Science High-Quality Instructional Materials Rubric

Office of Teaching and Learning

The Maryland K-12 Science High-Quality Instructional Materials (HQIM) Rubric is designed to evaluate core science instructional materials for inclusive, rigorous, and high-quality instructional methods, strategies, content and resources. It supports the identification of evidence of alignment to Maryland's Science HQIM Identification Framework.

This rubric was developed in partnership with Student Achievement Partners (SAP) and BSCS Science Learning (BSCS) and is grounded in SAP's Essential x Equitable (e^2) Instructional Practice Framework and using content with permission from BSCS. To learn more about the research and scholarship that underpins this work, please refer to the Science HQIM Identification Framework.

STRUCTURE

- **Criteria**: These criteria, directly from Maryland's Science HQIM Identification Framework, ground what to look for within the review process.
- **Indicators of Evidence**: Additional guidance for identifying key aspects of each criterion within instructional materials.
- **Evidence and Rating:** Space to capture evidence for each criterion and select a rating to reflect the overall quality of evidence.
    - Strong Evidence indicates that the material fully meets the criterion with minimal or no gaps.
    - Some Evidence indicates that the materials partially meet the criterion but have meaningful gaps.
    - Minimal Evidence indicates that the materials have minimal evidence of the criterion.
    - No Evidence indicates that the materials do not show presence of the criterion.

Additional support is provided for each criterion through the Science HQIM Companion Guide. This complementary resource supports a more granular examination of the criteria and offers concrete examples to illustrate how Key Criteria manifest in instructional materials. The companion guide includes key definitions, guidance on how to gather evidence, additional sample evidence, grade-level specifics (noted in the rubric when particularly relevant), red flags, and considerations for multilingual learners and students with diverse learning needs.

ORGANIZATION

Each review tool in this suite follows the same overarching organization, connected to Maryland's Science HQIM Identification Framework. Review materials for HQIM in Maryland are organized into four categories. Categories are divided into domains, which are further broken down into individual criteria.

Woven through all categories are 5 approaches to design that reflect the priorities Maryland has for instructional materials to truly be high quality. The priorities reflected in a criterion are communicated with these icons.

Icon	Maryland Priority
	Building Background Knowledge
	Affirming Cultural Identities
	Supporting Multilingual Learners
	Teaching Every Student
	Meeting Teacher Needs

For further information on scoring and the instructional materials review process, visit the Maryland HQIM website.

Grade-Level and Standards Aligned

Instructional Materials must receive an overall rating of "Strong" in the category of Grade-Level and Standards Aligned to be rated along the remaining three categories.

DOMAIN 1: SENSEMAKING

Criteria	Indicators of Evidence	Evidence and Rating
Phenomenon- or Problem-Driven Learning and Performance: Instructional materials are organized to center student learning around making sense of phenomena (i.e., specific occurrences in the natural or designed world) and/or problems (i.e., situations people want to change). These materials include all of the following elements: **a.** compelling phenomena and/or problems that are specific, meaningful to particular communities, and of the appropriate scope to drive student sense-making and promote learning of the targeted grade-appropriate standards; **b.** opportunities to engage with a range of phenomena, such as everyday occurrences and those that are relevant to society or culturally significant; **c.** student questions about phenomena/problems, and experiences (both prior experiences and those cultivated in the moment in class) related to the phenomena/problems, to motivate student sense-making and/or problem-solving; and **d.** instructional activities that help students answer questions they have about the phenomena and surface new questions that future lessons will help them answer.	• Materials center phenomena and problems that are specific, can authentically connect to students' lives, and are of the appropriate scope to drive student sensemaking and promote learning of the targeted, three-dimensional standards at the appropriate grade level (K-5) or grade band (6-12). • Materials provide opportunities to engage with a range of phenomena, such as everyday occurrences and those that are relevant to society or are culturally significant (i.e., meaningful to students' lives and cultural practices). • Materials utilize student-generated questions about phenomena and problems, and experiences (both prior experiences and those cultivated in the moment in class) related to the phenomena and problems, to motivate student sensemaking and problem-solving. • Materials provide learning experiences that help students answer questions they have about the phenomena or problem and surface new questions that future learning experiences will help them answer. • Materials provide opportunities for students to demonstrate their understandings and abilities through performances that are well-matched to the standards and based on the Performance Expectations (PEs). *See Companion Guide for Grade-Level Specifics*	

Criteria	Indicators of Evidence	Evidence and Rating
Three Dimensions Development: Instructional materials build student understanding of explicit, grade-appropriate elements of science and engineering practices (SEPs), disciplinary core ideas (DCIs), and cross-cutting concepts (CCCs) through engagement with the phenomena/problems. Moreover, the identified dimensions are required to explain the selected phenomenon or solve the identified problem.	• Materials build student understanding of explicit, grade band-appropriate elements of SEPs, DCIs, and CCCs. • Materials use phenomena or problems to drive three-dimensional student learning. • Materials require students' use of the targeted elements to describe or explain the phenomenon or solve the program. • Teacher materials provide lesson-level, element-specific three-dimensional learning targets that build over time and reflect student engagement with the phenomena and problems.	
Scientific Accuracy: Instructional materials use scientifically accurate and grade-appropriate scientific information, phenomena, and representations to support students' three-dimensional learning.	• Materials include scientifically accurate representations and text. • Materials are scientifically accurate and grade-level appropriate in their use of SEPs, DCIs, and CCCs., • Lessons and units support students in developing scientifically accurate understanding through their descriptions or explanations of phenomena and solutions to problems. • Teacher materials identify common student ideas.	

Criteria	Indicators of Evidence	Evidence and Rating
Nature of Science Development: Instructional materials organize learning around using the SEPs, CCCs, DCIs, and nature of science together in service of sensemaking. Nature of science expectations in the Next Generation Science Standards offer a route to building an understanding of the history and inequities in science. Instructional materials build students' understanding of the nature of science elements, explicitly connected to understanding. These materials include all of the following elements: **a.** how specific scientific understandings have been constructed; **b.** who has been included and excluded in scientific activities and communication of findings; **c.** the impact of how science has been, and is, done on a range of human and nonhuman communities and environments; and **d.** connections between the nature of science and problem/question definition and critical interpretation of findings	• Materials provide opportunities for students to learn how scientific understandings have been constructed. • Materials support students in learning how science investigations use a variety of methods and tools to gather data and are guided by a set of principles to ensure accuracy of measurements, observations, and objectivity of findings. • Materials support students in learning how people from different social, cultural, and ethnic backgrounds work as scientists and engineers. • Materials support students in learning that historically, wealthy European white men have been acknowledged for scientific activities, achievements, collaboration and communication while women and non-white individuals have been excluded from these acknowledgements and formal participation. • Materials support students in learning how science has been and continues to be done, in ways that impact a range of human and nonhuman communities and environments. • Materials support students in understanding that science distinguishes itself from other disciplines through the use of empirical evidence, argumentation, and skepticism to identify and address problems and develop explanations of the natural world.	

Criteria	Indicators of Evidence	Evidence and Rating
Hands On: Instructional materials provide students with the opportunity to regularly take part in hands-on investigation, modeling, and engineering. Learning experiences emphasize students' thinking as scientists with opportunities to pose questions; plan and carry out investigations that include the collection, organization, and analysis of data; develop and use models to construct and represent their understanding; and develop explanations and arguments based on evidence.	• Materials provide hands-on learning opportunities. • Materials provide learning experiences that promote scientific ways of knowing, scientific thinking, and scientific ways of communicating. • Materials support students to engage in scientific inquiry and develop the ability to use logical reasoning in a scientific context. • Materials support students' hands-on engagement with elements of grade level or grade band appropriate elements of the science and engineering practices of developing and using models and planning and carrying out investigations to make sense of phenomena and solve problems. • Materials provide both broad and more specific safety guidance to teachers and students.	

DOMAIN 2: COHERENCE

Criteria	Indicators of Evidence	Evidence and Rating
Lesson and Unit Coherence: Instructional materials include logical sequences within units, across units, and within a grade band. Lessons and units in the materials build on prior lessons and experiences by addressing questions raised in previous lessons and leading students to pose new questions that will be explored in subsequent lessons. In doing so, the materials build understanding toward a defined set of three-dimensional expectations.	• Materials provide a clear, concise, and logical scope and sequence of units and learning experiences or lessons by grade-level or grade bands that make sense to students and support students in constructing the storyline. • Materials provide resources and questions that build on prior learning so that students are making links between units and lessons to figure out phenomena and solve problems using the three dimensions. • Teacher materials include alignment to three-dimensional expectations across units and lessons by grade, grade bands and course.	

Criteria	Indicators of Evidence	Evidence and Rating
Three-Dimensional Coherence: Instructional materials build DCIs, SEPs, and CCCs progressively from one lesson or unit to the next. In the materials, scaffolding to support student development of SEPs and CCCs decreases over progression to support student independence.	• Materials provide opportunities for students to demonstrate growth in their understanding of the interconnectedness of the DCIs, SEPs and CCCs in figuring out phenomena and solving problems. • Materials provide scaffolds to support students in demonstrating independence in their use of the SEPs and CCCs. • Teacher materials include alignment to three-dimensional learning targets across units and lessons by grade, grade bands and course. • Teacher materials indicate how DCIs, SEPs, and CCCs are connected within and across units and lessons to build student conceptual understanding across all three dimensions. • Teacher materials indicate how DCIs, SEPs, and CCCs within and across units and lessons support students' abilities to progressively figure out phenomena or solve problems. *See Companion Guide for Grade-Level Specifics*	
Instructional Model Coherence: Instructional materials include routines and strategies situated within an instructional model that offer coherence in the types of learning experiences and the approach to learning.	• Teacher materials provide an overview of the instructional model, an evidence-based explanation of its design, and a description of how to use it across units and lessons to support students in figuring out phenomena and solving problems. • Materials provide opportunities for students to select and use routines and strategies embedded in the instructional model in groups or individually, across lessons and units that support sensemaking. • Teacher materials indicate or provide evidence and guidance for how the instructional model progressively supports student learning and sensemaking through explicit use of strategies and routines that are consistently used and grow in complexity over time within and across units.	

Criteria	Indicators of Evidence	Evidence and Rating
Assessment Coherence: Instructional materials include an approach to assessment that aligns with the approach to instruction.	• Teacher materials describe the assessment system and approach to assessment used in the materials. • Materials include unit-level assessments or assessments at the learning experience level that are aligned to Maryland's three-dimensional learning targets by grade, grade band, or course.[1] • Materials provide unit-level assessments or assessments at the learning experience level that elicit evidence of learning through the use of the three dimensions (DCIs, SEPs and CCCs) to figure out phenomena and solve problems. • Materials provide guidance, resources, multiple opportunities and formats to assess learning in groups or individually to support and maintain progress toward figuring out phenomena and solving problems.	

DECISION POINT

Instructional Materials must have **Strong** evidence overall in the Grade-Level and Standards Aligned category to be rated against the remaining categories. This category identifies the foundational prerequisites that must be met for the review process to continue.

[1] Maryland State Department of Education. (n.d.). *Science Branch*. Government of Maryland. https://marylandpublicschools.org/about/Pages/DCAA/Science/index.aspx

Designed to Affirm Students

DOMAIN 1: CULTURALLY RESPONSIVE-SUSTAINING INSTRUCTION

Criteria	Indicators of Evidence	Evidence and Rating
Affirmation and Centering of Students: Instructional materials are designed to encourage students to anchor learning in their individual experiences, backgrounds, and cultural knowledge to support and further their scientific knowledge and skills. 	• Materials provide regular opportunities for students to share who they are and what they know, bringing their unique funds of knowledge to their learning experiences. • Materials support student reflection and conversation within the context of figuring out phenomena or solving problems that affirm their identities and experiences. • Materials provide authentic and meaningful activities (e.g., scenarios, investigations, tasks) that reflect both the authenticity of the discipline (i.e., how science is done in a variety of real-world contexts) and are authentic to students' lived experiences. *See Companion Guide for Grade-Level Specifics*	
Science as a Tool for Civic Engagement: Instructional materials consistently include phenomena and tasks that prompt students to apply and develop their civic engagement skills and examine social context and current events, using science to question the world and the current status quo. 	• Materials provide opportunities for students to connect their scientific knowledge and practices with societal issues in their communities. • Materials use science phenomena or problems that connect to social issues and provide students with opportunities to consider potential impact on their communities. • Materials provide opportunities for students to connect phenomena or problems to their own experiences, their community, or culture. • Materials provide opportunities for critically examining proposed explanations, models and solutions for influence, bias, and diversity of perspectives and for considering whose voice is elevated and whose is absent. • Materials provide opportunities for students to take action in their communities.	

Real-World Connections: Instructional materials consistently connect with students' lives, their future goals, their communities, and the world and nurture ways to engage in their own communities and beyond. These materials include all of the following elements: **a.** use of scientific phenomena and tasks to connect to current events; **b.** collaborative tasks and/or projects that involve real-world problem-solving through meaningful interactions with peers and their local communities; **c.** structures (e.g., tasks, classroom activities, routines, assignments) to explore scientific phenomena from current events and data that are relevant to students' lives and communities so that students see themselves in the tasks and understand how they relate to their context and promote a sense of belonging; **d.** opportunities for students to reflect on how science phenomena, problems, and activities affect themselves, their families, and their communities and how their specific communities might shape the phenomena/problems/activities; and **e.** teacher guidance to support students in developing SEPs and disciplinary knowledge that are relevant to their academic and professional goals.	• Materials use phenomena and tasks to connect to current events. • Materials provide collaborative tasks and/or projects that involve real-world problem-solving through meaningful interactions with peers and/or their local communities. • Materials provide structures (e.g., tasks, classroom activities, routines, assignments) to explore phenomena from current events and data that are relevant to students' lives and communities so that students see themselves in the tasks and understand how they relate to their context and promote a sense of belonging. • Materials offer opportunities for students to reflect on how phenomena and problems affect themselves, their families, and their communities and how their specific communities might influence the phenomena or problems. • Teacher materials provide teacher guidance to support students in developing SEPs, DCIs, and CCCs that are relevant to their academic and professional goals. *See Companion Guide for Grade-Level Specifics*	

DOMAIN 2: LANGUAGE AFFIRMING INSTRUCTION

Criteria	Indicators of Evidence	Evidence and Rating
Multilingualism in Science: Instructional materials are deliberately designed to honor and build upon students' language(s) as an asset, encouraging students to use their linguistic repertoire to communicate with one another via reading, writing, speaking, and listening while engaging in scientific learning. 	• Materials promote sustained oral and written communication, including explicit encouragement to use a range of language practices and registers and to use their full language repertoire through translanguaging so all students express themselves in a language they are comfortable with while making sense of phenomena or solving problems through three-dimensional science learning and meeting language objectives in the target language. • Materials support students in building vocabulary and understanding of new concepts in English and home language(s), including use of social and academic vocabulary. • Materials support students in making cross-linguistic connections, including identifying and comparing similarities and differences between home language(s) and English (e.g., cognates) or registers and registers of instruction. • Materials state clear and specific integrated three-dimensional goals that emphasize the ways students use language for learning and communicating meaning in science. • Materials introduce students to new language after students have developed conceptual understanding so they can understand and communicate science ideas. • Materials make the purpose of using language to communicate about phenomena clear to students and teachers. • Materials offer ongoing discussion opportunities for students to listen actively, express, revisit, and refine their three-dimensional understanding and language over time. • Materials offer ongoing opportunities for students to revisit and refine their three-dimensional understanding and language over time through reading, viewing, writing, and representing. *See Companion Guide for Grade-Level Specifics*	

Criteria	Indicators of Evidence	Evidence and Rating
Language Objectives: Instructional materials provide explicit alignment between language and content objectives to ensure that the language goals embedded within the standards are being attended to in every lesson. This includes language objectives for both expressive (writing and speaking) and receptive (listening and reading) communication that are aligned to the science performance expectations. 	• Materials provide language objectives that are specific to the phenomena or problems under study and include the target language skill (speaking, listening, reading, and writing), the communicative purpose, and the three-dimensional science learning expectation. • Materials include language objectives to develop language intentionally and in tandem with the science learning over the course of a unit (moving from simpler to more complex language, moving towards increasingly precise and complex use of language, culminating in an opportunity to demonstrate language). • Teacher materials suggest instructional approaches for language development that leverage language goals and language-based supports to meet three-dimensional grade-level science learning goals in the context of making sense of phenomena and designing solutions.	

Criteria	Indicators of Evidence	Evidence and Rating
Phenomena/Text Selection to Support Language Development: Instructional materials use texts that have all of the following elements: **a.** authentic language; **b.** rich vocabulary and syntax; **c.** content that is written in home languages, when possible, and is high quality (e.g., not poor-quality translations); and **d.** formats that support sensemaking and language development (e.g., text engineering) and examine social contexts and current events, using science to question the world and the current status quo.	• Materials provide authentic opportunities to read, listen to, and view texts that are rich in vocabulary and syntax in service of making sense of phenomena and solving problems. • Texts include varied use of language that increases in complexity and precision as students develop conceptual understanding across the unit. • Texts are formatted in ways that support sensemaking and language development (e.g., include additional explanations, context, annotations, relevant illustrations or visuals, text chunking, text cognates, nominalization, multiple-meaning words, or vocabulary supports in home languages). • Texts and resources include high-quality translations that accurately capture the meaning, tone, and nuances of the original text to support students' comprehension.	

Instructional Design

DOMAIN 1: STUDENT AGENCY

Criteria	Indicators of Evidence	Evidence and Rating
Metacognitive Processes: Instructional materials develop and surface students' metacognition by teaching and supporting students to monitor understanding while engaging in science learning. These materials include all of the following elements: **a.** setting goals, self-monitoring growth, and reflecting on the impact of students' choices and ongoing development as scientists and engineers; **b.** providing opportunities for students to think about how language is used in science for sense making, expression of complex relationships, describing phenomenon and problems; **c.** providing opportunities to revisit student models, explanations, and designs as part of the process of intentional reflection; and **d.** providing strategies to help students understand the relationship between the three dimensions and the variety of language used (e.g., everyday, science specific, home language) 	• Materials provide opportunities and support for students to set goals, self-monitor their growth, and reflect on the impact of their choices in their ongoing development as scientists and engineers. • Materials provide opportunities for students to think about how the science and engineering practices and crosscutting concepts contribute to sensemaking, figuring out relationships, and describing or explaining phenomena and solving problems. • Materials provide opportunities for students to think about how language is used in science for sensemaking, expression of complex relationships, and describing or explaining phenomena and solving problems. • Materials provide students with supports to express their ideas in a variety of ways. • Materials provide students with supports to evaluate their use of language to communicate their ideas. • Materials provide opportunities for students to revisit and revise their models, explanations, and designs as part of the process of intentional reflection. • Materials provide strategies to help students understand the relationship between the three dimensions (SEPs, DCIs, CCCs) and the variety of language used (e.g., everyday, science specific, home language). *See Companion Guide for Grade-Level Specifics*	

Criteria	Indicators of Evidence	Evidence and Rating
Choice and Voice: Instructional materials include a balance of student-choice and teacher-defined tasks and offer a variety of phenomena/problems that support student choice and leverage students' approaches to sensemaking. 	• Learning experiences invite students to pose their own questions in service of describing or explaining a phenomenon or solving a problem. • Learning experiences support students in pursuing investigations based on their own questions in order to describe or explain a phenomenon or solve a problem. • Learning experiences invite students to monitor their progress toward answering their own questions related to phenomena or problems. • Materials provide students with opportunities to identify related phenomena or problems based on experiences, communities and cultures and connect them to the existing phenomena and problems. • Materials provide students with opportunities for them to choose how to express their ideas to make sense of phenomena and solve problems in ways that best reflect their strengths as learners and their understanding of the three dimensions (SEPs, DCIs, CCCs). • Materials provide opportunities and supports for the provision and use of peer feedback focused on explanations, models, and designs. *See Companion Guide for Grade-Level Specifics*	

Criteria	Indicators of Evidence	Evidence and Rating
Authentic Engagement as a Scientist: Instructional materials promote productive struggle and the sensemaking process through engaging, relevant phenomena that are sequenced to build conceptual understanding of DCIs, concepts, and practices; provide opportunities to take risks; allow for iterative building of knowledge and multiple approaches; and use misconceptions as opportunities for entry points for learning. 	• Learning experiences are designed and sequenced for students to figure out phenomena or solve problems using the DCIs, crosscutting concepts, and science and engineering practices in ways that promote authentic engagement as scientists. • Materials provide opportunities within and across lessons for students to use their ideas and questions in a sequence that builds overtime (i.e., prior conceptions, common ideas, science ideas, misconceptions) and abilities as entry points for learning. • Learning experiences provide a variety of approaches for students to figure out phenomena and solve problems to build knowledge by revisiting and revising their ideas based on empirical evidence identified or collected within the unit or lesson. • Phenomena- and/or problem-based investigations, models, explanations, arguments, and designs developed by students become more complex over time through an iterative process of individual and group sensemaking. • Materials provide opportunities for students to make sense of the nature of science and make connections to how their learning experiences are aligned to ways scientists think and work. • Materials provide opportunities for students to engage in public reasoning as part of collaborative sensemaking . • Materials normalize mistake-making and learning from mistakes.	

Criteria	Indicators of Evidence	Evidence and Rating
Collaborative Learning: Instructional materials engage all students in collaborative learning through a variety of routines, structures, and tasks that allow for whole-group, small-group, and independent thinking. Materials explicitly plan for students to demonstrate their curiosity and share their tentative thinking; ask questions; and adjust their understanding by building on one another's ideas through speaking, listening, reading, and writing using the three dimensions (SEPs, DCIs, CCCs). 	• Materials provide opportunities for student collaboration to promote making sense of the phenomenon or problem. • Materials provide opportunities for student-to-student discourse that include clear discussion structures matched to the purpose of the discussion, prompts, and supports for making sense of the phenomenon/problem (e.g., slides, protocols, anchor charts). • Materials provide opportunities for students to interact with peers and then revisit their thinking to help them monitor their progress over the course of lessons and across units. • Materials provide opportunities for student collaboration that include structures to hear, see, and consider ideas shared by their peers. • Materials provide opportunities for student collaboration that promote public reasoning and authentic engagement as a scientist.	

DOMAIN 2: MONITORING PROGRESS AND SUPPORTING STUDENTS

Criteria	Indicators of Evidence	Evidence and Rating
K-12 Progressions: Instructional materials identify and build on students' prior learning in all three dimensions. These materials include all of the following elements: **a.** explicit identification of prior student learning expected for all three dimensions; and **b.** clear explanations of how the prior learning will be built upon. 	• Materials support students in accessing and engaging relevant prior knowledge and experience across all three dimensions (SEPs, DCIs, CCCs) explicitly related to that expected from prior grade bands. • Materials make explicit links to prior learning and experiences in all three dimensions (SEPs, DCIs, CCCs). • Materials make explicit links to future learning and experiences in all three dimensions (SEPs, DCIs, CCCs). • Materials provide strategies, routines, or approaches to make student thinking visible. • Materials support students in monitoring progress toward three-dimensional learning targets in preparation for learning expected in subsequent lessons, units, and grade bands. • Teacher materials include explicit identification of prior student learning expected for all three dimensions (SEPs, DCIs, CCCs). • Teacher materials include guidance for how new learning will utilize prior knowledge and uncover and attend to common student ideas across lessons and units.	

Criteria	Indicators of Evidence	Evidence and Rating
Supports and Scaffolds: Instructional materials are designed to support a variety of student strengths and diverse learning needs in ways that are based in research and do not interfere with their ability to engage with grade-level content. These materials include all of the following elements: **a.** guidance on potential individual student needs so that supports, scaffolds, and extensions can be effectively differentiated to support three-dimensional sensemaking; **b.** resources that provide acceleration opportunities for students who are not yet proficient in reading, writing, and language grade-level skills; **c.** resources that provide extensions for students who have met performance expectations to continue growth; and **d.** supports and scaffolds that are designed to shift to student independence over time. 	• Materials provide research-based supports and scaffolds for student use that are designed to develop independence by fading over time. • Materials provide supports and scaffolds for student use that promote the development of more complex models, explanations, arguments, designs, and solutions over time. • Materials include resources that provide extensions for those students who have met learning targets to continue growth. • Materials provide reading, writing, and language scaffolds to support each student in grade-level science learning. • Teacher materials provide guidance for how to differentiate supports, scaffolds, and extensions to support three-dimensional sensemaking based on student needs. • Teacher materials provide guidance to support students with acceleration opportunities for science concepts and practices when needed so that each student can continue forward with grade-level science content. *See Companion Guide for Grade-Level Specifics*	

Criteria	Indicators of Evidence	Evidence and Rating
Simultaneous Science Sensemaking and Language Development: Instructional materials include intentional language learning opportunities alongside appropriate, research-based supports for multilingual learners and students with diverse learning needs to develop scientific sensemaking and language simultaneously. 	• Materials provide opportunities for students to develop, revisit, and refine their language use in the context of three-dimensional science learning. • Materials include explicit instruction in reading, writing, speaking, listening, viewing, and representing as students engage in language functions when using science and engineering practices (e.g., describe, compare, explain, argue, etc.). • Materials embed high-leverage language development supports that align with language patterns and structures needed for scientific sensemaking. • Materials are designed to develop conceptual understanding before students are introduced to new academic science language. • Teacher materials explain how opportunities during core learning experiences support the simultaneous development of language and three-dimensional science.	
Relevant Contexts: Instructional materials provide contextualized tasks and problems that are relevant to students and their communities and emphasize phenomena and sensemaking that incorporate student and community interests and agency. Instructional materials lift up diverse cultures via asset-oriented narratives. 	• Materials use asset-oriented narratives to lift up diverse cultures in meaningful ways. • Materials offer opportunities for students to identify and engage with related phenomena or problems, particularly those relevant to them and to their local communities. • Materials provide opportunities for students to solve community-based problems, emphasizing taking action to build student agency.	

Three-Dimensional Performance Progress Monitoring: Instructional materials embed frequent opportunities to monitor and develop students' progress in scientific sensemaking using the three dimensions and nature of science. These opportunities are fully coherent with instructional design, implying that they reflect students' opportunities to learn, and the same criteria as instructional materials, as appropriate to the scope and nature of the assessment(s). These materials include all of the following elements: **a.** consistent multidimensional assessment opportunities that center on making sense of phenomena and addressing problems with the three dimensions and nature of science; **b.** embedded and consistent formative assessment practices to surface student understanding and inform instructional decision-making; **c.** varied and multiple means of surfacing sense-making with multiple dimensions that coherently measure and signal what is most valued about student learning in science, including attention to culturally and linguistically responsive practices; **d.** routine opportunities to demonstrate understanding at a range of complexity, including simple checks on understanding and more complex performance tasks at appropriate intervals; and **e.** routine opportunities to surface data about students' experience and to triangulate this with performance information to inform instruction. 	• Materials provide formative and summative assessment opportunities that center on making sense of phenomena and solving problems using the three dimensions (SEPs, DCIs, CCCs) and nature of science. • Materials provide opportunities for students to demonstrate understanding of the three-dimensions (SEPs, DCIs, CCCs) with increasing complexity, including simple checks on understanding and more complex performance tasks at appropriate intervals. • Materials provide formative assessment opportunities to make student thinking visible to students (and teachers). • Materials provide summative assessment opportunities for students and relevant information to support teachers in monitoring student learning. • Materials provide opportunities for students to apply their understandings in new contexts (i.e., to related phenomena or problems as transfer tasks). • Teacher materials provide guidance on how student ideas surfaced through formative assessment practices can be triangulated with student experiences to inform instructional decision-making. • Teacher materials provide guidance on how to attend to culturally and linguistically responsive practices when monitoring student progress.	

Criteria	Indicators of Evidence	Evidence and Rating
Meaningful Feedback: Instructional materials provide frequent opportunities for feedback to advance content understanding and disciplinary literacy skills, as appropriate to the type of literacy instruction. These materials include all of the following elements: **a.** peer and teacher cycles of feedback, including communicating progress; **b.** normalization of mistake-making and affirmation of effort and growth; **c.** guidance for explicit, timely, informative, and accessible formative feedback to address partial understandings about tasks, texts, and topics in ways that allow learners to monitor their own progress effectively and to use that information to guide their own effort and practice; **d.** focusing of students' attention on sense-making and/or metacognitive processes; and **e.** guidance on how and when to collect data, as well as how to respond to specific student strengths and needs.	• Materials provide opportunities and supports for peer and teacher cycles of formative feedback. • Materials support normalization of mistake-making and affirmation of effort and growth. • Materials support students in recognizing mistakes as a part of learning. • Materials promote asset-based approaches to providing feedback throughout the learning process (e.g., when making student thinking visible, during sensemaking, and in service of developing metacognitive processes). • Teacher materials provide opportunities to offer formative feedback that addresses common student ideas revealed through learning experiences. • Materials offer opportunities for students to interact with feedback in ways that allow students to monitor their own progress and learn from mistakes. • Teacher materials provide guidance on how and when to collect data, as well as how to respond to specific student strengths and needs.	

Educator Support

DOMAIN 1: EDUCATOR KNOWLEDGE

Criteria	Indicators of Evidence	Evidence and Rating
Examination of Self: Instructional materials support teachers in examining their own identities, biases, and belief systems to help them understand how these factors might influence instructional choices and the lens through which they interpret student thinking. These materials may include reflection prompts, examples of educator thinking, or embedded professional learning. 	• Teacher materials provide guidance within each grade/unit that invites teachers to identify and reflect on the way their identities, experiences, and knowledge impact how they view students and their thinking/work (e.g., prompts or reflection tasks, sample teacher thinking). • Teacher materials provide teacher reference callouts and/or reflection opportunities to address, identify, and interrupt biases.	

Pedagogical Content Knowledge: Instructional materials explicitly support teachers in building students' science understanding by helping educators understand how students learn science. These materials include all of the following elements: **a.** explanations, examples, additional conceptual information, and related phenomena to support teachers in building their own knowledge of the targeted phenomena, problems, SEPs, DCIs, and CCCs; **b.** explicit guidance for instructional strategies and routines that support authentic student sense-making (e.g., how to elicit student ideas and surface student questions that drive ongoing learning experiences); and **c.** explicit guidance for instructional strategies and routines that are consistent with how students learn science (e.g., rather than simply providing teachers with alternative conceptions or common student ideas, provide information about what experiences young children often have that lead them to believe one thing and how to use that facet of understanding to build a more accurate and complete understanding in grade-appropriate ways). 	• Teacher materials provide support for teachers in building their own knowledge of the targeted phenomena, problems, SEPs, DCIs, CCCs, and nature of science. • Teacher materials provide background on common student ideas for each unit and provide examples of how students might respond to questions or tasks based on those ideas. • Teacher materials provide explicit guidance for instructional strategies and routines that support students in making sense of the phenomenon or problem using the targeted SEPs, DCIs, and CCCs. • Teacher materials provide guidance for strategies and routines that are consistent with how students learn science. • Teacher materials explain how scaffolds support students' independent use of the SEPs by elements over the course or grade band.	

Criteria	Indicators of Evidence	Evidence and Rating
Students' Linguistic and Cultural Assets: Instructional materials support educators in understanding how to surface and value diverse sensemaking repertoires and how to leverage students' linguistic and cultural assets in service of scientific sensemaking across the three dimensions. These materials include all of the following elements: **a.** integrated structures for educators and prompts for them to learn about and integrate the knowledge, strengths, and resources of students, families, and the community — especially those who have been historically marginalized; **b.** diverse examples of how different student experiences and language can be leveraged within specific instructional contexts; and **c.** explicit prompts and supports for surfacing student assets within teacher guides or other facilitator materials. 	• Teacher materials are designed with integrated structures for teachers and prompts for them to learn about and integrate the knowledge, strengths, resources, and language practices of students, families, and the community — especially those who have been historically marginalized. • Teacher materials include diverse examples of how different student experiences and language can be leveraged within specific instructional contexts. • Teacher materials provide explicit prompts and supports for surfacing student assets within and across lessons. • Teacher materials provide guidance on ways that educators can attend to the assets of students, families, and communities who have been historically marginalized (e.g., centering multilingual students as thought leaders through instruction, prompts to consider inclusion of families of color).	

Criteria	Indicators of Evidence	Evidence and Rating
Supporting Language Development for All Learners: Instructional materials build educators' understanding of research-based practices to support language development for all learners, especially for multilingual learners. These materials include all of the following elements: **a.** use of home language, translanguaging, and developing cross-linguistic connections to deepen understanding of the linguistic features across languages and registers; and **b.** development of oracy skills. 	• Teacher materials support educator understanding of key linguistic features in the science unit in ways that develop cross-linguistic connections. • Teacher materials provide support for educators to listen and look carefully to language structures used by students at various points in the unit. • Teacher materials explain how students' language develops over the course of the science unit and includes alignment to oracy and language development standards. • Teacher materials deepen understanding of instructional strategies that support the simultaneous development of language, content, and literacy skills. • Teacher materials provide sample student responses within the context of lesson content with a range of language proficiency levels.	

Criteria	Indicators of Evidence	Evidence and Rating
Inclusive Classroom Environments: Instructional materials include specific guidance, instructional strategies, and routines for cultivating classroom cultures in which all students can have a voice and feel a sense of belonging. These materials include all of the following elements: **a.** structures for ensuring that all students can share their ideas; **b.** opportunities for students to see their ideas as valued elements/expertise within the science classroom setting; and **c.** opportunities for students to recognize self and peer assets while celebrating diversity of experiences. 	• Teacher materials provide structures for ensuring that each student can share their ideas and questions, through various modalities. • Teacher materials provide guidance for how teachers can support students in seeing their ideas and community connections as valued elements/expertise within the science classroom setting. • Teacher materials provide guidance for how teachers can support students in recognizing self and peer assets while celebrating diversity of experiences.	

DOMAIN 2: SUPPORTING PRINCIPLED ADAPTATION

Criteria	Indicators of Evidence	Evidence and Rating
Related and Alternative Phenomena: Instructional materials provide guidance for how to identify and use alternative phenomena and problems as part of instructional activities, including locally relevant and compelling phenomena/problems. 	• Teacher materials provide guidance on how to elicit related phenomena or problems from student experiences. • Teacher materials provide guidance on how to support students in connection to their related phenomena or problems at multiple points across a unit. • Teacher materials highlight how underlying mechanisms of example related and alternative phenomena or problems are similar and different from phenomena or problems embedded as part of unit design. • Teacher materials provide guidance on how to maintain lesson and unit coherence if alternative lesson-level phenomena or problems are used. • Teacher materials include guidance on how to find and evaluate data sets and resources for students to engage in sensemaking if the option of using alternative phenomena or problems is offered in the materials.	
Surfacing of Student Experiences: Instructional materials include explicit structures for collecting student interest and experience data and triangulating this information with performance/proficiency data to inform possible needed adaptations of materials. 	• Materials provide guidance on when, how, and where in the unit to collect student interest and experience data. • Materials provide guidance on how to use student interest or experience data with student proficiency and prior knowledge data to inform possible adaptations. • Materials provide guidance on how to use students' prior conceptions as instructional resources that serve as entry points for learning.	

Criteria	Indicators of Evidence	Evidence and Rating
Student-Centered Extensions and Alternatives: Instructional materials provide guidance for possible extension activities, alternative investigations, or design projects that allow for student choice and adaptation to specific communities and students. These materials may include structures and guidance, with opportunities for teachers and students to have complete autonomy over content, or they may include more structured opportunities, with specific elements that are open to choice and adaptation. 	• Teacher materials provide guidance to help teachers make decisions about the use of student-centered extensions that promote student choice and voice. • Teacher materials provide guidance for teachers about extension learning experiences that present opportunities for students to select and use science and engineering practices independently. • Teacher materials explain how possible alternative investigations, design projects, or simulations play an equivalent role to embedded learning experiences. • Teacher materials explain how alternative investigation or design projects maintain (do not interrupt or detract from) the unit's coherence from students perspective. • Teacher materials provide guidance to ensure that each student has the opportunity to meet or exceed grade level learning targets (i.e., student use of an alternative investigation or project does not prevent those students from meeting or exceeding grade level expectations).	

Criteria	Indicators of Evidence	Evidence and Rating
Clear Guidance on Constant and Variable Features: Instructional materials are designed such that they assume some local adaptation will be needed to authentically support diverse learners. Instructional materials explicitly support teachers in understanding which elements of the materials should not be adapted (or should be done so very carefully) and which elements have been designed such that teachers and students can modify them with great success (e.g., to connect with local resources and priorities, to be appropriate to available time for instruction). 	• Teacher materials explain how the anchor phenomenon and/or problem was selected based on student interest and data. Materials explain how phenomena or problems, if not local, can support the development of global community members. • Teacher materials explain which elements may be adapted and why specific elements of the materials should not be adapted. • Materials identify which elements of the materials are designed for adaptation to the local context. • Materials provide guidance to teachers about how to modify elements of the materials for local contexts.	

DOMAIN 3: USABILITY

Criteria	Indicators of Evidence	Evidence and Rating
Design and Functionality: Instructional materials are designed to support ease of student and teacher use. These materials include all of the following elements: **a.** visually appealing design with an organized and logical format; **b.** appropriate pacing; **c.** clear and concise educator-facing guidance; **d.** a variety of ways to engage with the content, including leveraging current technology and tools; **e.** manipulatives that are well organized, with an emphasis on ease of setup; and **f.** appropriate guidance for hands-on activities. 	• Teacher and student materials are visually appealing with an organized and logical format. • Teacher materials provide guidance for appropriate pacing (e.g., time required for each lesson/unit, sequencing). • Teacher materials offer clear and concise guidance. • Teacher materials provide a variety of ways to engage with the content, including leveraging current technology and tools. • Teacher materials provide clear guidance for how to set up the materials and supplies required for investigations. Teacher materials provide kits and/or lists of materials required with specifications for each item. • Teacher materials provide appropriate guidance for investigations, learning experiences, and hands-on learning experiences.	

Criteria	Indicators of Evidence	Evidence and Rating
Adaptability for Context: Instructional materials contain materials and/or meaningful suggestions for how to adapt for district, school, and/or classroom context. These materials may include varied selections for topics under study; flexibility to modify tasks to connect to local resources, organizations, or issues; or varied pacing suggestions based on number of school days or minutes of instruction. 	• Teacher materials provide guidance for a variety of school and classroom schedules (e.g., instructional minutes, block/traditional schedule). • Teacher materials are in a format that supports educators in making revisions for local context. • Teacher materials provide guidance for how and when to make adjustments and modifications to the learning experiences while maintaining coherence and supporting students as they figure out phenomena and solve problems. • Teacher materials include suggestions within each grade level to attend to local context through phenomena or problems (e.g., suggestions for planning a field trip to a city food center during a unit on ecosystems).	
Program Coherence: Core instructional materials work in concert with (or have the potential to work in concert with) additional supplemental science materials (e.g., Maryland Environmental Literacy Standards Framework, local projects, school-based science/STEM initiatives). These materials include aligned and research-based content and instructional approaches across materials. 	• Teacher materials explain how the instructional model, routines, and strategies build student learning across units. • Teacher materials provide guidance to link student learning and engagement across units and lessons and across all three dimensions (SEPs, DCIs, CCCs). • Teacher materials provide an assessment system with teacher guidance for evaluating student performance and determining instructional next steps. • Teacher materials include explanations and examples of how the concepts and/or standards align to other grade/course levels so that teachers can improve their own knowledge of the subject. • Teacher materials may include guidance for how to incorporate ancillary resources into the selected program.	