

1 point:

- Materials provide tools to score assessment items, but not consistently.

0 points:

- Materials do not or rarely provide tools to score assessment items.

Guidance for Indicator 3x.

Indicator 3x. Guidance is provided for interpreting the range of student understanding (e.g., determining what high and low scores mean for students) for relevant Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas.

What is the purpose of this indicator?
"To develop the skills and dispositions to use scientific and engineering practices needed to further their learning and to solve problems, students need to experience instruction in which they (1) use multiple practices in developing a particular core idea and (2) apply each practice in the context of multiple core ideas. Effective use of the practices often requires that they be used in concert with one another, such as in supporting explanation with an argument or using mathematics to analyze data. Classroom assessments should include at least some tasks that reflect the connected use of multiple practices. "(BOTA Report, Conclusion 4-2, p. 130) Tasks designed to assess the Next Generation Science Standards will need to have the following characteristics: ● "reflect the progressive nature of learning by providing information about where students fall on a continuum between expected beginning and ending points in a given unit or grade; and ● an interpretive system for evaluating a range of student products that is specific enough to be useful for helping teachers understand the range of student responses and that provides tools to helping them decide on next steps in instruction." (BOTA Report, conclusion 4-1, p. 129) "It is possible to design assessment tasks and scoring rubrics that assess three-dimensional science learning. Such assessments provide evidence that informs teachers and students of the strengths and weaknesses of a student's current understanding, which can guide further instruction and student learning and can also be used to evaluate students' learning." (BOTA Report, conclusion 4-3, p. 130) This indicator ● examines the series to determine if guidance is provided for interpreting the range of understanding students have (e.g., determining what high and low scores mean for students) for relevant SEPs, CCCs, and DCIs as they explain phenomena or solve problems. This indicator differs from Gateway 1 Criterion 2, Indicator 1c in that this indicator focuses on **interpreting the range of understanding** of the three dimensions; indicator 1c focuses on **eliciting evidence** of students' three-dimensional learning.
Research Connection
Students will need guidance about what is expected of them and opportunities to reflect on their performance as they develop proficiencies. Teachers will need information about what students understand and can do so they can adapt their instruction. Instruction that is aligned with the framework and the NGSS will naturally provide many opportunities for teachers to observe and record evidence of students learning. (BOTA Report, p. 5)

Evidence Collection

Review the student and teacher materials across the series.
Review the grade and series scope and sequence.

In the instructional materials for the series being reviewed:

- Look for and record evidence throughout the series to determine where the materials provide guidance for interpreting the range of understanding students have (e.g., determining what high and low scores mean for students) for relevant SEPs, CCCs, and DCIs as they explain phenomena or solve problems.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials provide guidance for interpreting the range of understanding students have (e.g., determining what high and low scores mean for students) for relevant SEPs, CCCs, and DCIs as they explain phenomena or solve problems.
- Do the materials assist teachers in interpreting student responses to diagnose what learning difficulties remain?
- Do the materials provide specific suggestions to teachers about how to use the information from the assessments to make instructional decisions about what ideas or learning needs to be addressed by further activities?
- Are the tools easy to use and/or is guidance provided for using the tool to score assessment items?

During Discussion:

- Identify evidence of where materials provide guidance for interpreting the range of understanding students have (e.g., determining what high and low scores mean for students) for relevant SEPs, CCCs, and DCIs as they explain phenomena or solve problems.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Look for consensus on whether the indicator was met fully or partially.
- Agree on final ratings.

Scoring:

2 points:

- Materials provide clear guidance for interpreting the range of understanding students have for relevant SEPs, CCCs, and DCIs. **AND**
- Materials provide clear guidance to help teachers make decisions about instruction and provide feedback to students.

1 point:

- Materials provide guidance for interpreting the range of understanding students have for relevant SEPs, CCCs, and DCIs, but it is not clear. **AND/OR**
- Materials provide guidance to help teachers make decisions about instruction and provide feedback to students, but it is not clear.

0 points:

- Materials do not provide guidance for interpreting the range of understanding students have for relevant SEPs, CCCs, and DCIs. **OR**
- Materials do not provide guidance to help teachers make decisions about instruction and provide feedback to students.

Guidance for Indicator 3y.

Indicator 3y. Assessments are accessible to diverse learners regardless of gender identification, language, learning exceptionality, race/ethnicity, or socioeconomic status (also see indicators 3i and 3t).

What is the purpose of this indicator?
Boundaries for indicator 3t and related indicators: Indicator 3i extends beyond assessments and across all materials, focusing on attributes of the materials that help provide all students with a feeling of belonging in the science classroom. Indicator 3t focuses on assessments providing a variety of modalities. This indicator focuses on whether assessments are free of bias and accessible to all students. This indicator ● examines the series to determine if the assessments are accessible to diverse learners regardless of gender identification, language, learning exceptionality, race/ethnicity, or socioeconomic status.
Evidence Collection
Review the student and teacher materials across the series. Review the grade and series scope and sequence. In the instructional materials for the series being reviewed: ● Look for and record evidence throughout the series to determine assessments are accessible to diverse learners regardless of gender identification, language, learning exceptionality, race/ethnicity, or socioeconomic status.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● Are the assessments accessible to diverse learners regardless of gender identification, language, learning exceptionality, race/ethnicity, or socioeconomic status throughout the series? **During Discussion:** ● Identify evidence of where assessments are accessible to diverse learners regardless of gender identification, language, learning exceptionality, race/ethnicity, or socioeconomic status. ● Explain the strategy/reasoning used as you collected evidence for this indicator. ● Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations. ● Look for consensus on whether the indicator was met fully or partially. ● Agree on final ratings.

Scoring:
2 points: ● Assessments are consistently accessible to diverse learners throughout the series. **1 point:** ● Assessments are accessible to diverse learners throughout the series, but not consistently. **0 points**: ● Assessments are not accessible to diverse learners throughout the series.

Criterion 5: Technology Use: Are the materials designed to include and support the use of digital technologies?

Consider the purpose for Criterion 5 when looking for evidence to support indicators 3z-3ad.

What is the purpose of this criterion?
This criterion: ● examines how the materials integrate digital technology and interactive tools to support student engagement in the three dimensions of science. ● examines how the digital materials are web based and compatible with multiple internet browsers,multiple operating systems, and allow the use of tablets and mobile devices. ● examines how the materials include opportunities to assess three-dimensional learning using digital technology. ● examines how the materials can be customized for individual learners, using adaptive or other technological innovations. ● examines how the materials use digital technology to provide collaborative opportunities for teachers and/or students.

Guidance for Indicator 3z.

Indicator 3z. Materials integrate digital technology and interactive tools (data collection tools, simulations, modeling), when appropriate, in ways that support student engagement in the three dimensions of science.

What is the purpose of this indicator?
This indicator ● examines whether materials integrate digital technology and interactive tools in ways that support student engagement in the three dimensions of science.
Evidence Collection
Review the units, chapters and lessons in both student and teacher materials across the series. Review the grade and series scope and sequence. **In the instructional materials for the series being reviewed:** ● Look for and record evidence throughout the series to determine whether digital technology and interactive tools, such as data collection tools, simulations, and/or modeling tools are available to students. ● Look for and record evidence that included digital tools support student engagement in the three dimensions of science.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Do the materials provide digital technology and interactive tools, such as data collection tools, simulations, and/or modeling tools for students?
- Do the included digital tools support student engagement in the three dimensions of science?

During Discussion:

- Identify evidence of digital technology and/or interactive tools that are available for student use.
- Identify evidence that included digital technology and/or interactive tools support student engagement in the three dimensions of science.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Agree on final narrative.

Scoring:

This indicator is not scored – Narrative Information Only

Guidance for Indicator 3aa.

Indicator 3aa. Digital materials are web based and compatible with multiple internet browsers. In addition, materials are "platform neutral," are compatible with multiple operating systems and allow the use of tablets and mobile devices.

What is the purpose of this indicator?
This indicator ● examines the materials to determine whether digital materials are web based and compatible with multiple internet browsers. ● examines the materials to determine whether digital materials are "platform neutral" and are compatible with multiple operating systems and allow the use of tablets and mobile devices.
Evidence Collection
Review all instructional materials in the grade-band series, including teacher's guide(s), assessments, and any supplemental materials to find all integrations of instructional technology. Review resources for teachers and students. Consider how technology is integrated with program materials to enhance student learning. **In the instructional materials for the series being reviewed:** ● Look for publisher provided evidence that specifies whether digital technology resources are web-based and compatible with multiple internet browsers. ● Look for publisher provided evidence that specifies whether instructional resources are accessible on both Windows and Apple platforms. ● Look for publisher provided evidence that specifies whether student resources (including assistive technology for students with disabilities) work on tablets and other mobile devices as well as PCs. ● Record the specific examples.

Discussion Points for Cluster Meeting:

Questions to think about as you prepare for the team discussion:

- Does the publisher provide evidence that specifies whether digital technology resources are web-based and compatible with multiple internet browsers?
- Does the publisher provide evidence that specifies whether digital materials and resources are accessible on both Windows and Apple platforms?
- Does the publisher provide evidence that specifies whether student resources (including assistive technology for students with disabilities) work on tablets and other mobile devices as well as PCs?

During Discussion:

- Discuss the degree that the publisher provides evidence of digital technology resources that are web-based and compatible with multiple internet browsers.
- Discuss the degree that the publisher provides evidence of digital materials and resources that are accessible on both Microsoft and Apple platforms.
- Discuss the degree that the publisher provides evidence of student resources (including assistive technology for students with disabilities) that work on tablets and other mobile devices as well as PCs.
- Explain the strategy/reasoning used as you collected evidence for this indicator.
- Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations.
- Agree on final narrative.

Scoring:

This indicator is not scored – Narrative Information Only

Guidance for Indicator 3ab.

Indicator 3ab. Materials include opportunities to assess three-dimensional learning using digital technology.

What is the purpose of this indicator?
This indicator ● examines the materials to determine if digital technology provides opportunities for student assessments. ● examines the materials to determine whether available digital technology is used to assess three-dimensional learning.
Evidence Collection
Review all instructional materials in the grade-band series. Consider how digital technology is integrated with program materials to assess three-dimensional learning. **In the instructional materials for the series being reviewed:** ● Look for evidence that opportunities for student assessments include digital technologies. ● Look for evidence that assessments of three-dimensional learning use digital technologies. ● Record the specific examples.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● Is digital technology used to provide student assessments? ● Is digital technology used to assess three-dimensional learning? **During Discussion:** ● Identify evidence of how digital technology is leveraged during student assessments? ● Identify evidence of how digital technology is used to assess three-dimensional learning. ● Explain the strategy/reasoning used as you collected evidence for this indicator. ● Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations. ● Agree on final narrative.
Scoring:
This indicator is not scored – Narrative Information Only

Guidance for Indicator 3ac.

Indicator 3ac. Materials can be customized for individual learners, using adaptive or other technological innovations.

What is the purpose of this indicator?
This indicator ● examines whether teachers can customize materials for individual learners using adaptive or other technological innovations. ● examines whether teachers can customize materials for local use using technological innovations.
Evidence Collection
Review all instructional materials in the grade-band series. Consider how digital technology is can be used to customize learning. **In the instructional materials for the series being reviewed:** ● Look for and record evidence that teachers have opportunities to manipulate or construct personalized learning experiences for individual students and differentiate materials based on individual student needs. ● Look for and record evidence that materials can be customized for local use (studentor community interests).
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● Are teachers able to create their own assessments? ● Are assessments adaptive (questions change based on student answers) or fixed form (same questions for all students? ● Are teachers able to manipulate digital materials to construct personalized learning experiences or differentiate materials for individual students? ● Are teachers able to customize digital materials for local use? **During Discussion:** ● Identify evidence of how teachers able to manipulate digital materials to construct personalized learning experiences for individual students. ● Identify evidence of how digital materials can be differentiated based on individual students' needs. ● Identify evidence of how teachers are able to customize digital materials for local use. ● Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations. ● Agree on final narrative.
Scoring:
This indicator is not scored – Narrative Information Only

Guidance for Indicator 3ad.

Indicator 3ad. Materials include or reference digital technology that provides opportunities for teachers and/or students to collaborate with each other (e.g., websites, discussion groups, webinars, etc.).

What is the purpose of this indicator?
This indicator ● examines the series to determine if the materials provide opportunities for teachers and/or students to collaborate with each other.
Evidence Collection
Review all instructional materials in the grade-band series. Consider how digital technology is can be used to customize learning. **In the instructional materials for the series being reviewed:** ● Look for and record evidence that the materials include or reference digital technology that provides opportunities for teachers and/or students to collaborate with each other.
Discussion Points for Cluster Meeting:
Questions to think about as you prepare for the team discussion: ● Do the digital materials provide opportunities for online collaboration? ● Is the collaboration between teacher and student? ● Is the collaboration between students? ● What types of digital technologies or platforms are used for the collaborations (websites, discussion groups webinars, e-mail, messaging)? **During Discussion:** ● Identify evidence of opportunities for online collaboration. ● Identify evidence of who has opportunities to collaborate. ● Provide evidence of the type of digital technology or platform used to collaborate. ● Explain the strategy/reasoning used as you collected evidence for this indicator. ● Share any generalizations that you noted as you looked at materials across this series, with specific examples noted to support your generalizations. ● Agree on final narrative.
Scoring:
This indicator is not scored – Narrative Information Only