Coherence and Alignment Among Science Curriculum, Instruction, and Assessment (CASCIA)

Validity Evaluation Report

September 2025

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Introduction

The Coherence and Alignment among Science Curriculum Instruction and Assessment (CASCIA) project was a multi-state partnership funded by a three-year grant under the U.S. Department of Education's Competitive Grants for State Assessments (CGSA) program. Its purpose was to design a scoring and score reporting framework that would build educators' capacity to track, interpret, and communicate students' learning in science. As the lead state for this grant, the Nebraska Department of Education (NDE) collaborated with two other states, Alabama and Alaska, three organizations providing technical support [edCount, LLC (edCount); the Learning Sciences Research Institute at the University of Illinois, Chicago (LSRI); and EdMetric, LLC (EdMetric)], and an external evaluator [Seneca Consulting, LLC (Seneca)] to create replicable and scalable resources designed to benefit education agencies both within and outside of the CASCIA project.

CASCIA was the third in a series of CGSA-funded projects focused on improving learning and assessment in science. It extended and expanded upon the work of the Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments project, funded by a CGSA in 2020, and the Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores (SCILLSS) project funded by a CGSA in 2016. These projects produced science curriculum and assessment resources that became publicly available in 2023 and established a replicable process for educators to create similar resources. Like its predecessors, CASCIA prioritized the active participation of state and local educators throughout the project to maximize the relevance, usefulness, and coherence of the resources it yielded for teachers, students, and parents.

Both SIPS and CASCIA focused on links between expectations for student learning, what students experienced in their classrooms and on assessments, and the information assessments provided. SIPS focused primarily on the development and validation of instructionally-aligned innovative classroom science assessments. CASCIA built upon those foundations and concentrated more specifically on score reports, reporting mechanisms, and their use in informing instruction.

The purpose of this report is to evaluate the validity of the CASCIA assessment reporting system by examining the extent to which its design and implementation fulfilled the goals outlined in the Validity Evaluation Plan. Specifically, the report presents findings related to each of the four evaluation questions that guided the work. It synthesizes evidence from the pilot study and post-pilot evidence collection to assess how well the CASCIA system supported accurate interpretation and appropriate use of assessment results by educators and other stakeholders.

Acronyms

To aid readers in navigating the terminology and acronyms referenced throughout this report and the CASCIA project, the following list provides concise definitions for key terms and organizations mentioned above.

- **CASCIA** - Coherence and Alignment among Science Curriculum Instruction and Assessment
- **CCCs** - Crosscutting Concepts
- **CGSA** - Competitive Grants for State Assessments
- **CRRs** - Classroom Roster Reports
- **DCIs** - Disciplinary Core Ideas
- **ECD** - Evidence-Centered Design
- **EOU** - End-of-Unit
- **INL** - Instructional Needs Levels
- **ISRs** - Individual Student Reports
- **IUA** - Interpretation and Use Argument
- **KSAs** - Knowledge, Skills, and Abilities
- **MAP** - Measures of Academic Progress
- **NGSS** - Next Generation Science Standards
- **NSCAS** - Nebraska Student-Centered Assessment System
- **PAD** - Principled Assessment Design
- **PC** - Performance Category
- **PEs** - Performance Expectations
- **PLDs** – Performance Level Descriptors
- **SCILLSS** - Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores
- **SEPs** - Science and Engineering Practices
- **SIPS** - Stackable, Instructionally-embedded, Portable Science
- **TIG** - Task Interpretation Guide
- **ToA** - Theory of Action
- **UDL** - Universal Design for Learning
- **VA** - Validity Argument
- **WTRM** - What These Results Mean

Background on the SIPS EOU Assessments and CASCIA Reporting System

In this section, we describe the process used to develop the SIPS EOU assessments and CASCIA score reports and reporting resources.

SIPS Assessment Design and Development

The SIPS EOU assessments were developed using a PAD approach that explicitly linked the intended constructs, the evidence needed to support claims about student learning, and the tasks designed to elicit that evidence (Mislevy & Riconscente, 2006). By applying PAD, the SIPS development process created a transparent chain of reasoning that strengthened the validity of the resulting reports.

At the outset of this process, SIPS partners articulated claims about what students should know and be able to do in relation to NGSS PEs. These claims were operationalized through PLDs, which specified gradations in student proficiency, and through design patterns, which detailed the knowledge, skills, and abilities (KSAs) to be measured, the types of student work products expected, and the features of tasks that could reliably elicit evidence of learning.

Task development followed from these specifications. Each EOU assessment included three multi-part tasks that were phenomenon-based and structured around a chain of sense-making, allowing students to demonstrate integration of disciplinary core ideas (DCIs), science and engineering

practices (SEPs), and crosscutting concepts (CCCs). Task specifications required coherence with PLDs and design patterns, ensuring that all prompts and scenarios targeted intended KSAs and remained within the assessment boundaries. The inclusion of variable features in the task design also provided flexibility while maintaining comparability across students and administrations.

SIPS partners developed scoring rubrics in tandem with tasks to provide clear, criterion-based guidance for distinguishing between different levels of student performance. These rubrics were intended to support reliable scoring and also yield interpretable feedback for educators. To further enhance accuracy and reliability, each rubric was accompanied by exemplar responses and prompt-specific scored and annotated anchor sets of student responses, which illustrated how the criteria applied across a range of actual student work. The inclusion of exemplars and anchor sets was intended to help ensure consistency in scoring, support educator understanding of the distinctions between performance levels, and provide concrete models that connected student evidence to the intended constructs. By aligning rubrics and anchors directly to PLDs, the scoring system ensured that evidence captured from student responses reflected the targeted constructs and could be meaningfully used by educators.

The use of PAD offers procedural evidence for content coherence—the alignment between what the EOUs were intended to measure and what they actually measured—and for comparability across students and administrations. Although the EOUs were not designed to be directly comparable across units, since each targeted distinct bundles of PEs and KSAs, the consistent use of development processes, task specifications, rubrics, and annotated anchor sets ensured stable scoring and interpretation of results across students and administrations. By systematically linking claims, PLDs, design patterns, task specifications, and rubrics, the PAD approach established a principled foundation for CASCIA reporting.

Reporting System

CASCIA partners designed the CASCIA reporting system to provide educators, students, and families with clear, actionable information about student performance on the EOU assessments. The reporting resources include multiple, interconnected components tailored to different audiences and purposes:

- **Individual Student Report (ISR):** Summarizes individual student performance by PC using a three-level traffic-signal instructional need system (Red, Yellow, Green). These levels are based on the number of score points earned on prompts aligned to each PC. The ISRs are designed to support communication with families and guide individualized instructional planning.
- **Classroom Roster Report (CRR):** Summarizes student performance across a classroom, showing the number and percentage of students at each instructional need level within each PC. The CRR helps educators reflect on patterns of performance, identify needs for reteaching, and plan flexible instructional groupings.
- **Educator and Family Guidance & Learning Resources:** Developed uniquely for *each unit's performance categories*, these resources provide tailored explanations of results. Educator

guidance describes what students at each instructional need level are likely able to do, recommends next instructional steps, and offers a bank of strategies aligned with UDL. Family resources offer clear explanations and manageable supports for reinforcing learning at home.

- **Task Interpretation Guide (TIG):** Supports educators' understanding of the EOU tasks and prompts, including design features, intended evidence, and connections to unit instructional frameworks.
- **Interactive Scorer Training Modules:** A five-chapter module for grades 5 and 8 designed to support accurate scoring and meaningful use of assessment results. Modules included task and rubric interpretation, practice scoring activities with exemplars, and scored and annotated anchor sets. They also provided opportunities to apply ISR and CRR data to identify patterns of student performance and plan next instructional steps at multiple levels—including integration of educator and family guidance, the TIG, and unit curricular materials.

Samples of these CASCIA reporting resources are provided in Appendix A.

Principled Design with Stakeholder Engagement

CASCIA partners developed the reporting resources through a PAD process that prioritized collaboration with educators as key contributors and co-designers, along with consultation from district and building administrators, parents/guardians, and CASCIA partner state leads. This collaborative approach ensured that the resources were grounded in educator expertise and aligned with stakeholder needs and priorities.

- **Establishing PCs and INLs:** CASCIA partners worked with state science specialists and educator panels to group prompts into PCs and draft WTRM statements describing what students at different levels of instructional need for each PC likely know and can do. These knowledge and skill statements identified for each INL are based on combinations of the PEs, DCIs, SEPs, and CCCs measured by specific prompts on the unit-specific EOU. Educators then engaged in a structured, consensus-based process to set "cut points" for the traffic-signal INLs (red = extensive additional support, yellow = moderate support, green = minimal or no additional support). This process involved reviewing prompts and rubrics, discussing threshold expectations, and iteratively recommending cut scores until achieving consensus.
- **Iterative Prototyping and Refinement:** CASCIA partners presented draft versions of ISRs, CRRs, and supporting resources in focus groups with administrators, educators, and parents. Participants evaluated the clarity, usefulness, and accessibility of the reports and provided feedback on wording, structure, and design. Focus groups were facilitated at three key junctures in the CASCIA project: 1) prior to initiating the pilot study, 2) following the Quarter 2 administration window, and 3) at the culmination of the pilot. CASCIA partners systematically reviewed and incorporated feedback from focus groups and state partners throughout the development and piloting process.
- **Instructional Supports Development:** Panels of educators developed interpretive guidance, instructional strategies, and family resources that are instructionally relevant, grounded in

universal design for learning (UDL) principles, and practical for classroom and home use. These resources were refined through multiple rounds of review and revision with state specialists and organizational partners.

- **Capacity-Building through Professional Learning:** CASCIA partners developed interactive scoring and reporting modules to build educators' capacity for consistent scoring and meaningful use of results. The modules prioritize the use of rubrics and anchor sets to support calibration of educator judgments and translation of results into clear, actionable responses to instructional needs at the performance-category level. Scoring workshops provided opportunities to practice with rubrics and student exemplars, which elucidated the rubrics and red, yellow, and green INL cut points.

This educator-driven, iterative, and principled process was intended to ensure that the CASCIA reporting resources were not only instructionally useful but also directly connected to classroom and family contexts. A key expectation for the project is that by integrating tailored guidance, calibrated scoring tools, and professional learning supports, the reporting system will provide actionable evidence to guide student learning across classrooms and homes.

Validity Evaluation Approach and Themes

Project Goals

The goals of CASCIA establish the importance of the meaningful use of data through coherent and aligned systems of curriculum, instruction, and assessment:

a. Establish replicable and scalable score reports and reporting mechanisms that communicate assessment results, their meaning, and how they can be made actionable to improve instruction and learning for all students;

b. Connect information from multiple assessments administered for different purposes and uses and at different points in time throughout year-long instruction to create a profile of students' learning and growth toward achieving end-of-unit and end-of-year learning outcomes;

c. Build state and local educators' capacity to interpret assessment results and use data to inform instructional design and classroom practices; and

d. Establish replicable and scalable processes, tools, and resources that district administrators, educators, students, and parents need to leverage high-quality assessment in ways that prioritize student learning and that drive meaningful shifts to instructional practice.

The validity approach centers the project goals as the focus of the study. In doing so, the validity work aligns with the *Standards for Educational and Psychological Testing*, which dictate that validity centers on the use of the assessment results. "Validity refers to the degree to which evidence and

theory support the interpretations of test scores for the proposed uses of tests" (p. 11, AERA, APA, NCME, 2014).

Validity Themes

The CASCIA validity evaluation approach drew on the integrated framework established through the SIPS and CASCIA projects. This framework was based on validity theory, evidence-centered design (ECD), and guidance from *The Standards* (AERA et al., 2014). The validity evaluation focused on the connections among assessment design, score reporting, stakeholder interpretation, and instructional decision-making.

The broader validity evaluation framework (Forte, 2012, 2013; Forte & Diaz-Bilello, 2012; Quenemoen, Flower, & Forte, 2013) supported the analysis of multiple sources of evidence organized around key claims and associated validity themes. These themes included:

- **Content Coherence:** Scores reflect students' knowledge and skills in relation to the target construct or domain;
- **Comparability:** The system yields scores that are comparable across students, sites, and time, as needed for intended interpretations;
- **Accessibility and Fairness:** Students are tested under conditions that allow them to demonstrate their knowledge and skills; and
- **Consequences:** Assessment use leads to improvements in education and achievement.

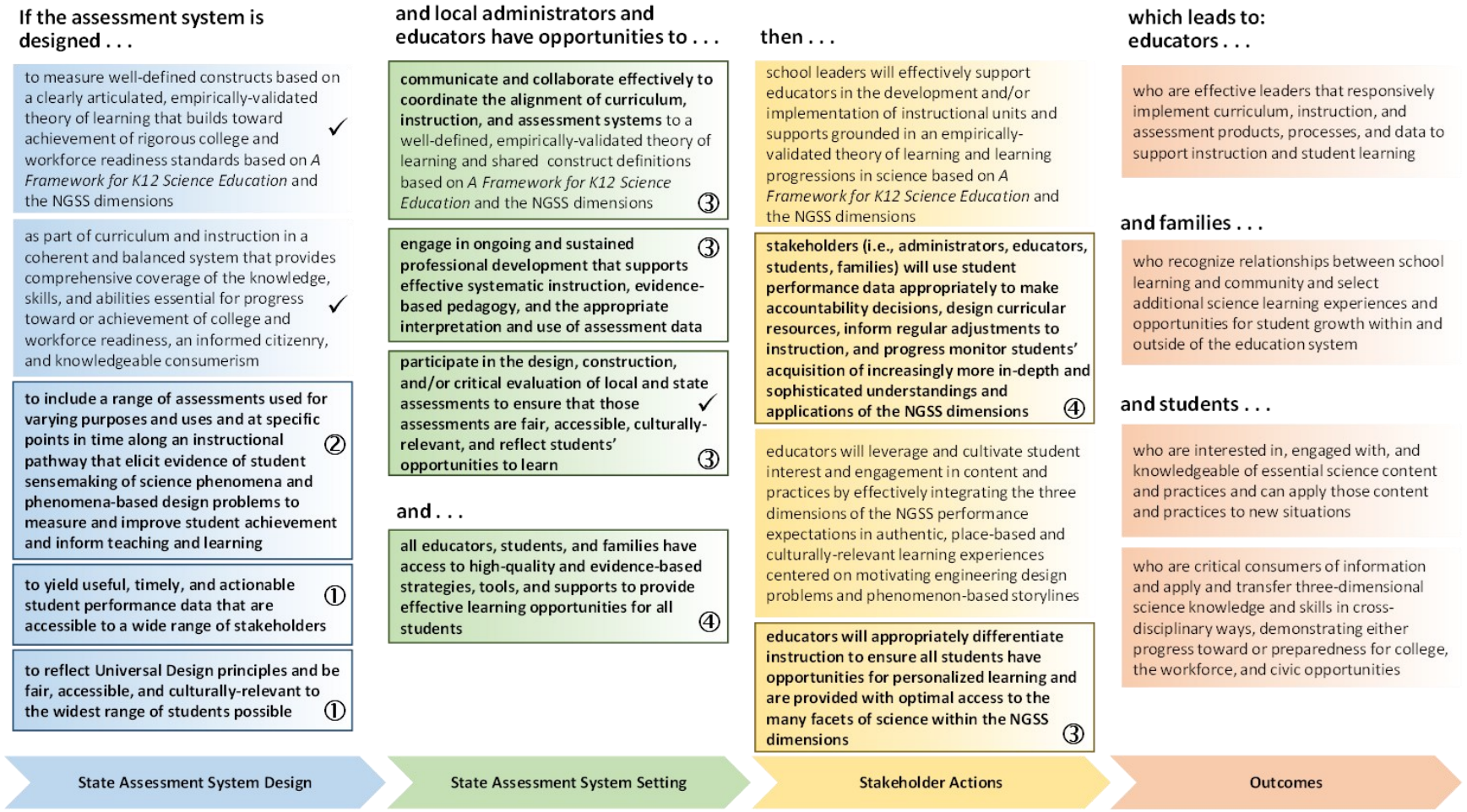
A comprehensive validity evaluation includes evidence related to each theme and should span the full assessment lifecycle—from design and development through administration, scoring, reporting, interpretation, and use.

The SIPS project generated strong validity evidence for content coherence by developing NGSS-aligned instructional resources and assessments and pilot testing them with teachers. It also contributed evidence for comparability and fairness. CASCIA built on that foundation and extended the evidence base for comparability, accessibility and fairness, and consequences by focusing on the interpretation and use of score reports.

Theory of Action and Validity Evaluation Questions

The SIPS-CASCIA Theory of Action, or ToA, illustrates how assessment design features and support conditions would enable stakeholder actions that, in turn, would lead to improved outcomes (see Exhibit 1). Each design feature or condition has a claim associated with it. For example, the claim that "The assessment system is designed to yield useful, timely, and actionable student performance data that are accessible to a wide range of stakeholders" ties directly to the first CASCIA project goal.

Exhibit 1. SIPS-CASCIA Theory of Action



The SIPS-CASCIA ToA represents the change process for the SIPS-CASCIA assessments and reporting system and the context in which it would be implemented. As suggested by the headings above the columns of colored text boxes, the logic reads from left to right as:

- If specific design elements are the case (blue column) and meet specific resource and engagement conditions (green column), then stakeholders will be prepared to take necessary actions (yellow column) that will contribute to key outcomes for educators, families, and students (orange column).

Each blue and green text box can be considered a claim about elements or conditions by removing the "if" from the prompt at the top of those columns; for the second blue box from the bottom, that would result in the claim:

- The assessment system is designed to yield useful, timely, and actionable student performance data that are accessible to a wide range of stakeholders.

That same box is annotated to indicate that it relates to **CASCIA project goal 1**.

Similarly, the yellow text boxes can be understood as claims about the uses of the assessment scores to effect changes in curriculum and instruction by presenting the text as a statement; the bottom yellow box would reflect the claim:

- If the design elements and conditions for this system are implemented as intended, educators will have opportunities to appropriately differentiate instruction to ensure all students have opportunities for personalized learning and are provided with optimal access to the many facets of science within the NGSS dimensions.

This text box is also annotated to indicate that it reflects **CASCIA project goal 3**.

We note that not all of the boxes in the ToA can or should be included in an Interpretation and Use Argument (IUA) because they are long-term ideal outcomes (orange boxes) or beyond the scope of an assessment system and require incorporation of many other inputs (e.g., "educators will leverage and cultivate student interest and engagement in content and practices by effectively integrating the three dimensions of the NGSS performance expectations (PEs) in authentic, place-based and culturally-relevant learning experiences centered on motivating engineering design problems and phenomenon-based storylines"). However, including these components allows for those using the assessment system to see the connections between that system and other systems and perhaps address issues in those other systems elsewhere.

Considering all of these pieces together allows us to map the project goals to (1) a validity evaluation framework that ensures that the combined SIPS-CASCIA evidence meets the full range of evidence expectations as defined in *The Standards* and (2) the SIPS-CASCIA ToA that communicates the assessment system within its context and connects claims within that ToA to an IUA and, ultimately, to a comprehensive Validity Argument (VA). The CASCIA IUA encompasses those text boxes that are outlined in Exhibit 1. The SIPS IUA includes some parts of those boxes and also the boxes annotated with a "✓." Thus, all blue and green boxes are addressed as part of the full SIPS-CASCIA validity evaluation.

Below, we show the relationship between the CASCIA project goals and the CASCIA IUA claims, making clear how the overarching aims of the project are translated into claims about interpretation and use (see Exhibit 2). We then provide the evaluation questions aligned to each project goal, establishing the framework for gathering evidence to support or refute those claims (see Exhibit 3).

Exhibit 2. Relationships Between CASCIA Project Goals and CASCIA IUA Claims

CASCIA Project Goals	CASCIA IUA Claims
1. Establish replicable and scalable score reports and reporting mechanisms that communicate assessment results, their meaning, and how they can be made actionable to improve instruction and learning for all students	The assessment reporting system is designed to: • yield useful, timely, and actionable student performance data that are accessible to a wide range of stakeholders; and • reflect Universal Design principles and be fair, accessible, and culturally-relevant to the widest range of students possible.
2. Connect information from multiple assessments administered for different purposes and uses and at different points in time throughout year-long instruction to create a profile of students' learning and growth toward achieving end-of-unit and end-of-year learning outcomes	The assessment system is designed to include a range of assessments used for varying purposes and uses and at specific points in time along an instructional pathway that elicit evidence of student sensemaking of science phenomena and phenomena-based design problems to measure and improve student achievement and inform teaching and learning.
3. Build state and local educators' capacity to interpret assessment results and use data to inform instructional design and classroom practices	If the design elements and conditions for this system are implemented as intended, educators will have opportunities to: • communicate and collaborate effectively to coordinate the alignment of curriculum, instruction, and assessment systems; • engage in ongoing and sustained professional development that supports effective systematic instruction, evidence-based pedagogy, and the appropriate interpretation and use of assessment data; • participate in the design, construction, and/or critical evaluation of local and state assessments to ensure that those assessments are fair, accessible, culturally-relevant, and reflect students' opportunities to learn; ...and will be more prepared to: • appropriately differentiate instruction to ensure all students have opportunities for personalized learning and are provided with optimal access to the many facets of science within the NGSS dimensions.
4. Establish replicable and scalable processes, tools, and resources that district administrators, educators, students, and parents need	If the design elements and conditions for this system are implemented as intended, all educators, students, families will:

CASCIA Project Goals	CASCIA IUA Claims
to leverage high-quality assessment in ways that prioritize student learning and that drive meaningful shifts to instructional practice	• have access to high-quality and evidence-based strategies, tools, and supports to provide effective learning opportunities for all students; ...and will be more prepared to: • use student performance data appropriately to make accountability decisions, design curricular resources, inform regular adjustments to instruction, and progress monitor students' acquisition of increasingly more in-depth and sophisticated understandings and applications of the NGSS dimensions.

Exhibit 3. Translation of CASCIA Project Goals into Validity Evaluation Questions

CASCIA Project Goals	CASCIA Validity Evaluation Questions
1. Establish replicable and scalable score reports and reporting mechanisms that communicate assessment results, their meaning, and how they can be made actionable to improve instruction and learning for all students	To what extent can replicable and scalable reporting templates and mechanisms be established to effectively communicate assessment results and their meaning to improve instruction and learning for all students? a. For each individual assessment, how valid is the information that reports provide about a student's learning at that point in the school year? b. For each individual assessment, how actionable is the information reports provide for improving instruction and learning?
2. Connect information from multiple assessments administered for different purposes and uses and at different points in time throughout year-long instruction to create a profile of students' learning and growth toward achieving end-of-unit and end-of-year learning outcomes	To what extent does the CASCIA system of score reports and reporting resources work in conjunction with other school/classroom outcome measures to support quality instruction, student achievement, and interest in science?
3. Build state and local educators' capacity to interpret assessment results and use data to inform instructional design and classroom practices	To what extent can strategies be implemented to build the capacity of state and local educators to interpret assessment results and use data to inform instructional design and classroom practices? a. What resources and professional development strategies best support state and local educators in their appropriate interpretation of assessment results in relation to students' learning at each assessment point in the school year?

CASCIA Project Goals	CASCIA Validity Evaluation Questions
	b. What resources and professional development strategies best support state and local educators in their appropriate use of assessment results to make effective instructional decisions after each assessment point in the school year? c. What resources and professional development strategies best support state and local educators in their appropriate interpretation and use of cumulative assessment results at the end of the school year to make effective decisions for subsequent instructional years?
4. Establish replicable and scalable processes, tools, and resources that district administrators, educators, students, and parents need to leverage high-quality assessment in ways that prioritize student learning and that drive meaningful shifts to instructional practice	To what extent can replicable and scalable processes, tools, and resources be established to empower district administrators, educators, students, and parents to prioritize student learning and drive meaningful shifts to instructional practice? a. What processes, tools, and resources best support communication and a shared understanding among district administrators, educators, students, and parents about the interpretation of assessment results in relation to students' learning across the school year? b. What processes, tools, and resources best support communication and a shared understanding among district administrators, educators, students, and parents about the use of assessment results and associated instructional strategies to improve instruction and learning across the school year?

We note that, as originally conceptualized, Evaluation Question 2 was divided into two questions: "Does the set of assessments across the school year provide an accurate and complete representation of students' learning at the end of the school year?" and "How is information from each assessment and from the combination of the assessments best represented to create a comprehensive profile of students' learning and growth?" In practice, however, the EOUs were never intended to serve as cumulative end-of-year measures of science achievement, nor were they designed or scaled for comparability to state summative assessments. State partners consistently emphasized that EOUs should provide instructional utility, not function as substitutes for state summative assessments. Accordingly, Evaluation Question 2 was reframed as indicated in Exhibit 3.

Data Collection

The CASCIA validity evaluation drew evidence from two major studies: the Pilot Study and the Post-pilot Evidence Collection. Each study contributed distinct forms of data that, when considered together, provide a multifaceted evidentiary base for the VA. The data collection associated with each validity evaluation question is presented in Exhibit 4.

Exhibit 4. Data Collection Activities Mapped to Validity Evaluation Questions

CASCIA Validity Evaluation Questions	Data Collection Activity
1. To what extent can replicable and scalable reporting templates and mechanisms be established to effectively communicate assessment results and their meaning to improve instruction and learning for all students? a. For each individual assessment, how valid is the information that reports provide about a student's learning at that point in the school year? b. For each individual assessment, how actionable is the information reports provide for improving instruction and learning?	• Pilot Study o Mid-Year Focus Group (January 2024) o End-of-Year Focus Group (May–June 2024) o Post-Administration Surveys (2023–2024) • Post-Pilot Evidence Collection o Standards Verification (July 2025) o End-of-Grant Survey (July 2025) o Targeted Interviews with Master CASCIA Teachers (July 2025) o Focus Group with State and Organizational Partners (August 2025)
2. To what extent does the CASCIA system of score reports and reporting resources work in conjunction with other school/classroom outcome	• Post-Pilot Evidence Collection

CASCIA Validity Evaluation Questions	Data Collection Activity
measures to support quality instruction, student achievement, and interest in science?	○ Expert Review of Reports (August 2025)
3. To what extent can strategies be implemented to build the capacity of state and local educators to interpret assessment results and use data to inform instructional design and classroom practices? a. What resources and professional development strategies best support state and local educators in their appropriate interpretation of assessment results in relation to students' learning at each assessment point in the school year? b. What resources and professional development strategies best support state and local educators in their appropriate use of assessment results to make effective instructional decisions after each assessment point in the school year? c. What resources and professional development strategies best support state and local educators in their appropriate interpretation and use of cumulative assessment results at the end of the school year to make effective decisions for subsequent instructional years?	• Pilot Study ○ End-of-Year Focus Group (May–June 2024) • Post-Pilot Evidence Collection ○ End-of-Grant Survey (July 2025) ○ Targeted Interviews with Master CASCIA Teachers (July 2025)
4. To what extent can replicable and scalable processes, tools, and resources be established to empower district administrators, educators, students, and parents to prioritize student learning and drive meaningful shifts to instructional practice? a. What processes, tools, and resources best support communication and a shared understanding among district administrators, educators, students, and parents about the interpretation of assessment results in relation to students' learning across the school year?	• Post-Pilot Evidence Collection ○ Targeted Interviews with Master CASCIA Teachers (July 2025) ○ Focus Group with State and Organizational Partners (August 2025)

CASCIA Validity Evaluation Questions	Data Collection Activity
b. What processes, tools, and resources best support communication and a shared understanding among district administrators, educators, students, and parents about the use of assessment results and associated instructional strategies to improve instruction and learning across the school year?	

Pilot Study (2023–2024 School Year)

CASCIA partners conducted the Pilot Study during the 2023–2024 academic year and included 12 teachers and 356 students across three participating states, with all data collected by the end of June 2024. The pilot served as the primary mechanism for gathering information on the usability, validity, and instructional utility of SIPS assessments and CASCIA reporting resources. Below, we show the four data collection activities that the pilot study comprised (see **Error! Reference source not found.**).

Exhibit 5. Pilot Study Data Collection Activities

Timing	Activity Name	Purpose
April 2023	Pre-Pilot Focus Groups	Gather input on prototype reporting resources before implementation; refine design for clarity, usability, and anticipated usefulness.
January 2024	Mid-Year Focus Groups	Collect interim feedback from educators, administrators, and parents on feasibility, alignment with curricula, and usefulness of reports/resources.
May–June 2024	End-of-Year Focus Groups	Evaluate overall usability, instructional utility, and return on investment after a full year; document changes in practice and perceptions of student learning.
Throughout 2023–2024	Post-Administration Surveys	Gather teacher feedback after each End-of-Unit (EOU) assessment on instructional alignment, report usability, value for instruction, and correspondence with other indicators of learning.

Focus Groups (2023–2024)

April 2023 Pre-pilot Focus Groups: The first pilot study activity was a set of pre-pilot focus groups held in April 2023 with 25 teachers, administrators, and parents/guardians across the three participating states. The purpose of these sessions was to obtain early stakeholder input on prototype reporting resources prior to implementation. Participants reviewed draft score reports and companion materials and provided qualitative feedback on their clarity, accessibility, and anticipated instructional usefulness. This feedback informed revisions to the reports prior to their deployment in classrooms. Because these focus groups examined draft instead of operationalized reports, we do not include their findings as part of the validity evidence base in this paper.

January 2024 Mid-Year Focus Groups: CASCIA partners conducted mid-year focus groups in January 2024, following administration of the second EOU assessment. Across five sessions, participants included three administrators, 11 educators (grades 5 and 8), and seven parents/guardians from the three pilot states. These groups were designed to provide formative

evidence on feasibility, alignment with grade-level expectations, and the perceived usefulness of reports and resources midway through the pilot.

Participants reviewed scoring guides for Units 1 and 2 as well as mock-ups of Individual Student Reports (ISRs; with family guidance) and Classroom Roster Reports (CRRs; with educator guidance). Educators and administrators discussed the alignment of EOUs with local curricula, the accessibility and interpretive guidance provided in the reports, and the supports needed to facilitate classroom use. Parents/guardians provided feedback on the clarity and usefulness of student reports and family guidance.

May–June 2024 End-of-Year Focus Groups: At the end of the school year, CASCIA partners conducted end-of-year focus groups in May–June 2024 with eight to 10 grade 5 and grade 8 teachers who had participated in the pilot throughout the year. The purpose of these groups was to evaluate the overall usability, instructional utility, and return on investment of the CASCIA resources after a full year of implementation. Teachers reflected on their experiences using reporting resources across the four EOUs, described observed changes in their instructional practice, commented on student learning and engagement, and discussed how they intended to use the resources in future years.

Post-Administration Surveys (2023–2024)

Teachers completed a series of post-administration surveys after each EOU administration. Across the 2023–2024 school year, 12 teachers submitted 40 surveys (11 after EOU1, nine after EOU2, nine after EOU3, and 10 after EOU4). CASCIA partners designed these surveys to capture structured feedback on multiple aspects of implementation, including the instructional materials and supports used, teacher comfort with science content, perceptions of student readiness, the accessibility and clarity of the assessment reports, the correspondence of CASCIA results with other indicators of student learning, the effectiveness of project supports (e.g., communication, resources, and trainings), and the actionability of results for instructional decision-making. The surveys included both Likert-type items and open-ended responses, yielding both quantitative and qualitative evidence about the perceived validity and usefulness of CASCIA resources.

Together, these activities provided complementary evidence about the design and use of CASCIA reporting resources. The pre-pilot focus groups supplied early input to refine prototypes, the mid-year focus groups offered formative insights on implementation, the end-of-year focus groups captured summative teacher reflections, and the post-administration surveys generated systematic feedback across all four EOUs.

Post-Pilot Evidence Collection (Summer 2025)

CASCIA partners collected additional evidence in Summer 2025 to examine the degree to which CASCIA results were coherent with other evidence of student learning and to evaluate the quality and coherence of the CASCIA reporting resources relative to partner state summative score reports and other reporting exemplars. This study drew upon multiple complementary activities—

standards verification activities, surveys, interviews, focus groups, and an expert review of reports—to provide a multifaceted evidentiary base (see **Error! Reference source not found.**).

Exhibit 6. Post-Pilot Evidence Collection Activities

Timing	Activity	Purpose
July 2025	Standards Verification	Confirm whether What These Results Mean (WTRM) statements and cut points for the red, yellow, and green Instructional Needs Levels (INLs) on the score reports accurately reflect evidence from sample student work from the EOU assessments
July 2025	End-of-Grant Survey	Examine continued use of CASCIA resources beyond the pilot and assess comparability with other measures
July 2025	Interviews	Gather qualitative evidence on how CASCIA results aligned with teacher judgments and classroom evidence
August 2025	Focus Group (State Partners)	Elicit system-level perspectives on capacity, priorities, and sustainability of CASCIA
August 2025	Expert Review of Reports	Assess quality and coherence of CASCIA reporting resources relative to state exemplars

Standards Verification (July 2025)

The standards verification was designed as a confirmatory activity to evaluate whether the evidence elicited by EOU prompts aligned with the WTRM statements—descriptors of what students at each INL for the Performance Category (PC) likely know and are able to do—and whether the cut points used to assign students to INLs accurately distinguish levels of performance. Three evaluation questions guided the study:

1. To what extent do student responses at each INL reflect the knowledge and skills described in the WTRM statements?
2. To what extent are the progressions across INLs consistent with reasonable increases in sophistication of understanding?
3. Do the cut points used to distinguish INLs correspond with meaningful differences in student work?

To address these questions, edCount compiled 32 scenarios across grades 5 and 8 (16 per grade). Below, we show a visual representation of the sampling approach for the standards verification (see

). For each grade, we selected four sets of scored and annotated student responses per EOU—two sets per PC—yielding 16 sets of student papers per grade. Each set included a representative sample of responses at the mid-score point of the INL range (e.g., a score of eight points when the yellow band spanned five to 10 points). Selection of responses was intentional, emphasizing cases that illustrated common misconceptions and misunderstandings.

Exhibit 7. Visual Representation of the Standards Verification Sampling Approach

	PC1			PC2			PC3			PC4		
Grade 5												
EOU1		Y	R				G	Y		N/A		
EOU2		Y	R	G	Y							
EOU3					Y	R	G	Y				
EOU4		Y	R				G	Y				
Grade 8												
EOU1					Y	R				G	Y	
EOU2		Y	R	G	Y					N/A		
EOU3					Y	R	G	Y				
EOU4		Y	R				G	Y				

Master CASCIA educators (grade 5: n=3; grade 8: n=4) reviewed these sets using three rubrics—Domain Concurrence, Differentiation, and Degree of Alignment—after structured training and calibration exercises (see Appendix B). For Domain Concurrence, educators evaluated whether the WTRM statements accurately reflect the knowledge and skills targeted by the EOU prompts; for Differentiation, educators evaluated whether the WTRM statements for the red, yellow, and green INLs represent meaningful progressions in student knowledge and skills; and for Degree of Alignment, educators evaluated whether the WTRM statements match actual student work samples at each level. The educators recorded ratings via an online survey instrument, and CASCIA partners collected their qualitative comments to document reasoning.

End-of-Grant Survey (July 2025)

CASCIA partners administered the End-of-Grant Survey in July 2025 to seven CASCIA educators that participated in the 2023–2024 pilot. The survey was designed to collect detailed evidence on the continued use, comparability, and instructional value of CASCIA reporting resources after the initial pilot year.

The survey yielded information about six areas of interest:

- **Usage:** Teachers reported how frequently they used EOUs, ISRs, CRRs, Interpretive Guidance, and Family Learning Resources, providing insight into uptake and sustainability of CASCIA resources in practice;

- **Comparability:** Respondents evaluated how CASCIA results corresponded with other indicators of student learning, including classroom grades, local benchmarks, and state summative assessments;
- **Instructional Impact:** Teachers indicated whether CASCIA results influenced their instructional planning, grouping strategies, and overall approach to science teaching. Items also asked whether CASCIA shifted teachers' thinking about science learning and assessment;
- **Perceived Validity and Reliability:** Questions probed whether INLs (red, yellow, green) reflected observed student performance and whether CASCIA improved the reliability of classroom evidence compared to prior practices;
- **Communication among Stakeholders:** Items addressed the extent to which teachers shared CASCIA results with students, families, and colleagues, as well as their comfort in using reports to communicate instructional needs; and
- **Improvement and Support:** Open-ended and Likert-type items elicited suggestions for improving the clarity, alignment, and usefulness of CASCIA resources, and identified professional learning supports that teachers perceived as necessary for successful implementation.

Targeted Interviews with CASCIA Educators (July 2025)

CASCIA partners conducted targeted interviews in Summer 2025 with seven CASCIA educators. The purpose of these interviews was to gather in-depth information about how teachers implemented CASCIA score reports and reporting resources across two consecutive school years, and how they perceived the coherence of CASCIA results with other measures of student learning.

Participants included teachers from both grade 5 and grade 8 who had participated in the 2023–2024 pilot and continued using CASCIA resources during the 2024–2025 academic year. These teachers were identified as "Master Educators" due to their extended engagement with the project and familiarity with the instructional and reporting resources.

The interviews collected qualitative evidence through structured prompts and open-ended follow-ups. Data included educator descriptions of assessment administration, the instructional utility of ISRs and CRRs, perceptions of the interpretive resources, and reflections on alignment between CASCIA results and classroom-based indicators of student performance. Interview protocols also elicited information on feasibility, sustainability, and potential adaptations to support broader implementation.

Focus Group with State and Organizational Partners (August 2025)

CASCIA partners conducted a structured focus group in August 2025 with representatives from participating state education agencies, partner organizations, and members of the edCount project team. The purpose of this focus group was to examine systemic perspectives on CASCIA's design

and implementation, with a particular emphasis on capacity-building, alignment with state priorities, and conditions for long-term sustainability.

Participants included seven state and organizational partners who had been directly involved in supporting or overseeing CASCIA implementation. The group represented both policy-level and technical perspectives, ensuring that discussion captured a wide range of system-level considerations.

The focus group collected qualitative evidence using a structured protocol that included targeted questions and prompts. Data included participant reflections on the professional development needed to support effective use of SIPS assessments and CASCIA reports, the coherence of CASCIA within existing state science assessment systems, and the potential for CASCIA to inform broader instructional practices and policy decisions. CASCIA partners collected additional evidence on conditions necessary for scaling, including resource requirements, training supports, and state-level communication strategies.

Expert Review of Reports (August 2025)

In August 2025, CASCIA partners conducted an expert review to evaluate the validity and utility of CASCIA score reports and reporting resources in comparison with state ISRs and interpretive materials. The purpose of this study was to gather systematic judgments from experts about whether the CASCIA reporting tools effectively communicated intended purposes, supported instructional use, and aligned with best practices in score reporting.

Three experts participated in the review: (1) a science content expert with industry and state-level experience, (2) a science content expert with experience at the state, district, and classroom levels, and (3) a psychometrician with research expertise in score reports. Each expert was individually oriented to the review process and provided access to curated materials in a secure folder. These materials included CASCIA reporting resources [ISR, CRR, Interpretive Guidance with Instructional Strategies, Family Guidance and Learning Resources, Task Interpretation Guide (TIG)] and state ISRs and guidance documents (from Alabama, Alaska, or Nebraska). Each reviewer was assigned either grade 5 or grade 8 materials, ensuring depth of review within a specific grade span.

CASCIA partners structured the review around a survey instrument (*Student Report Review Form*) that captured expert judgments across multiple dimensions, including clarity of purpose and use, report content and organization, performance interpretation, accessibility and design, and instructional/systemic utility. Evidence collected included Likert-scale ratings (from *Strongly Disagree* to *Strongly Agree*) and open-ended rationales to substantiate ratings, particularly in cases of disagreement. Responses were systematically compiled to provide comparative evidence on CASCIA ISRs and state ISRs.

Analysis and Findings

This section presents the results of the CASCIA validity evaluation. Whereas the preceding sections described the project goals, theory of action, and evaluation framework, the following subsections provide the evidence gathered to address each evaluation question. For each evaluation question, we summarize the data sources, analytic methods, findings, and their implications for the CASCIA VA.

Evaluation Question 1: Validity and Actionability of Assessment Results

Evaluation Questions 1 asks: *To what extent can replicable and scalable reporting templates and mechanisms be established to effectively communicate assessment results and their meaning to improve instruction and learning for all students?*

This evaluation question examines whether the CASCIA EOU score reports and reporting mechanisms provide information that is both valid (accurately representing students' learning at the point of assessment) and actionable (usable by educators to guide instruction). Evaluation Question 1 is divided into two sub-questions:

- **Evaluation Question 1a:** For each assessment, how valid is the information that reports provide about student learning at that point in the year?
- **Evaluation Question 1b:** For each assessment, how actionable is the information that reports provide for improving instruction and learning?

The SIPS EOUs were developed using a principled assessment design (PAD) approach. This design approach ensured explicit links between claims, measurement targets, performance level descriptors (PLDs), task specifications, and rubrics. CASCIA extended this foundation by producing score reports and other reporting resources tailored for educators, families, and students.

Evaluation Question 1 therefore focuses on whether the EOUs achieve their dual purpose: reflecting valid interpretations of student performance and delivering results in a format that supports instructional action.

Results: Evaluation Question 1a. Validity of CASCIA Reports

Evaluation Question 1a asks: *For each assessment, how valid is the information that reports provide about student learning at that point in the year?*

The purpose of this evaluation question is to determine whether the interpretive statements in CASCIA reports—particularly the WTRM statements tied to INLs—represent the knowledge and skills students demonstrate on the EOU assessments. Evidence came from the July 2025 Standards Verification, 2023–2024 Post-Administration Surveys, January 2024 Mid-Year Focus Groups, May–June 2024 End-of-Year Focus Groups, and July 2025 Master Teacher Interviews.

July 2025 Standards Verification

The July 2025 Standards Verification provided the most direct evidence regarding the validity of CASCIA reports. Master CASCIA educators at grades 5 and 8 reviewed student work against the WTRM statements, evaluating evidence along three dimensions: Domain Concurrence (whether WTRM statements accurately reflected the knowledge and skills targeted by the EOU prompts), Differentiation (whether the red, yellow, and green INLs represented meaningful progressions in student knowledge and skills), and Degree of Alignment (whether the descriptors matched actual student work samples at each level). Detailed tables of results may be found in Appendix C. Here, we summarize the major findings of the standards verification for grades 5 and 8.

Grade 5

Domain Concurrence: At grade 5, panelists generally agreed that the WTRM statements captured the intended knowledge and skills. Panelists rated most PCs across the four EOUs as "fully aligned." The one partial exception occurred in EOU3, PC3, where two reviewers considered the descriptors fully aligned while one rated them as "somewhat aligned." This panelist argued that the WTRM language did not consistently capture the expectation that students should be able to label all of Earth's spheres rather than only some. The panelist framed this concern as a refinement issue in the wording of the WTRM, not as a misrepresentation of the construct.

Differentiation: Panelists found that the progression of WTRM statements across red, yellow, and green INLs generally reflected meaningful differences in sophistication. One panelist noted an exception in EOU3, PC2, and judged the yellow-level descriptor to be under-specified, thereby making the developmental distinction between yellow and green less clear. Nevertheless, the consensus was that the majority of categories displayed adequate progression.

Degree of Alignment: The Degree of Alignment analysis also largely confirmed that student work corresponded with WTRM descriptors. Panelists noted a few cases at the margins of INLs where classification could be debated. For example, a mid-range yellow response in EOU2, PC2 did not reference producers or consumers explicitly, leading one reviewer to question its placement. Similarly, in EOU2, PC1, a red-level response displayed partial reasoning that suggested some yellow-level thinking, and a yellow-level response seemed slightly stronger than its assigned level. In EOU1, PC1, one red-rated response paralleled yellow reasoning on a specific item, though overall classification remained defensible. These cases underscored the challenge of consistently distinguishing performances at the boundaries of INLs. On balance, however, panelists concluded that grade 5 WTRM statements were valid representations of the intended knowledge and skills.

Grade 8

Domain Concurrence: At grade 8, panelists again affirmed that the WTRM statements captured the intended knowledge and skills, while identifying a somewhat greater number of areas for refinement. Panelists rated most PCs as "fully aligned," and panelists cited several instances where

WTRM statements captured student reasoning precisely. For example, in EOU4, PCs 1 and 3, reviewers noted that the descriptors closely matched student responses, with the red–yellow–green levels clearly reflecting increasingly sophisticated applications of wave properties. Panelists highlighted these as strong examples of effective reporting. At the same time, panelists identified cases where WTRM statements only partially captured student demonstrations of knowledge. In EOU1, PC2, descriptors referenced reasoning about how materials reduce damage, but prompts did not consistently elicit such explanations. Similarly, in PC4, WTRM statements referenced Newton's Laws, but these were not consistently evident in student responses. Panelists also raised concerns in EOU3, where descriptors emphasized reasoning about genetic variation (PC2) and fossil evidence (PC3), but student work did not always reflect those expectations.

Differentiation: Panelists generally judged Differentiation across INLs to be adequate. They agreed that in most categories, WTRM statements successfully conveyed developmental progressions. They pointed specifically to EOU1, PC2, as an example where the red–yellow–green levels differentiated partial from complete use of evidence effectively. However, reviewers also identified categories where distinctions between yellow and green were less sharp—for instance, in EOU2, PC2, where "adequate" versus "complete and accurate" explanations overlapped.

Degree of Alignment: The Degree of Alignment analyses confirmed that most red, yellow, and green exemplars were appropriate for their classifications. Panelists highlighted cases where exemplars demonstrated exactly the kind of reasoning described by the WTRM, reinforcing confidence in the validity of the system. However, a handful of boundary cases revealed inconsistencies. For example, in EOU1, PC2, one yellow response lacked explicit evidence, raising questions about whether it was more consistent with red. In EOU3, PC3, a yellow response appeared closer to red-level reasoning, while one green response resembled strong yellow. Panelists emphasized that these examples illustrated the challenge of drawing precise boundaries rather than flaws in the descriptors themselves.

Survey Findings

2023-2024 Post-Administration Surveys

CASCIA partners administered the 2023–2024 Post-Administration Surveys after each EOU assessment and provide additional evidence about the accuracy of CASCIA reports. Across all four administrations (EOU1–EOU4), nearly all teachers indicated that CASCIA results corresponded with other evidence of student learning either somewhat effectively or very effectively. Following EOU1, one teacher rated the results as "not effective"; however, the same teacher later reported that the results were "very effective" after EOU3 and EOU4 and did not provide a rating for EOU2. Similarly, following EOU4, a different teacher rated the results as "not effective," though this teacher had previously rated the reports as "very effective" after EOU1 and EOU2 and "somewhat effective" after EOU3. These patterns suggest that individual judgments of accuracy varied across time and units, but overall, teachers consistently viewed CASCIA reports as providing information that aligned with other indicators of student performance.

July 2025 End-of-Grant Survey

The End-of-Grant Survey (July 2025) asked master educators to evaluate the accuracy and utility of CASCIA reporting resources. Responses to the item *"My students' results on the CASCIA End-of-Unit Assessments were comparable in relation to other assessment results during the school year"* reflected general agreement, though with some variation. One teacher selected "all year," five selected "often," and one selected "never." Qualitative comments illustrated this range: one teacher observed that results were comparable to classroom grades ("the year prior and last year, the results were comparable to my grades using my curriculum"), while another highlighted gains on standardized measures ("my students improved from NWEA MAP to NSCAS I believe because I used CASCIA"). The teacher who responded "never" did not elaborate, leaving the reason for this judgment unclear.

Below, we summarize responses to the Likert-type items administered in the survey (see

Exhibit 8). These items addressed the perceived value, complementarity, reliability, and alignment of CASCIA reports. Teachers' ratings were positive. For example, all seven respondents agreed that CASCIA reports were valuable for identifying students' instructional needs, with five selecting "strongly agree" and two "agree." No respondents selected "disagree" or "strongly disagree." One teacher emphasized that the reports "help me identify my weaker areas and build those up." Similarly, all teachers agreed that CASCIA results complemented other tools, with one noting that earlier end-of-unit projects "did not provide insight into the student learning like these assessments do."

Teachers also affirmed that CASCIA reporting resources aligned with the content and scope of their existing curriculum, with six strongly agreeing and one agreeing. Qualitative comments indicated that alignment sometimes prompted teachers to revise their curriculum documents. When asked whether CASCIA reports made their classroom assessment systems more reliable, four teachers strongly agreed and three agreed. Finally, all teachers affirmed that the CASCIA INLs (red, yellow, green) reflected their students' learning needs, with five strongly agreeing and two agreeing.

Exhibit 8. End-of-Grant Survey Results on Accuracy of CASCIA Reports (n = 7)

Question	Agree	Strongly Agree
The CASCIA reports are valuable tools for identifying students' instructional needs.	2	5
The CASCIA reporting resources align well with the content and scope of my existing curriculum, instruction, and assessment resources.	1	6
The assessment results as provided by the CASCIA reporting resources complement and extend other assessment tools and resources I already use, rather than duplicating them (e.g., provides new insights beyond other assessments already in use), in relation to students' learning across the school year.	1	6
Since using the CASCIA EOU assessments and reporting resources, I have a more reliable system in place for using classroom assessments that provide information about my students' learning across the school year.	3	4
The CASCIA instructional need levels (Red, Yellow, Green), shown by the reports, reflect my students' learning needs as observed during the year in my classroom(s).	2	5
The CASCIA materials align with my understanding of student learning needs.	4	3

Interview and Focus Group Findings

January 2024 Mid-Year Focus Groups

Teachers generally agreed that the PCs reflected their own understanding of student strengths and weaknesses. One teacher explained, *"EOU1 and EOU2 results were spot on with regard to where students are with their knowledge. They could have boosted their scores if their writing was more detailed. Matched well with students."* Another teacher affirmed, *"I feel like the results are accurate… Their quality of answers matches what I see in their everyday work: lots of consistency."* At the same time, some raised concerns, such as, *"Some of the areas that needed more practice were not the content area (knowledge); more like finding support evidence and the chain of sense-making – this was helpful."*

Parents also described the reports as useful; others said "too wordy/overwhelming." One parent shared, "I appreciate the bullet points about what you're looking for regarding what students can do. I don't get that in the other disciplines or with the state-standardized assessments." Another noted, "It is nice to have a breakdown of topics to describe what students might need help

with," while a third commented, "Assessment score report seems a little too wordy… If I'm getting these types of assessments for multiple content areas, this can be overwhelming."

Administrators echoed the positive aspects, highlighting clarity and guidance for families. One remarked, *"Color-coded bands are really helpful… Interpretive guidance is helpful for pointing out what students can do and what maybe they can't do. It is so much more helpful than a scale score, which gives no context about what students can do."* Another administrator said the reports were *"thorough and provided a lot of great information to families… Liked the learning resources for families and how it broke down performance categories and instructional needs levels into different categories and what students likely know and can do."*

May–June 2024 End-of-Year Focus Groups

Teachers in the end-of-year focus groups emphasized that the reports aligned with their own judgments of student performance. One experienced teacher explained, *"The data aligned with my expectations, validating my instincts honed over 26 years of teaching. I will use these reports as cumulative tests and evidence in parent meetings*." Similarly, another noted that the ISRs were *"enlightening for parents… Parents appreciated the detailed breakdown of their child's performance."*

At the same time, teachers described challenges that limited the accuracy of the reports for some students. One grade 8 teacher observed that *"My students struggled with connecting assessments to learning due to their reading levels*." Another explained that while the resources and reports became more interpretable over time, *"Initially, using both Amplify and CASCIA EOUs was too much for students. I increasingly used CASCIA resources when they were well-packaged and clear*."

July 2025 Master Teacher Interviews

Teachers consistently highlighted the value of the red–yellow–green system, which provided clarity when identifying student performance levels. One grade 5 teacher explained, *"The classroom-level reports helped me see patterns in student understanding and trends across the grade."* Another teacher shared that, *"The red-yellow-green system was helpful for identifying and discussing performance levels with students,"* though she acknowledged that red scores could sometimes be frustrating for them.

Master teachers commented on the accuracy of CASCIA score reports. A grade 5 teacher said the student-level reports were *"helpful for identifying misconceptions and prioritizing topics for reteaching."* A grade 8 teacher added, *"The data showed my students struggled with data literacy—making graphs, analyzing tables, and understanding evidence—which led me to adjust my curriculum."*

At the same time, interviewees acknowledged that accuracy was not perfect. One teacher noted, *"Sometimes student scores were lower than expected due to misreading directions,*

particularly when multiple reading steps were involved in a single item." Another said that while student-level data usually matched her own judgment, there were occasional discrepancies: *"Some students scored green but seemed to misunderstand key concepts upon review."*

Results: Evaluation Question 1b. Actionability of CASCIA Reports

This section addresses the second part of Evaluation Question 1, which examines the extent to which CASCIA reports are actionable for instructional use. While Evaluation Question 1a focused on the validity of the information provided, Evaluation Question 1b evaluates whether that information is presented in ways that are accessible, usable, and supportive of instructional decision-making.

Evaluation Question 1b asks: *For each assessment, how actionable is the information that reports provide for improving instruction and learning?*

The actionability of CASCIA reports depends not only on their accuracy but also on whether the reporting tools and resources provide clear, usable information that teachers can apply in instructional practice. As described in the background section, teachers had access to multiple resources, including ISRs, CRRs, interpretive guidance with instructional strategies, and family communication tools. Evaluation Question 1b examines how the educators perceived and used these resources, drawing on survey data, focus groups, and interviews.

January 2024 Mid-Year Focus Group

Teachers reported using the reports to group students, plan reteaching, and note areas to revisit in future instruction. One teacher explained, *"After I went through and looked at the report, I wrote down areas to review to support the next unit… more of what I pulled out of the report is what I could incorporate next year."* Another teacher noted that after returning from winter break, she planned to group kids by green, yellow, and red and do some reteaching; however, *"It went well for three days but then bombed a bit when we had 5 snow days in a row."* A third reflected, *"Next instructional steps – simple, R, Y, G. Really helped to know what to focus on."*

Teachers also emphasized the importance of timeliness, saying, *"It [the task interpretation guide] came too late, but I will use them to inform next year,"* and requested, *"Can we have these resources built in during the unit/formative assessments before we are done with the unit?"*

Administrators reinforced the importance of immediacy and support for teachers in interpreting results. One commented, *"Immediacy of access to results is very important. Some of the statewide assessments are very frustrating because results are so late and become irrelevant. It can't support understanding how students did or having conversations with students about their performance."* Another added, *"If we are not training our teachers on how to interpret the results, it's not going to be very good. Teachers need training on how to interpret the results, such as a short video."*

May–June 2024 End-of-Year Focus Groups

Teachers said that reports validated their judgments and helped them plan for future instruction. One grade 5 teacher reflected, *"The data aligned with my expectations, validating my instincts honed over 26 years of teaching. I will use these reports as cumulative tests and evidence in parent meetings."* Another grade 8 teacher emphasized the value of the ISRs for family communication, noting, *"The ISRs were enlightening for parents. I used them during conferences… Parents appreciated the detailed breakdown of their child's performance."*

Teachers also highlighted ways the reports supported adjustments to their teaching. For example, one grade 8 teacher explained that *"I plan to use the reports in a detailed manner with my students and at conferences. I'll connect them to their math scores and use the materials to supplement the curriculum."* Another grade 8 teacher shared that, while they primarily used a different curriculum, the reports provided a mechanism for identifying gaps: *"I use Stemscopes as a backbone and supplement it with activities from past experiences. I'll integrate acquisition goals to find and address gaps."*

Still, some noted barriers to fully leveraging the reports. One grade 8 teacher observed that *"My students struggled with connecting assessments to learning due to their reading levels."* Another grade 5 teacher found that *"Sometimes, the materials felt disjointed and hard to piece together, which limited their use."*

2023–2024 Post-Administration Surveys

Results from the 2023–2024 Post-Administration Surveys indicate that teachers generally found CASCIA reports both accessible and actionable. When asked about accessibility of the reports, most teachers rated them as "very accessible," with a smaller number selecting "somewhat accessible," and only one teacher ever selecting "not accessible." Following EOU1, eight of 12 respondents rated the reports as very accessible, three rated them somewhat accessible, and one rated them not accessible. After EOU2, eight of nine respondents rated the reports as very accessible and one rated them somewhat accessible. After EOU3, six of nine respondents rated the reports as very accessible and three rated them somewhat accessible. Finally, after EOU4, nine of 10 respondents rated the reports as very accessible and one rated them somewhat accessible.

Teachers also consistently reported that the results were actionable for instruction. For EOU1, half of the 12 respondents rated the reports as "very actionable," while the other half rated them as "somewhat actionable." For EOU2 and EOU3, six of nine respondents rated the reports as very actionable and three as somewhat actionable. For EOU4, nine of 10 respondents rated the reports as very actionable and one as somewhat actionable.

July 2025 End-of-Grant Survey

Below, we summarize the Likert-type items from the End-of-Grant Survey that directly assessed the actionability of CASCIA reports (see Exhibit 9). All seven respondents agreed they were valuable for identifying instructional needs, with five strongly agreeing and two agreeing. All seven also agreed that CASCIA results influenced grouping and reteaching decisions, and that the reports were actionable for lesson planning (three strongly agreed, four agreed). No respondents selected "disagree" or "strongly disagree."

Exhibit 9. End-of-Grant Survey Results on Actionability of CASCIA Reports (n = 7)

Question	Agree	Strongly Agree
The CASCIA reports are valuable tools for identifying students' instructional needs.	2	5
CASCIA results changed and impacted my grouping or reteaching decisions.	4	3
CASCIA results and reporting resources are actionable for planning lessons.	4	3

In addition to these Likert items, CASCIA partners asked teacher how often they used the CASCIA Interpretive Guidance and Instructional Strategies to make instructional decisions. Two reported using these materials all year, three often, and two sometimes.

Teachers described CASCIA reports as providing both confirmation of their judgments and new insights into student misconceptions. One educator commented, *"These reports help me identify my weaker areas and build those up,"* while another explained, *"I changed the sequence of learning within my four units around to be more cohesive to accomplish the standards because of the data from these assessments. And they have improved the learning!"*

July 2025 Master Teacher Interviews

Master teachers described CASCIA reports as actionable tools that supported instructional planning. They emphasized the clarity of the red–yellow–green system, which provided a practical shorthand for grouping students and targeting support. One grade 5 teacher said the reports were *"helpful for identifying misconceptions and prioritizing topics for reteaching,"* while a grade 8 teacher noted, *"The data showed my students struggled with data literacy—making graphs, analyzing tables, and understanding evidence."*

Feasibility of scoring was a consistent concern. One teacher reported that scoring assessments for 50–60 students could take 15–16 hours, while others described the scoring process as time-consuming. Several recommended digitization to make the reports more manageable.

Discussion: Evaluation Question 1. Validity and Actionability of CASCIA Reports

This evaluation examined the extent to which CASCIA score reports provide valid and actionable information about student learning. CASCIA partners investigated validity by analyzing the alignment of WTRM statements with evidence from sample student work and teacher perceptions of accuracy, and consistency with other assessment results, and examined actionability by reviewing how educators interpreted and applied CASCIA reports to inform instructional decision-making. Evidence was drawn from alignment studies, the 2023–2024 Post-Administration Surveys, the July 2025 End-of-Grant Survey, as well as the January 2024 Mid-Year Focus Groups, the May–June 2024 End-of-Year Focus Groups, and the July 2025 Master Teacher Interviews.

Validity of Interpretations of Information in the CASCIA Reports

Evidence from across the evaluation converged to support the validity of the interpretations of the information in the CASCIA reports. Teacher judgments, survey responses, and standards verification findings consistently pointed in the same direction: the INLs (red, yellow, green) captured meaningful differences in student understanding and provided accurate signals of learning. This convergence is important because it demonstrates validity not only in technical terms (alignment of WTRMs with student work) but also in practical terms, as reflected in how educators recognize their students' performance in the reports.

The standards verification evidence offered the strongest technical confirmation. Panelists affirmed that the WTRM descriptors captured the intended constructs, with only minor refinements needed at boundary cases. These refinements—such as clarifying thresholds between yellow and green—do not undermine validity but rather identify ways to strengthen precision. When coupled with survey and interview data showing that teachers independently recognized the same instructional levels in their classrooms, the alignment findings offer construct-related and consequence-related validity evidence for the INL and WTRM interpretations.

Equally important, teachers reported that the reports did more than confirm what they already knew. They described how CASCIA reports surfaced misconceptions that were not always apparent from classroom work or grades. This indicates that the reports provided *added diagnostic value*—a dimension that extends beyond simple correspondence with existing measures.

Taken together, these findings reinforce confidence in the validity of the CASCIA score report interpretations. The reports offer an accurate, trustworthy representation of student learning across units, grounded in both expert alignment judgments and classroom-based perceptions. While refinements to descriptor wording would sharpen boundaries between performance levels, the core VA is strongly supported.

Actionability of Reports

Evidence from across surveys, focus groups, and interviews shows that CASCIA reports were not only accurate but also highly actionable. Teachers consistently described the reports as clear, easy

to interpret, and immediately applicable to classroom practice. The use of color-coded INLs was central to this actionability: educators reported that the red–yellow–green framework offered a straightforward shorthand for identifying groups of students and prioritizing instructional needs. This design feature appears to have lowered barriers to use, making data analysis a practical task rather than an additional burden.

Beyond accessibility, the reports shaped a wide range of instructional practices. Teachers used them to reorganize groups for reteaching, adjust pacing guides, and, in some cases, revise unit sequencing across an entire school year. Importantly, teachers described how CASCIA reports confirmed their professional judgments while also extending them by highlighting specific misconceptions or reasoning gaps that might otherwise have gone unnoticed. This dual role—validating teacher expertise while adding diagnostic depth—illustrates the unique contribution of the reports to instructional decision-making.

At the same time, evidence points to conditions that moderated actionability. Timeliness of reporting was a consistent concern: educators stressed that delayed reports reduced opportunities for immediate intervention, even if the information remained useful for long-term planning. Similarly, student reading levels sometimes limited the degree to which reports could directly inform learning conversations with students. On the systems side, teachers flagged the time demands of manual scoring and recommended digitization as a step that would significantly enhance feasibility and integration into existing instructional workflows.

Taken together, these findings suggest that CASCIA reports are both accessible and influential in shaping instruction. Their strength lies in their ability to provide clear and trusted information that teachers can apply quickly and with confidence. While improvements in timeliness, scoring processes, and parent-facing communication would increase their impact, the evidence indicates that CASCIA already functions as a practical and valued tool for instructional decision-making.

Limitations and Issues for Future Study

Several contextual factors should temper how these findings are interpreted. First, the evaluation relied on relatively small samples of teachers, particularly in the standards verification and surveys. As a result, the evidence base reflects the perspectives of early implementers rather than a fully scaled user population. Second, much of the qualitative data came from teachers who volunteered for focus groups and interviews, which may introduce a positive bias toward the system. Third, contextual factors such as district-level support, local curricula, and available time for scoring influenced how educators experienced CASCIA in practice. These variables likely shaped perceptions of both validity and actionability.

Despite these limitations, the consistency of findings across methods and contexts strengthens the overall argument. Standards verification judgments converged with teacher perceptions, and teachers consistently described reports as both trustworthy and useful for instruction. Importantly, educators framed critical feedback across sources not as criticism of CASCIA but as

recommendations for refinement—for example, clarifying boundary descriptors, digitizing scoring processes, and simplifying parent-facing reports.

Future research can build on this foundation by broadening the sample of educators, examining how CASCIA functions in more diverse implementation settings, and studying longitudinal impacts on teaching and learning. Additional work could also investigate how professional development and digital reporting platforms amplify or constrain actionability. Addressing these questions will extend the strong initial evidence base and ensure that CASCIA continues to evolve in ways that maximize its validity, utility, and impact at scale.

Conclusion

Taken together, findings show that the information the CASCIA reports provide supports validity and actionable interpretations. They provide accurate information about student learning and present it in a format that educators can readily apply to instructional decision-making. The convergence of evidence across alignment studies, surveys, focus groups, and interviews reinforces confidence that CASCIA reporting tools meet their intended purpose. While teachers suggested refinements such as expanding digital access and simplifying parent-facing materials, these comments highlight opportunities to make a strong system even stronger.

Evaluation Question 2: Information to Support Student Interest & Achievement in Science

Evaluation Question 2 asks: *To what extent does the CASCIA system of score reports and reporting resources work in conjunction with other school/classroom outcome measures to support quality instruction, student achievement, and interest in science?*

This question reflects one of CASCIA's central goals: linking data from EOU assessments, classroom assessments, and state summative assessments into a coherent, year-long picture of student progress. The intent of the EOUs was to develop assessments with instructional utility that, when combined with other evidence sources, contribute to a broader profile of student achievement.

To evaluate this question, CASCIA partners conducted an expert review in August 2025 that explicitly examined the EOU score reports for clarity and purpose of use, report content and organization, performance interpretation, accessibility and design, and instructional/systemic utility. For comparative purposes, the experts also reviewed ISRs from the partner states.

Results: Evaluation Question 2

Purpose and Use Clarity: The Likert ratings indicated that experts generally judged the CASCIA EOU reports to be clearer in purpose and more instructionally oriented than the state ISRs. Qualitative evidence corroborated this finding: reviewers emphasized that EOU reports articulated their instructional role and provided companion resources that were useful to teachers and, in some cases, families. At the same time, reviewers noted the absence of explicit cautions against

inappropriate high-stakes applications (e.g., promotion or retention), which could invite misinterpretation. By contrast, state ISRs included such cautionary statements, but these were typically embedded in technical documentation rather than presented within the reports themselves. Experts therefore characterized the state ISRs as accountability-focused and less accessible to families, with language that aligned more closely with policymakers and administrators.

Report Content: Across items related to content and organization, reviewers expressed stronger agreement with the CASCIA EOU reports. They judged these reports to contain detailed and accessible information at the unit level, with resources that linked results to instructional needs. At the same time, reviewers recognized their limited breadth, as EOUs were not designed to capture the full scope of standards across the year. For the state ISRs, responses were mixed. Some reviewers agreed that reports were organized and reflected the breadth of standards, while others disagreed, citing density, technicality, and limited actionable information. On balance, reviewers concluded that CASCIA reports offered greater instructional value at the classroom level, while state ISRs provided broader but less accessible content.

Performance Interpretation: Experts rated the CASCIA reports as offering clearer performance categories and more illustrative examples than the state ISRs, though with less explicit communication of score limitations. Reviewers described CASCIA performance levels as straightforward and aided by interpretive examples. However, they also noted that the reports did not caution against over-interpretation or inappropriate comparisons across contexts. State ISRs, in contrast, did include statements about interpretive limitations, but these were frequently relegated to companion resources and couched in technical language. While this approach reinforced accountability functions, reviewers concluded that it offered less direct interpretive support for educators and families.

Accessibility and Design: Ratings of accessibility were generally stronger for the CASCIA reports. Reviewers described them as readable, visually clear, and broadly family- and teacher-friendly, though one expert noted some confusion when linking reports to companion resources. State ISRs, by contrast, received mixed evaluations: some reviewers agreed that the reports were readable and that design features supported understanding, while others disagreed. Overall, reviewers judged the state reports to be less approachable, with a tone and format more suited to administrators and policymakers than to classroom users.

Instructional Utility and System Coherence: On measures of instructional support and system coherence, reviewers rated CASCIA reports more favorably. They emphasized that CASCIA reports linked results to resources, supported instructional planning, and provided guidance directly applicable to classroom practice. Experts also noted that coherence across EOUs created a system-level view of student learning, even without direct comparability to summative assessments. State ISRs received lower ratings overall, though responses were not unanimous. Some reviewers acknowledged system-level information, but most concluded that the reports

emphasized accountability and policy functions, offering little actionable support for classroom instruction or family engagement.

Discussion

The findings for Evaluation Question 2 suggest that the CASCIA EOU reports largely achieved their intended purpose of supporting instruction and fostering student engagement in science at the unit level. Across all five analytic dimensions, experts consistently judged the EOU reports to be clearer, more accessible, and more instructionally useful than the state ISRs. Experts further concluded that teachers were the primary beneficiaries, given the reports' clarity of purpose, actionable guidance, and coherent linkage to instructional resources.

At the same time, reviewers identified two limitations. First, the reports did not consistently include explicit cautions against inappropriate use, leaving open the possibility of misinterpretation in high-stakes contexts. Second, because the EOUs were designed to provide depth within units rather than breadth across the science curriculum, they cannot be interpreted as cumulative or summative indicators of student achievement.

In contrast, state ISRs included explicit statements about the appropriate use of scores, but these were often buried in technical interpretive guides rather than clearly communicated within the reports themselves. Furthermore, while the ISRs fulfilled accountability functions, they offered limited instructional value and were generally less accessible to families.

Taken together, the evidence demonstrates that CASCIA EOU reports make a distinct contribution by providing instructionally relevant, unit-level insights that support classroom practice and student engagement. At the same time, the absence of explicit cautionary language and the lack of cumulative coverage highlight the importance of situating the EOUs within a broader evidence system rather than interpreting them as stand-alone measures of achievement.

Limitations and Future Research

The survey involved only three expert reviewers, so results should be considered illustrative rather than generalizable. These limitations underscore that findings should be interpreted as formative.

With future funding, a model framework could be developed to demonstrate how evidence from EOUs, classroom assessments, class grades, end-of-year (EOY) student surveys, and summative assessments might be integrated to provide a year-long profile of student science learning and interest against year-end goals (status and growth). This work would involve exploring guiding questions such as: What are the intents of the components of the profile (instructional support, progress monitoring, grading, accountability)? What is the primary role of each component (summative for accountability; classroom assessments for progress monitoring and grading; EOUs for instructional support and progress monitoring; EOY student surveys for instructional support)? The process would include reviewing state standards and blueprints, developing a matrix of unique and shared expectations, drafting options for framework reporting categories, and piloting a trial

profile across sample schools before finalizing the tool with training and PD supports. The benefit of this framework would be to illustrate how the various assessment and reporting components could work together to form a coherent, year-long profile of students' science learning and growth.

Conclusion

In summary, the EOUs provide meaningful evidence of student learning within units and may contribute to a year-long instructional profile. However, they were not designed to provide scaled comparability to state summative assessments. The greatest contribution of Evaluation Question 2 is the recognition that the EOU assessments can be part of a coherent system of evidence, with a framework that connects multiple sources of data across the year to support instruction, student engagement, and growth in science learning.

Evaluation Question 3: Capacity-Building and Return on Investment of SIPS Assessments and CASCIA Reporting Resources

The study of Evaluation Question 3 is situated within the broader CASCIA initiative and its connection to earlier projects such as SCILLSS and SIPS. These initiatives established the foundation for PAD and capacity-building supports that CASCIA carried forward. Evaluation Question 3 asks whether SIPS assessments and CASCIA reporting resources effectively build educator capacity to interpret and use results. This question reflects one of CASCIA's central goals: ensuring that the EOU assessments are not only valid in their measurement of science learning, but also usable by teachers to make instructional decisions and by administrators to support local implementation. The intent of the EOUs was to emphasize instructional usefulness—providing actionable feedback tied to INLs—rather than serving as scaled or comparable summative assessments. Their value lies in their role as one component of a system of evidence that supports instructional decisions, fosters student engagement, and complements rather than replaces state summative measures.

CASCIA partners conceptualized Evaluation Question 3 as a single question divided into three sub-questions:

- **Evaluation Question 3:** To what extent can strategies be implemented to build the capacity of state and local educators to interpret assessment results and use data to inform instructional design and classroom practices?
    - **Evaluation Question 3a:** What resources and professional development strategies best support state and local educators in their appropriate interpretation of assessment results in relation to students' learning at each assessment point in the school year?
    - **Evaluation Question 3b:** What resources and professional development strategies best support state and local educators in their appropriate use of assessment results to make effective instructional decisions after each assessment point in the school year?
    - **Evaluation Question 3c:** What resources and professional development strategies best support state and local educators in their appropriate interpretation and use of cumulative

assessment results at the end of the school year to make effective decisions for subsequent instructional years?

Background

Over the course of the project, CASCIA partners provided teachers with professional development opportunities and resources designed to strengthen their capacity to interpret and use assessment results in ways that meaningfully informed instructional planning. The pilot orientation training (August 3, 2023) served as the initial touchpoint for all participating educators, offering both an overview of the CASCIA project and targeted preparation for engagement with the pilot EOU assessments, score reports, and other reporting mechanisms.

The orientation emphasized coherence among curriculum, instruction, and assessment, situating the EOU assessments within the broader goals of supporting student learning. Teachers were introduced to the SIPS learning goals and assessment design principles, including the importance of measuring transfer of knowledge and integrating DCIs, SEPs, and CCCs. This grounding helped educators recognize how assessment tasks were directly aligned to instruction and how results could guide subsequent teaching.

Resources developed and shared during the project—including instructional frameworks, scoring rubrics, exemplar student responses, interpretive guidance, and reporting tools—were central to building teachers' capacity to use assessment evidence effectively. The orientation introduced these resources, modeling how they could be applied to evaluate student performance and identify next instructional steps. Teachers also learned strategies for preparing students for assessments, such as reinforcing scientific practices (e.g., graphing, modeling, analyzing data) and vocabulary development, which ensured closer alignment between instruction and assessment.

Teachers also engaged in structured professional learning activities throughout the pilot. These included pre-recorded training modules before each administration window, virtual scoring workshops, and focus groups. CASCIA partners designed the scoring workshops to deepen teachers' understanding of assessment criteria and calibrate scoring practices. In doing so, they promoted the importance of reliable scoring and helped teachers internalize expectations for student performance and reflect on areas of instructional emphasis.

As a follow-up to the pilot, the CASCIA project team developed five-chapter interactive scorer training modules for grade 5 and grade 8 educators. Chapter 1 introduces the purpose of the module and its intended audience, while Chapters 2 through 5 orient educators to the CASCIA scoring and reporting resources, provide strategies and interactive practice for accurate and consistent scoring, guide interpretation and application of assessment results, and offer approaches for calibration and capacity building. Collectively, the modules give teachers and instructional leaders structured, accessible professional learning to strengthen their ability to score student work, interpret results, and use assessment evidence to inform instructional planning and support student learning.

CASCIA state partners participated in reviews of draft module PowerPoints and presenter scripts to provide feedback on clarity, accessibility, relevance, and usability. Two state partners from Alaska and three from Nebraska completed reviews[1]; no partners participated from Alabama. Feedback was collected via structured survey items using a Likert scale, and reviewers also provided qualitative comments.

Overall, survey responses were highly positive, with the majority of participants agreeing or strongly agreeing that the chapters accomplished their intended purpose, were appropriate for the intended audience, contained clear and accessible content, included ample background information and examples, and provided suitable additional resources. We summarize the combined ratings from CASCIA state partners for Chapters 1–5 below (see **Error! Reference source not found.**).

Exhibit 10. Combined Survey Responses on Module Quality and Usability

Survey Item	Strongly Disagree	Disagree	Agree	Strongly Agree
Chapter accomplishes its intended purpose	2	0	6	22
Chapter is appropriate for its intended audience (format, structure, length)	1	5	9	20
Chapter content is clear, accurate, and accessible	1	3	11	21
Chapter offers ample background information and robust examples	0	0	10	19
Additional resources are appropriate and supportive	0	0	7	22

Participants commended the modules for clear organization, accessible content, practical examples, scaffolded guidance, and well-aligned resources. Specific highlights included annotated student responses, robust scoring guidance, and clear connections to teaching strategies. Suggested improvements focused on simplifying repetitive phrasing, clarifying complex slides, and providing additional guidance for navigating external resources. Following each review, CASCIA organizational partners met to debrief and discuss state partner feedback. Revisions were applied to each chapter to address opportunities for improvement.

Because CASCIA partners developed the modules in the final year of the project, educators did not have the opportunity to access or use them during the 2023–2024 pilot. With additional funding, the

[1]Reviewer participation differed by chapter, resulting in varying response counts.

modules could be piloted and disseminated more broadly to educators, allowing for further evaluation and refinement.

Results: Evaluation Question 3a. Interpretation of Assessment Results at Each Point in the School Year

May–June 2024 End-of-Year Focus Group: Teachers emphasized the value of the CRR and acquisition goals for helping them interpret student performance after each unit. One teacher explained, *"I frequently used the CRR to help move forward and tie in previous skills for reinforcement."* Another highlighted how the CRR provided insight into instructional gaps, noting, *"Using the classroom roster report helped tailor instruction to student needs, reinforcing their understanding and addressing gaps."* These reports, combined with acquisition goals, gave teachers clear indicators of where students were struggling and what needed to be reinforced. However, some noted challenges, such as not being able to use resources as fully as they wanted, with one teacher admitting, *"I didn't use the resources as much this year because I plan to integrate them more comprehensively next year, focusing on gaps like magnetism."*

July 2025 End-of-Grant Survey: Teachers consistently reported that CASCIA reports were accessible, easy to interpret, and valuable for identifying student instructional needs. In the End-of-Grant Survey, all respondents agreed or strongly agreed that the red–yellow–green designations reflected their students' observed needs. Similarly, in the post-administration survey (n=42), 79% rated the reports as accessible and 95% said results corresponded at least somewhat with other indicators of learning. These findings suggest that CASCIA strengthened teachers' ability to interpret assessment evidence.

July 2025 Master Teacher Interviews: Teachers stressed that clarity and scaffolds were key to helping them and others interpret results. One grade 8 teacher explained that she walked through levels with students to help them understand what yellow, green, and red meant in the context of her standards-based grading: *"I used the CASCIA reports to go through levels with students and help them understand what yellow, green, and red scores meant in context with my standards-based grading."* Another teacher emphasized the role of educator-facing resources, saying that rubric examples were vital because *"grading the assessments was cognitively demanding and led to decision fatigue without them."* Parents were also an important audience for interpretation. A teacher reported that family guidance *"simplified and communicated complex information"* so that parents could engage productively in conversations about learning.

Results: Evaluation Question 3b. Use of Assessment Results to Inform Instructional Decisions

May–June 2024 End-of-Year Focus Group: Teachers reported using CASCIA reports and interpretive resources to adjust instruction, refine lessons, and better differentiate for student needs. One participant explained, *"I will be prepping lessons on Canvas and adjusting my delivery based on feedback and resources."* Another noted, *"I plan to use the interpretive guidance pieces next year. I flagged resources for different levels of students and think linking resources to these levels would be helpful."* Teachers also saw value in repeating assessments because they revealed

student growth, as one teacher put it: *"I plan to use the assessments again because they were beneficial. Students' growth, despite their challenges, shows the potential of these resources."* Still, some teachers acknowledged structural barriers such as time and multiple course preps, with one explaining, *"I am a multiple prep teacher and have 7–8 classes throughout the day… I wanted to redesign my curriculum and potentially use these materials to assist with transitioning."*

July 2025 End-of-Grant Survey: Respondents described using CASCIA results to varying degrees when making instructional decisions. When asked whether their students' CASCIA results were comparable to other assessments, five indicated "Often," one reported "All Year," and one reported "Never." Use of the CASCIA Interpretive Guidance and Instructional Strategies was more evenly distributed: three respondents reported "Often," two "All Year," and two "Sometimes." Illustrative comments included: *"I used the CASCIA Interpretive Guidance and Instructional Strategies… all year."* Another respondent explained that they used guidance "Sometimes," depending on instructional needs.

July 2025 Master Teacher Interviews: Several teachers described using CASCIA data to reorganize instruction and target supports. One grade 8 teacher called CASCIA *"a game changer in my use of assessment data,"* explaining that she routinely tied results back to pacing and reteaching decisions. Another noted that even when results did not shift her fundamental teaching style, they provided *"a better diagnostic tool than many other existing assessments"* and sharpened her focus on areas where students struggled. Professional development was most useful when it emphasized application. Teachers pointed to the importance of scoring guides, educator resources, and modeling of how to integrate CASCIA results into lesson planning. One said the assessments *"revealed deeper misunderstandings"* than other tools, which helped her identify specific standards that needed to be spiraled back into instruction.

Results: Evaluation Question 3c. Interpretation and Use of Cumulative Results Across the School Year

May–June 2024 End-of-Year Focus Group: Focus group participants saw cumulative results as useful for improving instructional emphasis, vertical alignment, and cross-curricular collaboration. One teacher explained, *"I plan to use the results to identify weak areas like the Earth-moon-sun unit and communicate these to the next grade's teachers."* Another emphasized how end-of-year results could shift emphasis across units: *"I would absolutely use these results to re-evaluate instructional emphasis. It is clear my students… need more time and emphasis on certain units rather than others."* Others highlighted opportunities for integrating results into planning across subjects, with one sharing, *"I will use them to adjust my teaching on Canvas and align with math standards. I've spoken with the math teacher to incorporate graphing earlier."* Teachers also planned to refine their own instruction based on cumulative data, as one explained: *"I plan to use the results to refine my instruction and address specific gaps in understanding."*

July 2025 End-of-Grant Survey: At the end of the school year, use of cumulative results and family guidance materials was inconsistent. Three respondents reported using the Family Guidance and

Learning Resources "Sometimes," two reported "All Year," and two reported "Never." One respondent reflected: *"The year prior and last year, the results were comparable with my other data."* Another described selective use: *"I just didn't use the reporting this year."*

July 2025 Master Teacher Interviews: Teachers reported that cumulative evidence across units was especially valuable for long-term planning. One grade 8 teacher described how CASCIA helped her rebuild curriculum: *"Resources like acquisition goals and curriculum supports were used, particularly in Unit 1, which was previously a weaker area. These helped me rebuild curriculum in that unit."* Another tracked students' growth across multiple assessments, noting that year-over-year comparisons highlighted content areas that required continued attention. Teachers agreed that cumulative results allowed them to look beyond single lessons to broader patterns. As one teacher explained, *"Report data made it easier to adjust pacing and identify standards that needed a spiraled review."* Others highlighted the importance of integrating CASCIA results into schoolwide conversations so that end-of-year insights could shape instructional planning for subsequent grades.

Discussion

Findings for Evaluation Question 3 suggest that SIPS assessments and CASCIA reporting resources contributed meaningfully to building educator capacity in both the interpretation and use of assessment results. Across sub-questions, evidence indicated that teachers found the resources clear, accessible, and instructionally valuable, particularly when paired with scaffolds such as rubric examples and family guidance materials. Experts judged that the reports correspond well with other evidence of student learning, and many teachers credited CASCIA with strengthening their ability to diagnose student needs and adjust instruction accordingly.

At the same time, findings also point to variability and limitations. Not all teachers used the resources consistently, and structural barriers such as workload and time limited application. Cumulative reports, in particular, showed uneven uptake across teachers, though those who used them reported value for long-term planning and cross-grade alignment. Professional development was most effective when it emphasized modeling and practical integration rather than abstract guidance.

Taken together, the evidence suggests that CASCIA achieved its intent of enhancing educator capacity to interpret and use assessment results, though its full potential depends on consistent implementation, integration into broader instructional planning, and ongoing professional learning supports.

Conclusion

The evaluation of Evaluation Question 3 indicates that CASCIA has made significant strides in building teacher capacity to interpret and use assessment data. Teachers across various data sources consistently described the reports as accessible, aligned with student needs, and actionable for instructional purposes. The project has demonstrated value in strengthening data

use skills and supporting instructional adjustments, and it has shown potential for cumulative insights across units. At the same time, the pilot results highlight key areas for improvement, including the need for streamlined reporting tools, reduced scoring burdens, and expanded support for consistent implementation. While the evidence is promising, further research with larger and more diverse teacher samples is needed to confirm CASCIA's impact on educator capacity and to refine the supports needed for scaling.

Evaluation Question 4: Communication, Shared Understanding, and Scalability of SIPS Assessments and CASCIA Reporting Resources

Evaluation Question 4 asks: To what extent can replicable and scalable processes, tools, and resources be established to empower district administrators, educators, students, and parents to prioritize student learning and drive meaningful shifts to instructional practice?

The study of Evaluation Question 4 is situated within the broader CASCIA initiative's commitment to ensuring that assessment innovations are not only psychometrically sound and instructionally useful but also valued and sustained by key stakeholders at the state and organizational levels. Building on earlier projects such as SCILLSS and SIPS, CASCIA engaged partners across agencies and organizations to provide feedback on the perceived utility, scalability, and sustainability of the EOU assessments and reporting resources. Evaluation Question 4 focuses on whether these stakeholders—state partners, district leaders, and collaborating organizations—view CASCIA as feasible to implement, aligned to policy and instructional priorities, and supportive of longer-term goals for science education. This perspective is crucial to understanding not only how CASCIA is utilized in classrooms but also whether it has the structural support necessary for adoption and sustainability at scale.

CASCIA partners conceptualized two sub-questions for Evaluation Question 4:

- **Evaluation Question 4a:** What processes, tools, and resources best support communication and a shared understanding among district administrators, educators, students, and parents about the interpretation of assessment results in relation to students' learning across the school year?
- **Evaluation Question 4b:** What processes, tools, and resources best support communication and a shared understanding among district administrators, educators, students, and parents about the use of assessment results and associated instructional strategies to improve instruction and learning across the school year?

Results: Evaluation Question 4a. Communication and Shared Understanding of Assessment Interpretation

August 2025 State and Organizational Partners Focus Group: In the state and organizational partners focus group, participants emphasized that while CASCIA reporting structures provide interpretive potential, their impact depends heavily on communication and leadership at multiple levels. Several participants noted that student and classroom-level reports were helpful for teachers as a way to gather evidence of what students know and can do and to provide meaningful

information to families. At the same time, participants raised concerns that if families viewed an ISR without teacher context, they might not fully understand the report. Teachers also expressed that initial concerns about large amounts of "red" in reports subsided once they understood that these results signaled the need for targeted reteaching rather than final judgments of student ability.

Participants stressed the importance of leadership in making reports accessible. Some observed that uptake was limited in places where state or district leads did not actively promote the resources, underscoring the importance of leadership in helping teachers use and interpret the materials. Others cautioned that misalignment between content and assessment leadership can create friction, making it harder for teachers to benefit from the tools.

Focus group participants also pointed to the value of crosswalks that link reports directly to standards and instructional resources. Participants saw grade 5 materials as well-aligned, while they described grade 8 resources as less aligned due to more significant variation across states in terms of how their standards are organized (i.e., by grade band vs. grade level). Participants noted modules as promising tools to provide additional teacher-friendly support, though some felt that the modules could be "lofty" without scaffolding or guidance for how to adapt them.

July 2025 Master Teacher Interviews: Interviews with master teachers reinforced these findings. Teachers reported that reports and scoring guides supported their own interpretation, but broader communication often required additional support. One grade 8 teacher remarked, *"The resources are solid for us as teachers, but administrators and parents don't always understand the categories. More training or communication tools would help."* Several teachers observed that families tended to focus only on the red–yellow–green designation, with less attention to the detail within the reports. One explained that while some parents engaged deeply, *"Others just wanted to know if their child was red, yellow, or green."* In addition, a few teachers noted that being the only science teacher in their school limited opportunities for collaboration and reduced interest from colleagues or administrators in digging into the CASCIA data.

Results: Evaluation Question 4b. Communication and Shared Understanding of the Use of Assessment Results

August 2025 State and Organizational Partners Focus Group: Participants emphasized CASCIA's potential to drive instructional change when using results collaboratively. They saw modules as especially useful in supporting processes where teachers complete pre-work individually and then come together to discuss and review results. Participants explained that this collaborative structure helped teachers see the reports as actionable and meaningful. At the same time, they noted that in the absence of formal structures, use of CASCIA results often remained confined to individual teachers. Participants saw sustaining communication and collaborative use as requiring administrative leadership, professional learning communities, and alignment with district pacing and professional development systems.

July 2025 Master Teacher Interviews: Educators highlighted that CASCIA reports supported collaboration not only with families, but also with colleagues and administrators. One teacher described using reports in grade-level team meetings to *"align instruction and share strategies."* Another explained that presenting science data to administrators was affirming: *"While my administrators prioritize math and reading, presenting science data helped me feel validated in the importance of my instruction."* Teachers also noted the need for more user-friendly processes to increase shared engagement. One grade 8 teacher observed that some parents were confused by the amount of information on the reports and suggested *"a two-sided version or a simplified summary"* to make results more accessible. Another suggested that district leaders could foster wider adoption by providing clear supports for reflection, such as *"a short guide on how to understand and use the report."*

Discussion

Findings for Evaluation Question 4 suggest that CASCIA has the capacity to support communication and shared understanding of assessment results, but its impact depends significantly on leadership and context. Teachers valued the interpretive clarity of reports and saw potential for collaborative use, yet families often relied only on high-level indicators, and administrators varied in the extent to which they promoted the resources. Crosswalks, modules, and guides were identified as promising tools, but their effectiveness was uneven without scaffolding or integration into existing district structures.

Conclusion

Overall, evidence indicates that CASCIA reporting resources can contribute to a shared understanding of assessment results when embedded in collaborative processes and supported by leadership. At the same time, variability in uptake and communication highlights the importance of continued refinement of tools, clearer family-facing materials, and stronger integration with district professional learning and leadership initiatives to achieve scalability and sustainability.

Overall Conclusions

The CASCIA validity evaluation was designed to determine whether the system of EOU assessments, score reports, and interpretive resources met the project's overarching goals: to provide valid and actionable information about student learning, to build educator capacity, and to support coherent, scalable processes that prioritize student achievement. Specifically, the project goals were to:

a. Establish replicable and scalable score reports and reporting mechanisms that communicate assessment results, their meaning, and how they can be made actionable to improve instruction and learning for all students;

b. Connect information from multiple assessments administered for different purposes and uses and at different points in time throughout year-long instruction to create a profile of students' learning and growth toward achieving end-of-unit and end-of-year learning outcomes;

c. Build state and local educators' capacity to interpret assessment results and use data to inform instructional design and classroom practices; and

d. Establish replicable and scalable processes, tools, and resources that district administrators, educators, students, and parents need to leverage high-quality assessment in ways that prioritize student learning and that drive meaningful shifts to instructional practice.

Findings from multiple studies—including the pilot, post-pilot evidence collection activities, surveys, interviews, and expert reviews—converge to provide an evidence base for the VA and evidence that the project goals were addressed well.

Across all four evaluation questions, the evidence consistently demonstrates that CASCIA reports yield information that supports valid and actionable interpretations. Teachers and expert reviewers affirmed that the INLs accurately reflected student performance, that reporting resources were accessible and usable, and that the system provided diagnostic insights beyond what existing assessments typically offered. Educators reported using the reports to group students, adjust instruction, and communicate more effectively with families. While we were not able to collect as much evidence for those reports intended for broader audiences (e.g., parents and other system level stakeholders), stakeholders generally emphasized that the design's clarity, coherence, and integration of instructional resources made CASCIA a practical and valued tool.

The evaluation also shows that CASCIA contributed meaningfully to capacity-building. Teachers strengthened their ability to interpret assessment results, use data for instructional decision-making, and communicate findings with families and administrators. Professional learning supports—including rubrics, exemplars, and interactive modules—were especially effective in building confidence and consistency in use. At the system level, state and organizational partners recognized CASCIA's potential to enhance alignment and foster collaboration, though they noted that uptake depended on leadership, communication structures, and integration into broader professional development systems.

At the same time, the evaluation highlights areas for refinement and future research. Teachers frequently cited timeliness of reporting and the burden of manual scoring as barriers, suggesting that digital platforms are essential for broader scalability. Parent-facing reports would benefit from simplified formats or summaries to increase accessibility. Broader samples of educators and more diverse implementation contexts are needed to confirm generalizability of findings. Finally, explicit cautionary language should be embedded within reports to reduce the risk of inappropriate high-stakes use.

These findings support the conclusion that CASCIA has successfully advanced the goals of the CGSA program. It has demonstrated that an assessment and reporting system can provide information to support valid and instructionally useful interpretations, in a scalable manner, while building the capacity of educators to make meaningful use of data. The CASCIA assessment reporting system, in combination with the assessments and resources developed by SIPS, represents a replicable model for how state and local agencies can design reporting mechanisms that connect assessment to instruction, strengthen communication across stakeholders, and prioritize student learning. With continued refinement and investment in sustainability, this model provides a compelling framework for the future of science assessment systems.

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Appendix A. CASCIA Reporting Resource Samples

Exhibit A-1. Individual Student Report – Grade 5 Unit 4

Date : 10/07/25

Grade 5 Unit 4 Science: Quarterly Assessment Report
Earth and its Gravitational Force and Motion

Student: Student Name 1
Teacher: Mrs. Allen
School: Lakewood

The quarterly assessment report summarizes individual student performance on the Grade 5 Unit 4 End-of-Unit (EOU) Science Assessment, **"Earth and its Gravitational Force and Motion,"** which measures students' ability to analyze data and support arguments involving patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky, how Earth's gravitational force is always directed downwards, and the effect of the relative distance from Earth on the apparent brightness of the sun and other stars. This assessment is the fourth of four quarterly assessments that students will complete this school year.

How To Interpret Your Student's Results

Student performance data shows the number of points the student achieved for each performance category. Based on these achieved score points, panels of grade 5 science educators used their teaching expertise to recommend **instructional needs levels** (green, yellow, and red) to help parents, guardians, and teachers make reasonable interpretations of the concepts and skills the student has learned and areas that may require additional instructional support.

Instructional Need Levels

G
- **Minimal to no** additional instruction on these skills is recommended.
- The student is ready to extend these skills in future learning.

Y
- **Moderate** additional instruction on these skills is recommended.
- The student needs additional opportunities to strengthen these skills in future learning.

R
- **Extensive** additional instruction and reteaching of these skills is recommended.
- The student needs significant opportunities to reinforce and apply these skills in future learning.

Performance Categories	This performance category measures the student's ability to:	Points Earned/ Possible	Instructional Needs Level R	Y	G	Learning Resources for Families
Support Arguments Related to Interactions Within the Earth, Sun, and Moon System	Support an argument with evidence, data, or a model to explain how: • the length and direction of shadows relates to the time of day • the position and motion of objects in the Earth-sun system relate to the length and direction of shadows during the day • the length of shadows changes from summer to winter • observable patterns can be used to predict dates of various moon phases • gravity is the force that maintains Earth's spherical shape	10/12			✓	PC 1 Resources
Analyze Data to Describe Observable Patterns Related to the Earth, Sun, and Moon System	Analyze and interpret data and graphs to reveal patterns or relationships about: • predicting shadow length during regular intervals over the course of a day • predicting the position and movement of the Big Dipper in the night sky • approximate sunrise and sunset times (e.g., length of daylight) during regular intervals over the course of a year • the appearance of the moon every four weeks (e.g., moon phases) during regular intervals over the course of four months	11/13			✓	PC 2 Resources
Support Arguments Related to the Apparent Brightness of Stars	Support an argument with evidence, data, or a model to explain how: • the effect of distance on the apparent brightness of the sun compared to that of other stars can be used to support or refute a claim related to the brightness of stars • living organisms rely on the predictable patterns of the position and motion of objects in the sky	8/9			✓	PC 3 Resources

Learning Resources for Parents Available at: https://drive.google.com/drive/folders/1Hftlk2y5d-7mIBsO6cGaXGden1uU3hSI?usp=sharing

Exhibit A-2. Classroom Roster Report – Grade 5 Unit 4

Date : 10/07/25

Grade 5 Unit 4 Science: Quarterly Assessment Classroom Roster Repor
Earth and its Gravitational Force and Motion

Teacher : Mrs. Allen

School: Lakewood

The quarterly assessment classroom roster report summarizes student performance by classroom on the Grade 5 Unit 4 End-of-Unit (EOU) Science Assessment and offers information about students' **instructional needs levels by performance category** that educators can use to inform a variety of individualized, small, and whole group learning opportunities and to make timely and meaningful adjustments to instruction. This report shows the **number and percentage of students assigned to each instructional needs level** (green, yellow, and red) based on the total points they earned on prompts associated with the performance category.

Instructional Need Levels

G
- **Minimal to no** additional instruction on these skills is recommended.
- The student is ready to extend these skills in future learning.

Y
- **Moderate** additional instruction on these skills is recommended.
- The student needs additional opportunities to strengthen these skills in future learning.

R
- **Extensive** additional instruction and reteaching of these skills is recommended.
- The student needs significant opportunities to reinforce and apply these skills in future learning.

Student Name	Classroom Instructional Needs Levels by Performance Category		
Student Name 1	G (10/12)	G (11/13)	G (8/9)
Student Name 2	R (1/12)	Y (6/13)	R (2/9)
Student Name 3	Y (7/12)	Y (6/13)	Y (6/9)
Student Name 4	Y (5/12)	Y (7/13)	Y (4/9)
Student Name 5	G (11/12)	G (12/13)	Y (7/9)
Student Name 6	Y (9/12)	G (11/13)	G (8/9)
Student Name 7	R (1/12)	Y (6/13)	R (2/9)
Student Name 8	Y (7/12)	Y (6/13)	Y (6/9)
Student Name 9	Y (7/12)	Y (7/13)	Y (4/9)
Student Name 10	G (11/12)	G (12/13)	Y (7/9)
Student Name 11	Y (8/12)	G (11/13)	G (8/9)
Student Name 12	R (1/12)	Y (6/13)	R (2/9)
Student Name 13	Y (7/12)	Y (7/13)	Y (5/9)
Student Name 14	Y (5/12)	Y (7/13)	Y (4/9)
Student Name 15	G (11/12)	G (12/13)	Y (7/9)
Student Name 16	Y (9/12)	G (11/13)	G (8/9)
Student Name 17	R (1/12)	R (5/13)	R (2/9)
Student Name 18	Y (7/12)	Y (7/13)	Y (5/9)
Student Name 19	Y (5/12)	Y (6/13)	Y (4/9)
Student Name 20	G (11/12)	G (12/13)	Y (7/9)
Student Name 21	Y (8/12)	G (11/13)	G (8/9)
Student Name 22	R (1/12)	Y (6/13)	R (1/9)
Student Name 23	Y (7/12)	Y (7/13)	Y (6/9)
Student Name 24	Y (5/12)	Y (7/13)	Y (3/9)
Student Name 25	G (10/12)	G (12/13)	Y (7/9)
Student Name 26	G (10/12)	G (11/13)	G (8/9)
Student Name 27	R (1/12)	Y (6/13)	R (2/9)
Student Name 28	Y (7/12)	Y (7/13)	Y (6/9)
Student Name 29	Y (5/12)	Y (7/13)	Y (4/9)
Student Name 30	G (11/12)	G (12/13)	Y (7/9)

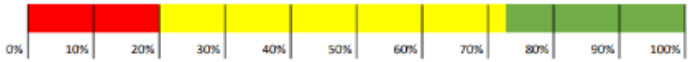
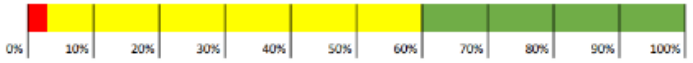
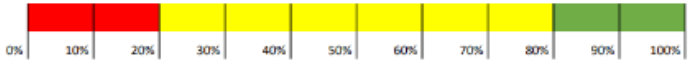
Performance Categories	Prompts for this performance category measure the student's ability to:	NGSS Performance Expectations	Percent Distributions of Students by Instructional Needs Level	Instructional Guidance Resources
Support Arguments Related to Interactions Within the Earth, Sun, and Moon System · Task 1 – Prompt 1, Part A · Task 1 – Prompt 1, Part D · Task 1 – Prompt 2 · Task 3 – Prompt 2, Part C · Task 3 – Prompt 3	Support an argument with evidence, data, or a model to explain how: · the length and direction of shadows relates to the time of day · the position and motion of objects in the Earth-sun system relate to the length and direction of shadows during the day · the length of shadows changes from summer to winter · observable patterns can be used to predict dates of various moon phases · gravity is the force that maintains Earth's spherical shape	5-PS2-2, 5-ESS1-1 and 5-ESS1-2		
Analyze Data to Describe Observable Patterns Related to the Earth, Sun, and Moon System · Task 1 – Prompt 1, Parts B & C · Task 2 – Prompt 1 · Task 3 – Prompt 1 · Task 3 – Prompt 2, Parts A & B	Analyze and interpret data and graphs to reveal patterns or relationships about: · predicting shadow length during regular intervals over the course of a day · predicting the position and movement of the Big Dipper in the night sky · approximate sunrise and sunset times (e.g., length of daylight) during regular intervals over the course of a year · the appearance of the moon every four weeks (e.g., moon phases) during regular intervals over the course of four months	5-ESS1-1 and 5-ESS1-2		 G5 U4 Resources
Support Arguments Related to the Apparent Brightness of Stars · Task 2 – Prompt 2, Parts A - C · Task 2 – Prompt 3	Support an argument with evidence, data, or a model to explain how: · the effect of distance on the apparent brightness of the sun compared to that of other stars can be used to support or refute a claim related to the brightness of stars · living organisms rely on the predictable patterns of the position and motion of objects in the sky	5-ESS1-1 and 5-ESS1-2		

Exhibit A-3. Interpretive Guidance and Instructional Strategies for Educators – Grade 5 Unit 4 PC1 (pp. 1-14)

Coherence and Alignment Among Science Curriculum, Instruction, and Assessment (CASCIA) Project

Grade 5 Unit 4: Earth and its Gravitational Force and Motion

Interpretive Guidance and Instructional Strategies for Educators

May 2025

Grade 5 Unit 4: Earth and its Gravitational Force and Motion, Interpretive Guidance and Instructional Strategies for Educators was developed with funding from the U.S. Department of Education under the Competitive Grants for State Assessments Program CFDA 84.368A. The contents of this paper do not represent the policy of the U.S. Department of Education, and no assumption of endorsement by the Federal government should be made.

Table of Contents

Purpose

The purpose of this document is to help educators understand their students' performance on the Grade 5 Unit 4 Science Assessment and to provide instructional strategies and resources for planning and adjusting instruction to help students learn, whether it involves reteaching previously addressed concepts and skills from the prior instructional unit or planning additional learning opportunities or interventions in the subsequent unit.

Unit Overview

By engaging in this unit, students deepen their knowledge of the direction of the Earth's gravitational forces and how distance from the Earth influences the brightness of the sun and stars. Focusing on developing and using models, constructing explanations and designing solutions, analyzing and interpreting data, and engaging in argument from evidence, students learn about the gravitational force of Earth, how these cause observable patterns, and the brightness of the sun and other stars.

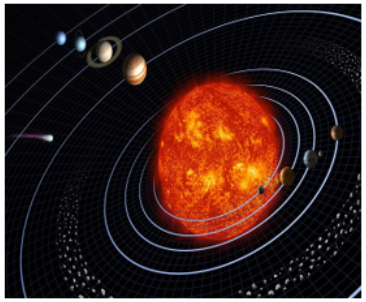


Image: The Solar System
Credit: Harman Smith and Laura Generosa
Source: Based on Image:Solar_sys.jpg, with Pluto removed
License: CC0 1.0 DEED

Instructions for Educators

1. Based on your analysis of student work from the assessment, in combination with additional assessment evidence gathered over the course of the instructional unit, consider themes or trends in your students' performance. Refer to your students' scores on the Classroom Roster Report to determine the degree to which students in your classroom require additional instructional support based on their instructional needs levels—red, yellow, or green—for each performance category.
2. For each performance category, use the provided interpretive guidance (i.e., *What These Results Mean*, *Next Instructional Steps*, and *Example Scored and Annotated Student Work* located in the Grade 5 Unit 4 EOU Assessment Scoring Guide) to understand what your students likely know and are able to do and to consider next instructional steps based on their instructional needs levels. Scored and annotated student work samples are provided for each performance category to demonstrate the evidence students might demonstrate in response to each prompt for each possible score point. The student responses represent the full range of score points possible for each prompt based on the scoring rubric.
3. For each performance category, use the *Instructional Strategies and Resources* organized by Universal Design for Learning (UDL) principle to support the design and delivery of accessible instruction and learning opportunities for all students based on their performance on the Grade 5 Unit 4 Assessment and their recommended instructional needs. These instructional recommendations can be selected and used to intentionally plan instruction and learning opportunities for students across the range of instructional needs levels (i.e., red, yellow, green).

Universal Design For Learning

The instructional strategies and resources provided in this document are organized by the Universal Design for Learning (UDL) principles. UDL is a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn." (CAST, 2022). Taking time to reflect on prior instruction when planning for accessible, differentiated, and culturally responsive instruction for diverse learners and culturally diverse classrooms serves to identify ways to improve future instructional practices. The UDL Guidelines provide a framework for this reflection. The guidelines include three principles: Multiple Means of Engagement, Multiple Means of Representation, and Multiple Means of Action & Expression as ways to focus on variety and flexibility in instructional practices.

Multiple Means of Engagement	*The WHY of Learning* - provide options for recruiting student interest, sustaining effort, and promoting motivation.
Multiple Means of Representation	*The WHAT of Learning* - provide options for displaying information, including alternatives for auditory and visual information, use multi-media, clarify vocabulary and symbols, support comprehending text, and guide information processing and visualization.
Multiple Means of Action & Expression	*The HOW of Learning* – vary the methods for student responses and collection of evidence of their learning, optimize access to tools and technologies, use multiple tools for construction and composing responses, facilitate managing information and resources, and enhance student capacity for monitoring progress.

By examining instruction and instructional materials through the lens of each of these principles, we can identify and thus reduce or remove barriers to diverse learners to promote accessible and equitable teaching and learning opportunities. Application of UDL guidelines and principles allows all students to engage with and be provided with multiple means of representing instructional content and expressing what they know and can do, which is similarly the purpose of the use of accommodations for students receiving special education, students who have a 504 plan, and emerging Bilinguals.

Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System

Interpretive Guidance for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System *Task 1, Prompt 1, Part A (3 Points); Task 1, Prompt 1, Part D (3 Points); Task 1, Prompt 2 (2 Points); Task 3, Prompt 2, Part C (2 Points); Task 3, Prompt 3 (2 Points)*		
Red (0-3 score points earned) ➢ **Extensive** additional instruction and reteaching of these skills is recommended. ➢ The student needs significant opportunities to reinforce and apply these skills in future learning.	**Yellow (4-9 score points earned)** ➢ **Moderate** additional instruction on these skills is recommended. ➢ The student needs additional opportunities to strengthen these skills in future learning.	**Green (10-12 score points earned)** ➢ **Minimal to no** additional instruction on these skills is recommended. ➢ The student is ready to extend these skills in future learning.
What These Results Mean		
This student is likely able to: • Present an **inaccurate** representation of the position of the sun, the direction, **and/or** the length of an object's shadow. • State **some** science ideas or information to provide an **inaccurate** description or conclusion about the length and direction of shadows over the course of a day **and/or** a year. • **Use some** science ideas **and/or** information about the motion of objects in the Earth-moon system to **attempt** to refute a claim. • **Use some** science ideas or information related to gravity or a lunar eclipse to **attempt** a description or conclusion.	**This student is likely able to:** • **Partially complete** a diagram **with a minor error** to represent the position of the sun, the direction, **or** the length of an object's shadow. • Use **some correct and relevant** science concepts, mathematical representations, or information to construct an **accurate but incomplete** argument about the length and direction of shadows over the course of a day **and/or** a year (i.e., change in shadows' length from summer to winter). • Use **some relevant** concepts, mathematical representations, **or** information to demonstrate understanding of the pattern of motion of objects in the Earth-moon	**This student is likely able to:** • **Complete** a diagram to **correctly** represent relationships among the position of the sun and the direction **and** the length of an object's shadow. • Use **correct and relevant** science concepts, mathematical representations, or information to construct a **clear and convincing** argument about the length and direction of shadows over the course of a day **and** a year (i.e., change in shadow length from summer to winter). • Use **relevant** science concepts, mathematical representations, **and** information to demonstrate understanding of the pattern of motion of objects in the

Interpretive Guidance for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System *Task 1, Prompt 1, Part A (3 Points); Task 1, Prompt 1, Part D (3 Points); Task 1, Prompt 2 (2 Points); Task 3, Prompt 2, Part C (2 Points); Task 3, Prompt 3 (2 Points)*		
Red (0-3 score points earned) ➢ **Extensive** additional instruction and reteaching of these skills is recommended. ➢ The student needs significant opportunities to reinforce and apply these skills in future learning.	**Yellow (4-9 score points earned)** ➢ **Moderate** additional instruction on these skills is recommended. ➢ The student needs additional opportunities to strengthen these skills in future learning.	**Green (10-12 score points earned)** ➢ **Minimal to no** additional instruction on these skills is recommended. ➢ The student is ready to extend these skills in future learning.
	system to **partially** refute a claim with **minor errors**. • Use **some relevant** science information about gravity **and** a lunar eclipse and **apply some** of these concepts to construct an argument.	Earth-moon system to **accurately** refute a claim with **at least two pieces** of evidence. • **Correctly** use **relevant** science concepts or information about gravity **and** a lunar eclipse to construct a **clear and convincing** argument.

Interpretive Guidance for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System *Task 1, Prompt 1 A (3 Points); Task 1, Prompt 1 D (3 Points); Task 1, Prompt 2 (2 Points); Task 3, Prompt 2, Part C (2 Points); Task 3, Prompt 3 (2 Points)*		
Red (0-3 score points earned) ➢ **Extensive** additional instruction and reteaching of these skills is recommended. ➢ The student needs significant opportunities to reinforce and apply these skills in future learning.	**Yellow (4-9 score points earned)** ➢ **Moderate** additional instruction on these skills is recommended. ➢ The student needs additional opportunities to strengthen these skills in future learning.	**Green (10-12 score points earned)** ➢ **Minimal to no** additional instruction on these skills is recommended. ➢ The student is ready to extend these skills in future learning.
Next Instructional Steps		
Provide opportunities for the student to: • Identify examples and non-examples of representations of the position of the sun and the direction and length of an object's shadow. • Select from and correctly use provided terminology and concepts to engage in discussion to develop conclusions related to daily changes in the length and direction of shadows and different positions of the sun, moon, and stars at different times of the day, month, and year. • Identify provided science ideas and information that support or refute a provided claim. • Collaboratively brainstorm and generate ideas and reasons to support a provided argument.	**Provide opportunities for the student to:** • Correctly use relevant terminology and concepts to engage in argumentation. • Discuss and apply scientific concepts from the unit to explain decision-making, data analysis, and reasoning to construct an argument. • Identify and use multiple sources of relevant evidence, data, and/or models to construct and support or refute a claim related to the orbits of Earth around the sun and the moon around Earth. • Evaluate the strength of a provided argument based on the relevance and sufficiency of the reasoning and evidence.	**Provide opportunities for the student to:** • Connect scientific theories and laws to justify an argument clearly and logically. • Compare and refine arguments based on an evaluation of the evidence presented. • Develop and use multiple forms of data and information (e.g., graphs or tables) to identify patterns and make a prediction related to the orbits of Earth around the sun and the moon around Earth.

Interpretive Guidance for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System *Task 1, Prompt 1 A (3 Points); Task 1, Prompt 1 D (3 Points); Task 1, Prompt 2 (2 Points); Task 3, Prompt 2, Part C (2 Points); Task 3, Prompt 3 (2 Points)*		
Red (0-3 score points earned) ➢ **Extensive** additional instruction and reteaching of these skills is recommended. ➢ The student needs significant opportunities to reinforce and apply these skills in future learning.	**Yellow (4-9 score points earned)** ➢ **Moderate** additional instruction on these skills is recommended. ➢ The student needs additional opportunities to strengthen these skills in future learning.	**Green (10-12 score points earned)** ➢ **Minimal to no** additional instruction on these skills is recommended. ➢ The student is ready to extend these skills in future learning.
• Collaboratively select from provided evidence, data, and/or models that are relevant to support a provided argument.		

Instructional Strategies and Resources for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System *Task 1, Prompt 1 A (3 Points); Task 1, Prompt 1 D (3 Points); Task 1, Prompt 2 (2 Points); Task 3, Prompt 2 C (2 Points); Task 3, Prompt 3 (2 Points)*		
Instructional Strategies and Resources		
	Teaching Strategies	***Resources***
	*Argumentation through Discourse* Provide varied opportunities (stations, small groups, partners, whole class) for students to engage in interactive discourse, building on each other's ideas to coordinate claims, evidence, and reasoning in a scientific argument. Opportunities for scientific discourse related to interactions within the Earth, sun, and moon system should be in authentic, interest-driven scientific investigations.	• What is the Relationship Between the Earth, Sun, and Moon? – This video provides key information about the Earth, sun, and moon and describes the orbit of the Earth around the sun and the moon around the Earth. [www.youtube.com/watch?v=6xvuk25penAarth] • Earth and Space Science: Patterns in the Sky – These Google slides are organized by a set of lessons that include multiple teaching resources, videos, graphic organizers, and tools that students can use to explore and document their understanding of each object in the Earth, sun, and moon system and their relationships. [https://docs.google.com/presentation/d/1TpFzimva7AGCTgNAWqsLeExpd2lxbnKwI2He2nQ8xBo/copy] • Talk Activities that Can Scaffold Argumentation and Talk Activities Flowchart – This PDF tool highlights talk formats and explains when, how, and why to use each talk format in support of student investigations. The PDF is available in Spanish. [http://stemteachingtools.org/brief/35] • Smithsonian Science Education Center: Techniques for Encouraging a Culture of Argumentation in Your Classroom – This article from the *Smithsonian* discusses avenues for creating a culture of argumentation in a science classroom. [https://ssec.si.edu/stemvisions-blog/techniques-encouraging-culture-argumentation-your-classroom]

Instructional Strategies and Resources for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System *Task 1, Prompt 1 A (3 Points); Task 1, Prompt 1 D (3 Points); Task 1, Prompt 2 (2 Points); Task 3, Prompt 2 C (2 Points); Task 3, Prompt 3 (2 Points)*		
Instructional Strategies and Resources		
	Teaching Strategies	***Resources***
		[https://wordwall.net/en-us/community/sun-moon-earth] • Classroom Review Games – These ten innovative and entertaining classroom review games are designed to improve knowledge retention and engagement. [https://blog.classpoint.io/classroom-review-games/] • Space Place: Explore Earth and Space – This *NASA* website offers games to show the movement of the sun, moon, and Earth. [https://spaceplace.nasa.gov/menu/sun/]
	*Develop Self-assessment and Reflection* For many learners, recognizing that they are progressing toward greater independence is highly motivating. Alternatively, one key factor in learners losing motivation is their inability to recognize their progress. Learners must have multiple models and scaffolds of different self-reflection techniques to identify and choose the optimal ones.	• Self-Reflection – This website will fill your teacher toolbox with prompts and strategies that promote reflection on both the content and the practice of science. [https://www.calacademy.org/educators/science-notebooks-for-reflection] • Reflecting in STEM Space Science – This article shows how reflection in STEM is essential to student understanding and teacher evaluation of students' learning. Reflecting helps students make connections, understand their successes and failures, and become aware of their learning. Reflections help teachers identify where different students are in their learning process. [https://creativeeducator.tech4learning.com/2016/articles/reflecting-in-STEM]

Instructional Strategies and Resources for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System *Task 1, Prompt 1 A (3 Points); Task 1, Prompt 1 D (3 Points); Task 1, Prompt 2 (2 Points); Task 3, Prompt 2 C (2 Points); Task 3, Prompt 3 (2 Points)*		
Instructional Strategies and Resources		
	Teaching Strategies	***Resources***

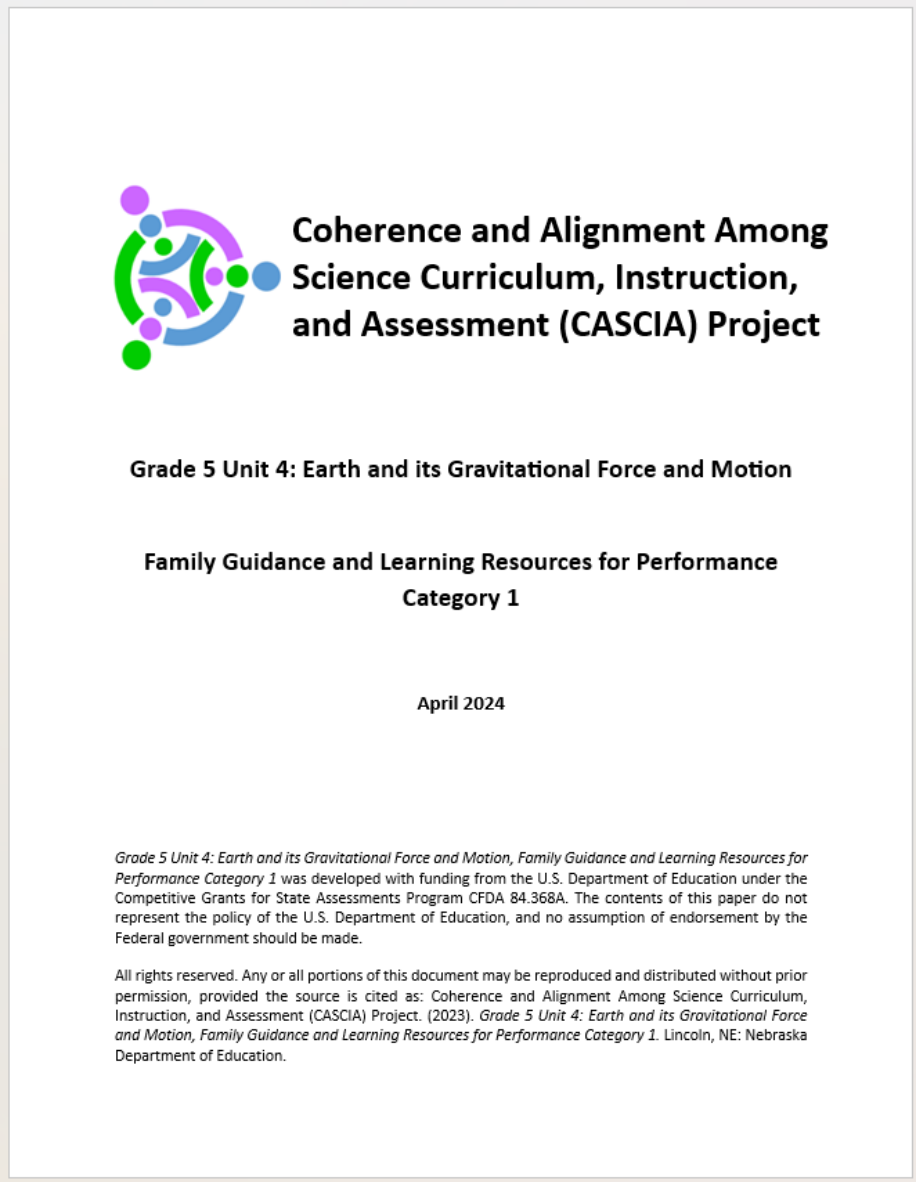
	*Vocabulary*
	Provide varied opportunities for students to learn and apply vocabulary in diverse situations and contexts. Vocabulary retention improves when academic terminology is layered on conceptual understanding. To maximize vocabulary building, support students in conceptual understanding and apply the academic terminology using the strategies outlined below.
	• Build an understanding of domain-specific vocabulary using a multi-sensory approach or by having students participate in simulations.
	• Make connections between vocabulary and real-life or future opportunities.
	  ○ Explain, describe, give real-world examples, or provide concrete representations of vocabulary words rather than formal definitions. Vocabulary.com (see Resources) provides explanations of words using real-world examples. Once signed in, an educator can create word lists for students.
	  ○ Build a vocabulary word wall for students to add and reference during instruction and self-guided activities or tasks.
	  ○ Have students restate the vocabulary word in their own words. Take this opportunity to help students connect
		• NASA-Space Place – This *NASA* Website includes vocabulary and definitions related to Earth and space.
		[https://spaceplace.nasa.gov/glossary/en/]
		• STEM Teaching Tools – Practice Brief 66 – This article explains how to support emerging multilingual learners as they develop language that interprets and explains phenomena.
		[https://stemteachingtools.org/brief/66]
		• Vocabulary.com – This website provides explanations of words using real-world examples. Once signed in, an educator can create word lists for students.
		[https://www.vocabulary.com/]
		• Text Project – Word Pictures – This website provides Word Pictures that are free for educators to use. Their site includes word pictures for core vocabulary and various content areas, including science and social studies.
		[https://textproject.org/wp-content/uploads/qrwp/QRWP_C3_Plants.pdf]
		• The Science Penguin – This website provides ideas for teaching science vocabulary. The vocabulary demonstration activity uses real objects to teach vocabulary terms.
		[http://thesciencepenguin.com/2013/12/science-solutions-vocabulary.html]

Instructional Strategies and Resources for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System *Task 1, Prompt 1 A (3 Points); Task 1, Prompt 1 D (3 Points); Task 1, Prompt 2 (2 Points); Task 3, Prompt 2 C (2 Points); Task 3, Prompt 3 (2 Points)*		
Instructional Strategies and Resources		
	Teaching Strategies	***Resources***
	new vocabulary, especially general vocabulary, to prior knowledge. • Read books or watch videos related to vocabulary words and concepts. • Sort words, photographs, or concrete representations into categories. Text Project (see Resources) provides free Word Pictures for educators to use. It includes word pictures for core vocabulary and various content areas, including science and social studies. • Pre-teach vocabulary and symbols, especially in ways that promote connection to the learners' experience and prior knowledge. • Define domain-specific vocabulary (e.g., predator) using domain-specific and common terms. • Embed visual, non-linguistic supports for vocabulary clarification (pictures, videos, etc.). • Have students create their glossary of terms.	• Interactive Word Walls Enliven Vocab Learning – This article includes teaching strategies to support students' use of a word wall to build an understanding of key vocabulary. [https://www.middleweb.com/37209/interactive-word-walls-enliven-vocab-learning/]
	*Presenting Information in Different Modalities* Provide information using a variety of multimedia (e.g., videos, interactives, simulations), informational texts, and formats to teach and reinforce disciplinary core ideas related to interactions within the Earth, sun, and moon system.	• Earth and Space Science – This site provides Earth and space science videos, interactive activities, teaching materials, and more. [https://alaskapublic.pbslearningmedia.org/resource/ssecgoodthinking15/good-thinking-tis-the-season-for-a-reason/]

Instructional Strategies and Resources for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System *Task 1, Prompt 1 A (3 Points); Task 1, Prompt 1 D (3 Points); Task 1, Prompt 2 (2 Points); Task 3, Prompt 2 C (2 Points); Task 3, Prompt 3 (2 Points)*		
Instructional Strategies and Resources		
	Teaching Strategies	***Resources***
		• Moon Journal – *Learning Space* webpage has video tutorials, DIY projects, slideshows, games, and links to more you can see and do with NASA. [https://www.youtube.com/watch?v=rFXsXAPVl3Q]
	*Scaffolds for Communicating through Argumentation* Provide scaffolds for argumentative writing and discussions to justify or describe a phenomenon or support a design solution (e.g., sentence frames, graphic organizers, norms for whole class discussion, roles for students during small group activities) to support communicating in science-specific ways that may seem unnatural. • Pre-teach vocabulary and symbols, especially in ways that promote connection to the learners' experience and prior knowledge. • Embed visual, non-linguistic supports for vocabulary clarification (pictures, videos, etc.).	• National Science Foundation – Tools for Ambitious Science Teaching – This website discusses a tool that provides scaffolds for writing that support learners in constructing explanations with evidence. These take the form of sentence frames, guides for how to help English learners practice final explanations, norms for whole-class discussion that are developed by students, roles that students can take in small group activities, and others. [https://ambitiousscienceteaching.org/revising-models/] • Bozeman Science: Engaging in Argumentation – In this video [6:50], Paul Andersen explains how to have your students engage in argumentation in the science classroom. [https://www.youtube.com/watch?v=L96LiRDWgmI] • Stem Teaching Tool – Practice Brief 25: Equitable Argumentation – This article describes how supporting multiple modes of expression can increase how students communicate their arguments. [https://stemteachingtools.org/brief/25]

Instructional Strategies and Resources for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System *Task 1, Prompt 1 A (3 Points); Task 1, Prompt 1 D (3 Points); Task 1, Prompt 2 (2 Points); Task 3, Prompt 2 C (2 Points); Task 3, Prompt 3 (2 Points)*		
Instructional Strategies and Resources		
	Teaching Strategies	***Resources***
	*Expressing Learning in Multiple Modalities* Provide multiple, flexible options for students to communicate their arguments and learn about the Earth, sun, and moon system. • Use technologies that facilitate student participation and communication, such as discussion boards, podcasts, or blogs. • Allow students to choose a multi-modal project they would like to complete to demonstrate their learning, such as a poster presentation, debate, short film, lab report, blog, infographic, drawing, poetry, writing and performing a song, creating a game, etc. • Provide a variety of ways in which students can "write" to respond to questions (e.g., traditional form of writing, with sentence starters, using pictures, etc.).	• Upper Elementary Students Explore Earth and Space Science by Modeling – Articles to explain modeling in space science education. [https://www.academia.edu/26763311/Upper_elementary_students_explore_Earth_and_space_science_by_modeling_and_observing_patterns] • Deepen Academic Knowledge – This website uses disciplinary facets to deepen academic vocabulary knowledge. [https://www.readwritethink.org/professional-development/strategy-guides/using-disciplinary-facets-deepen] • Read, Write, Think – In this strategy guide, you will see how one lesson utilizes tiered texts and multiple modalities to meet the learning style needs of students. [https://www.readwritethink.org/professional-development/strategy-guides/using-jigsaw-cooperative-learning] • How to Make Infographics – In this video [2:17], discover five ways to use infographics in the virtual or physical classroom. [https://www.youtube.com/watch?v=CGFjy-Hqr7U] • Digital Lab Notebook – This digital notebook offers students a digital option for recording lab results, writing lab reports, journaling, drawing, planning, or creative writing. It can also be saved as a copy.

Exhibit A-4. Family Guidance and Learning Resources – Grade 5 Unit 4 PC1



Coherence and Alignment Among Science Curriculum, Instruction, and Assessment (CASCIA) Project

Grade 5 Unit 4: Earth and its Gravitational Force and Motion

Family Guidance and Learning Resources for Performance Category 1

April 2024

Grade 5 Unit 4: Earth and its Gravitational Force and Motion, Family Guidance and Learning Resources for Performance Category 1 was developed with funding from the U.S. Department of Education under the Competitive Grants for State Assessments Program CFDA 84.368A. The contents of this paper do not represent the policy of the U.S. Department of Education, and no assumption of endorsement by the Federal government should be made.

Purpose

The purpose of this document is to help families understand their student's performance on the Grade 5 Unit 4 Science Assessment and to provide resources and recommendations for engaging their student in science learning at home.

Unit Overview

By engaging in this unit, students deepen their knowledge of the direction of the Earth's gravitational forces and how distance from the Earth influences the brightness of the sun and stars. With a focus on developing and using models, constructing explanations and designing solutions, analyzing and interpreting data, and engaging in argument from evidence, students learn about the gravitational force of Earth, how these cause observable patterns, and the brightness of the sun and other stars.

Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System

Prompts for this performance category require students to support an argument with evidence, data, or a model to explain how:

- the length and direction of shadows relates to the time of day
- the position and motion of objects in the Earth-sun system relate to the length and direction of shadows during the day
- the length of shadows changes from summer to winter
- observable patterns can be used to predict dates of various moon phases
- gravity is the force that maintains Earth's spherical shape

Grade 5 Unit 4: Earth and its Gravitational Force and Motion

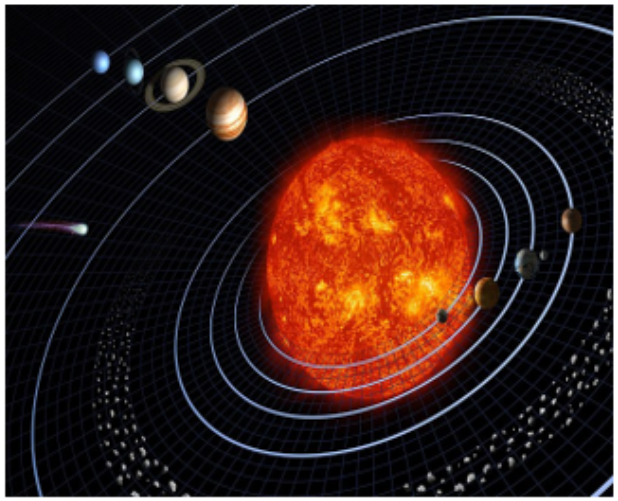


Image: The Solar System
Credit: Harman Smith and Laura Generosa
Source: Based on Image:Solar_sys.jpg, with Pluto removed
License: CC0 1.0 DEED

Instructions for Parents/Guardians

1. Refer to your student's score report to determine their instructional needs level—green, yellow, or red—for this performance category.
2. Use the Interpretive Guidance (see page 2) to understand what your student likely knows and is able to do based on their instructional needs level.
3. Use the Family Resources and Recommendations (see page 4) to engage with and support your student's science learning at home.

Interpretive Guidance for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System		
Red (0-3 score points earned) ➢ **Extensive** additional instruction and reteaching of these skills is recommended. ➢ The student needs significant opportunities to reinforce and apply these skills in future learning.	**Yellow (4-9 score points earned)** ➢ **Moderate** additional instruction on these skills is recommended. ➢ The student needs additional opportunities to strengthen these skills in future learning.	**Green (10-12 score points earned)** ➢ **Minimal to no** additional instruction on these skills is recommended. ➢ The student is ready to extend these skills in future learning.
What These Results Mean		
This student is likely able to: • Present an **inaccurate** representation of the position of the sun, the direction, **and/or** the length of an object's shadow. • State **some** science ideas or information to provide an **inaccurate** description or conclusion about the length and direction of shadows over the course of a day **and/or** a year. • **Use some** science ideas **and/or** information about the motion of objects in the Earth-moon system to **attempt** to refute a claim. • **Use some** science ideas or information related to gravity or a lunar eclipse to **attempt** a description or conclusion.	**This student is likely able to:** • **Partially complete** a diagram **with a minor error** to represent the position of the sun, the direction, **or** the length of an object's shadow. • Use **some correct and relevant** science concepts, mathematical representations, or information to construct an **accurate but incomplete** argument about the length and direction of shadows over the course of a day **and/or** a year (i.e., change in shadows' length from summer to winter). • Use **some relevant** concepts, mathematical representations, **or** information to demonstrate understanding of the pattern of motion of objects in the Earth-moon system to **partially** refute a claim with **minor errors**. • Use **some relevant** science information about gravity **and** a lunar eclipse and **apply some** of these concepts to construct an argument.	**This student is likely able to:** • **Complete** a diagram to **correctly** represent relationships among the position of the sun, and the direction **and** the length of an object's shadow. • Use **correct and relevant** science concepts, mathematical representations, or information to construct a **clear and convincing** argument about the length and direction of shadows over the course of a day **and** a year (i.e., change in shadows length from summer to winter). • Use **relevant** science concepts, mathematical representations, **and** information to demonstrate understanding of the pattern of motion of objects in the Earth-moon system to **accurately** refute a claim with **at least two pieces** of evidence. • **Correctly** use **relevant** science concepts or information about gravity **and** a lunar

Interpretive Guidance for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System		
Red (0-3 score points earned) ➢ **Extensive** additional instruction and reteaching of these skills is recommended. ➢ The student needs significant opportunities to reinforce and apply these skills in future learning.	**Yellow (4-9 score points earned)** ➢ **Moderate** additional instruction on these skills is recommended. ➢ The student needs additional opportunities to strengthen these skills in future learning.	**Green (10-12 score points earned)** ➢ **Minimal to no** additional instruction on these skills is recommended. ➢ The student is ready to extend these skills in future learning.
		eclipse to construct a **clear and convincing** argument.

Family Resources and Recommendations for Performance Category 1: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System	
Resources and Recommendations to Support Science Learning at Home	
Explore the Topic: • *How do the position and motion of objects in the Earth-sun system relate to the length and direction of shadows during the day?*	Watch this video [4:52] with your student to learn about what a shadow is and follow along in an investigation to see how shadows change over the course of a day. Stop the video to discuss the length (shorter or longer) and the direction of the shadow at different times of the day and where the sun appears in the sky. Ask your student to fill in the blank in each sentence. (You can pause the video at [3:45] to show the bar graph.) • The sun created long shadows in the (*blank*) (morning) when it was rising in the (*blank*) (East). • When the sun was almost directly overhead at (*blank*) (noon), the shadows were (*blank*) (shorter/shortest). • The shadows got (*blank*) (longer) in the afternoon when the sun was setting in the (*blank*) (West). Play all three interactive games with your student to better understand shadows. After playing, discuss how the movement of the model of the sun and the length and angle of the statue's shadow compare to observations of your student's shadow or an object's shadow when they go outside on a sunny day.
Explore the Topic: • *From Earth, how do the sun and moon appear to be moving across the sky?* • *Why do the sun and the moon appear to be moving?*	Ask your student to describe what they have noticed about where the sun and moon appear in the sky at different times of the day. Click on the arrows in this interactive model to observe 1) the apparent position of the sun and changes in sunlight on Earth and 2) the apparent position of the moon and changes in the moon phases. Stop the model at different time points to compare observations about differences in the location of the sun, the amount of light, the location of the moon, and the phase of the moon. Scroll down, select, and watch the video "Observe Patterns in the Sky" [1:20] with your student, which shows sunrise, sunset, moonrise, and moonset, to gather more information and facts about how objects in the sky appear to move.

Explain the Topic: • *Does the amount of sunlight different parts of Earth receive change over a year? Why?*	Watch this video [3:11] with your student to observe Earth's tilt as it rotates and orbits the sun. Also, observe how much area north and south of the equator is lit up when Earth is at different points in its orbit around the sun. Discuss these questions with your student: 1. Does the Earth's tilt remain the same no matter what time of year it is? (Yes. As the Earth orbits the sun each year, it stays tilted in the same direction all year round.) 2. Does the sun's light shine differently on Earth at different times of the year? (Yes. As Earth orbits the sun, its tilted axis always points in the same direction. So, throughout the year, different parts of Earth get more or less of the sun's direct rays.) Why do summer days have more direct sunlight and winter days have less direct sunlight? (Due to the tilt of the Earth on its axis and where Earth is in its orbit around the sun, summer days have more direct sunlight, while winter days have more indirect light. In Earth's June position in orbit [1:51 to 2:10], the northern hemisphere tilts toward the sun. During Earth's December position in orbit [0:41 to 1:05), the southern hemisphere tilts toward the sun.
Explain the Topic • *What causes the length of shadows to change from summer to winter?*	It may seem confusing that the length of your shadow or an object's shadow depends on the season. Watch this video [2:18] with your student to collect more evidence to support the idea that shadows are longer in the winter than in the summer. Discuss these key points with your student. • When Earth orbits the sun, there are times when parts of the planet are tilted toward the sun and times when parts are tilted away from the sun. In the summer, we are tilted toward the sun, so it is higher in the sky. In the winter, we are tilted away from the sun, so the sun appears lower in the sky. This means that the length of shadows depends on the seasons.
Evaluate the Topic • *What evidence do you have to explain when shadows are the longest?*	Check your student's understanding of the Earth and sun system and the length and direction of shadows in different seasons. Ask your student to use evidence (facts and information) from the videos and your discussions to describe (including words, drawings, or models): 1. When are shadows the longest? (Shadows are the longest in the winter.) 2. How do you know? (Since Earth is tilted away from the sun, the sun appears lower in the sky. That means the sun's light hits objects at a lower angle, making longer shadows. Since the sun is higher in the summer, the shadows are shorter.) The further north you travel in our hemisphere in the fall and winter, the lower the sun will appear in the sky. The lower it appears, the longer the shadow will be.) This optional activity has a cut-out worksheet to build a model of the Earth-sun-moon system. Have fun!

Resources

1. Following the Sun, *Crash Course Kids*
   [https://www.youtube.com/watch?v=1SN1BOpLZAs]
2. The Sun, the Sky, and a Whole Lotta Pie!, *PBS Learning Media Games*
   [https://contrib.pbslearningmedia.org/WGBH/buac18/buac18-int-ruffshadowgame/index.html]
3. Earth, Moon, and Sun Model, *PBS Learning Media*
   [https://contrib.pbslearningmedia.org/WGBH/buac19/buac19-int-earthsunmoon35model/index.html]
4. Observe Patterns in the Sky, *PBS Learning Media*
   [https://ca.pbslearningmedia.org/resource/buac18-k2-sci-ess-predictpatterns/predictable-patterns-in-the-sky/]
5. Earth In Orbit, *PBS Learning Media*
   [https://ca.pbslearningmedia.org/resource/buac18-35-sci-ess-earthinorbit/earth-in-orbit/]
6. Hey Ray! Why Our Shadows Are Long In Winter, *CBS News*
   [https://www.cbsnews.com/pittsburgh/news/hey-ray-long-winter-shadows/]
7. Earth, Sun & Moon Cut-out Worksheet, *Weebly*
   [https://zoomintothemoon.weebly.com/earth-sun-and-moon-orbits-cut-out-worksheet.html]

Exhibit A-5. Task Interpretation Guide – Grade 5 Unit 4 (pp. 1-6)

Coherence and Alignment Among Science Curriculum, Instruction, and Assessment (CASCIA)

Grade 5 Unit 4

End-of-Unit Assessment

Task Interpretation Guide

April 2024

The Grade 5 Unit 4 End-of-Unit Assessment Task Interpretation Guide was developed with funding from the U.S. Department of Education under the Competitive Grants for State Assessments Program, CFDA 84.368A. The contents of this guide do not represent the policy of the U.S. Department of Education, and no assumption of endorsement by the Federal government should be made.

Table of Contents

Introduction

The use of formative assessment practices, with informative and immediate feedback that leads to adjustments to instructional next steps, has been shown to be effective in helping students learn (Black & Wiliam, 1998; Wylie & Lyon, 2009; Heritage, 2010). Interim or large-scale summative assessments, such as those required under the *Every Student Succeeds Act of 2015 (ESSA)*, cannot and are not meant to inform daily instruction because of how and when they are administered. These forms of assessment can bring value to an assessment system, but only if coordinated and meaningfully aligned within a comprehensive, coherent system.

The Coherence and Alignment Among Science Curriculum, Instruction, and Assessment (CASCIA) Project brings together three partner states—Nebraska, Alabama, and Alaska—with a team of researchers and experts to establish science assessment resources that are coordinated and aligned across all parts of the assessment system. With coherence as the guiding principle, these state-level educators and national science education and measurement experts have joined with hundreds of local educators to address states' need for quality, standards-aligned science assessments that generate meaningful, interpretable, and actionable results, and to design a scoring and score reporting framework that builds educators' capacity to track, interpret, and communicate students' learning in science and to offer effective instruction for all students.

Purpose

The purpose of the *Grade 5 Unit 4 End-of-Unit Assessment Task Interpretation Guide* is to support educators' understanding of the Grade 5 Unit 4 End-of-Unit assessment tasks and prompts, their features, and the evidence (i.e., knowledge and skills) they are designed to elicit about student learning, and how the assessment and the information it provides can be used to plan instruction and learning opportunities for students, whether it involves planning for instruction prior to teaching the instructional unit, reflecting on the quality and sufficiency of prior instruction and instructional materials or planning additional student learning opportunities or interventions in the subsequent unit.

The Grade 5 Unit 4 Science Assessment includes three science tasks, each including multiple scorable prompts. Task 1, *Here Comes the Sun*, includes two prompts and 12 possible score points with Prompt 1 having a Part A through D; Task 2, *Meet the Beetles!*, includes three prompts and 11 possible score points with Prompt 2 having a Part A, B, and C; Task 3, *Turn, Turn, Turn*, includes three prompts and 11 possible score points, with Prompt 2 having a Part A, B, and C.

Prompts from the three tasks that measure similar combinations of dimensions (i.e., Disciplinary Core Ideas, Science and Engineering Practices, and Crosscutting Concepts) from the Next Generation Science Standards (NGSS) are organized into three performance categories. The NGSS Performance Expectations (PEs) are addressed in one or more performance categories to provide multiple opportunities to demonstrate flexible thinking and competency in different situations and contexts.

Performance Category	NGSS PEs	Prompts in Performance Category	Points Possible
Support Arguments Related to Interactions Within the Earth, Sun, and Moon System	5-PS2-1 5-ESS1-1 5-ESS1-2	Task 1, Prompt 1A Task 1, Prompt 1D Task 1, Prompt 2 Task 3, Prompt 2C Task 3, Prompt 3	12 points
Analyze Data to Describe Observable Patterns Related to the Earth, Sun, and Moon System	5-ESS1-1 5-ESS1-2	Task 1, Prompt 1BC Task 2, Prompt 1 Task 3, Prompt 1 Task 3, Prompt 2AB	13 points
Support Arguments Related to the Apparent Brightness of Stars	5-ESS1-1 5-ESS1-2	Task 2, Prompt 2A-C Task 2, Prompt 3	9 points

Contents

This document includes interpretive guidance to support educators' understanding of each prompt on the Grade 5 Unit 4 EOU Assessment, its features, and the evidence it is designed to elicit about students' learning, and offers important connections to the learning goals, formative assessment opportunities, and lesson descriptions within the SIPS Grade 5 Unit 4 Map / Instructional Framework as well as connections to future learning opportunities in the next unit.

For each prompt, the following information is provided:

- **Performance Category** – A classification of prompts within the EOU based on similarities in knowledge, skills, and abilities for which the prompts were designed to measure.
- **Acquisition Goals** – Specific goals that describe what students should understand, know, and be able to do at the end of a unit or course of instruction. The acquisition goals are derived from Stage 1 of the unit map / instructional framework that the prompt is intended to measure.
- **Prompt Knowledge and Skills for Measurement** – The evidence of student learning the prompt is designed to elicit.
- **Prompt and Exemplar Response** – The prompt consists of one to three sentences that raises an issue or asks a question to which students need to respond. An exemplar response represents a high-quality response that provides evidence that students have demonstrated the knowledge, skills, and abilities assessed by the prompt. Student exemplars are intended to assist in understanding the nature and expectations of the prompt. However, students may respond with other relevant scientifically accurate responses, evidence, observations, and ideas.

In general, a full-point exemplar response meets expectations and is:

- scientifically accurate
- complete
- coherent
- consistent with the type of student evidence expected as described in the rubric

For examples of student responses for each prompt representative of the full range of score points possible based on the scoring rubric, access the Grade 5 Unit 4 EOU Assessment Scoring Guide.

- **Prompt Complexity** – The sophistication of students' ability to demonstrate sense-making is characterized by their ability to (a) use disciplinary core ideas (DCIs), scientific and engineering practices (SEPs), and crosscutting concepts (CCCs) together in the service of sense-making about a phenomenon or problem, and (b) engage with and respond to items and tasks designed using variable features representing combinations of Low, Moderate, and High complexity designations. These combinations of features are based on the SIPS Complexity Framework.

  Adapted from the Cambridge Alignment Methodology (Forte, 2021) and informed by aspects of Achieve's Framework to Evaluate Cognitive Complexity in Science Assessments (Achieve, 2019), the SIPS Complexity Framework is grounded in sense-making and students' ability to flexibly apply knowledge through the integration of the same and new/different combinations of dimensions within the PEs from a unit bundle, in the context of a phenomenon or phenomenon-rooted design problem based on the focal DCIs.
- **Prompt Connections to the Unit Map / Instructional Framework** – A high-level overview of the evidence elicited by the prompt related to the acquisition goals, connections to the instructionally-embedded formative assessment opportunities within Stage 2 of the unit map, and connections to opportunities to learn based on the lesson descriptions within stage 3 of the unit map.

For each of the three tasks, the following information is provided:

- **Connections to Future Learning Opportunities** – The knowledge, skills, and abilities elicited by the prompt that can be leveraged and extended in future learning. Unit connections highlight where and how an educator can emphasize connections for students in the next unit.

SIPS Grade 5 Unit 4 EOU Assessment Task 1: Here Comes the Sun

Task 1 Prompt 1 – Part A

Performance Category: Support Arguments Related to Interactions Within the Earth, Sun, and Moon System

Acquisition Goals

- **A8:** Use evidence to support an argument that Earth's rotation about its axis causes differences in the amount of sunlight that reaches a given location on Earth over the course of 24 hours (e.g., darkness at night, dim light at sunrise that increases to daylight, decreasing light at sunset). *
- **A9:** Represent data in graphical displays to reveal differences in length and direction of shadow over a 24-hour period. *
- **A10:** Organize simple data sets to reveal patterns of change in length and direction of a shadow over a 24-hour period.

Prompt 1 Part A measures the students' ability to:

- Support an argument with evidence, data, or a model to explain how the length and direction of shadows relate to the time of day.

Student Worksheet

This task is about patterns of daylight.

Task

If you want to know the time, you can use a watch or a clock. In ancient times, people used sundials to tell time. A sundial is a flat, round disc with a thin wedge standing in its center. Light from the sun causes the thin wedge to cast a shadow onto the disc. The position of the shadow on the sundial shows what time it is.

Picture 1. Ancient Sundial

Prompt 1

Your class is studying patterns of shadows. You go outside and observe the position of a shadow at different times of the day. For each observation, you record:

- the position of the sun in the sky
- the position of the shadow of a tree at different times of the day

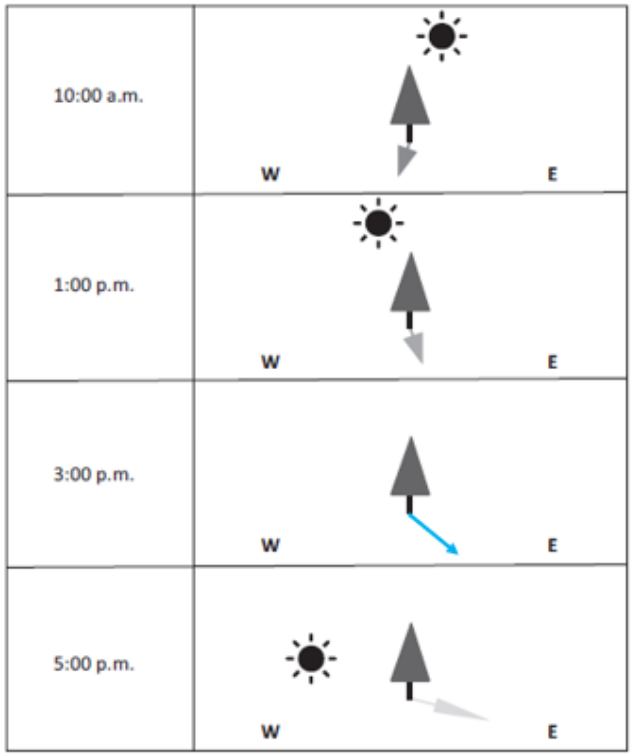
You stand in the same location for each observation. Figure 1 shows drawings of what you observed.

Part A.

Suppose you are not able to observe the position of the sun and the shadow at 3:00 p.m.

Draw the position of the sun **AND** the direction and length of the tree's shadow to show what you would observe at **3:00 p.m.** in **Figure 1.**

Figure 1. Drawing of Observations



Task 1 Prompt 1 Part A Complexity		
Degree and Nature of Sensemaking	**Moderate**	**This task...** • Requires integration of two dimensions in the service of sense-making
Complexity of the Presentation	**Moderate**	• The amount and type of information provided in the scenario supports multiple evident connections among ideas or concepts. • Provides graphics/data/models
Cognitive Demand of Response Development	**Low**	• Requires well-defined set of actions or procedures • Requires a connection or retrieval of factual information
Cognitive Demand of Response Production	**Moderate**	• Response includes multiple steps in a simple or moderately complex process

Task 1 Prompt 1 Part A Connections to the Instructional Framework	
Integration of Knowledge and Skills for Response Development	
• Students read the provided background information and Picture 1, which introduces a topic related to ancient people developing and using sundials to record time. • Students interpret a visual representation of a tree and the shadow it casts due to the position of the sun at different times of day to predict a missing data recording. • Students identify a pattern from their interpretation and use it to add to the model, indicating that the sun is further down than at 1:00 PM and that the shadow moves to the right. The shadow length at 3:00 PM is longer than 1:00 PM and shorter than 5:00 PM.	
Formative Assessments	**Opportunities to Learn**
Segment 3, pp. 16-17 *Informal Assessment: Sun-Earth Model (A10)* • Students describe patterns in data related to the change in length and direction of a shadow over a 24-hour period. • Students generate mathematical representations of data that show patterns of change in the length and direction of a shadow over a 24-hour period. • Students describe how mathematical representations support conclusions about how the length and direction of a shadow change over a 24-hour period.	**Segment 3, pp. 36-37** *Why are Shadows Always Changing? (A9, A10)* • Students investigate shadows in which they observe changes in shadows and the sun's position throughout the day. As students collect data, they begin to recognize the cause-and-effect relationship between the changing position of the sun, causing the shadows to change.

Task 1 Prompt 1 Part A Connections to the Instructional Framework, Continued	
Formative Assessments	**Opportunities to Learn**
Segment 3, pp. 17-18 *Informal Assessment: Movements of the Earth (A8)* • Students describe patterns in generated data related to the change in the amount of sunlight over 24 hours as the Earth rotates. • Students use data to support conclusions about patterns of change in the amount of sunlight over 24 hours as the Earth rotates. **Segment 3, pp. 18-19** *Formal Assessment: Sunrise and Sunset, how do the Earth and Sun Repeat that? (A8)* • Students describe patterns in generated data related to the change in the amount of sunlight over 24 hours as the Earth rotates. • Students use data to support conclusions about patterns of change in the amount of sunlight over 24 hours as the Earth rotates.	**Segment 3, pp. 37** *Why do we have Time Zones? (A8)* • The teacher displays a map of the world, which shows students the time zones. The teacher displays a flat projection of a map of the world and a globe. • Students use Stellarium to observe the sky at different points around the world, making sure they look at the current time. Eventually, students have enough observation points represented on the maps that when the sun is high in the sky on one side of the world, it is dark on the other, with dawn and dusk occurring in between. **Segment 3, pp. 37-38** *I'm Spinning Around (A8)* • Students use a model of a rotating chair to simulate the rotation of Earth and investigate the connections between the Earth's rotation on its axis, the appearance of stars in the sky, and the patterns in day and night around the world.

Task 1 Prompt 1 Part A Connections to the Instructional Framework, Continued	
Formative Assessments	**Opportunities to Learn**
Segment 3, pp. 20-21 *Formal Assessment: Shadow Puppets are Changing (A9, A10)* • Students generate representations of data that show patterns of change in the amount of sunlight over 24 hours as the Earth rotates. • Students use data to support conclusions about patterns of change in the amount of sunlight over 24 hours as the Earth rotates. **Segment 3, pp. 21-22** *Formal Assessment: Sun-Earth Model Revisions 1 (A8)* • Students describe patterns in generated data related to the change in the amount of sunlight over 24 hours as the Earth rotates. • Students use data to support conclusions about patterns of change in the amount of sunlight over 24 hours as the Earth rotates.	**Segment 3, p. 38** *Time by the Ancient Sundial (A9, A10)* • Students create a sundial to investigate shadows, observe the movement of the sun, make quantitative observations, collect data, and recognize the patterns. • Students design and construct sundials using the engineering design process.

Exhibit A-6. Interactive Scorer Training Modules – Grade 5

CASCIA Grade 5 Unit 1

Interactive Training Module Table of Contents

Chapter	Title	Recording	PDF (Accessible)	PowerPoint
1	**Introduction to the Interactive Training Module** This chapter: • Provides an overview of the SIPS and CASCIA Projects • Describes the module's purpose, audience, and navigation and accessibility features, and • Describes the contents of the five chapters.	Grade 5 Unit 1 – Chapter 1 Recording	Grade 5 Unit 1 – Chapter 1 PDF (Accessible)	Grade 5 Unit 1 – Chapter 1 PowerPoint
2	**Orientation to the CASCIA Scoring and Reporting Resources** This chapter: • Explains how the assessment tasks are designed to measure students' multi-dimensional science learning, • Describes the purpose and location of the CASCIA scoring and reporting resources, and • Describes how the assessment tasks and resources work together to support shifts in science teaching and learning.	Grade 5 Unit 1 – Chapter 2 Recording	Grade 5 Unit 1 – Chapter 2 PDF (Accessible)	Grade 5 Unit 1 – Chapter 2 PowerPoint

3 Part 1	**Preparation for Accurate and Consistent Scoring of Student Work** This chapter: • Introduces strategies to support accurate and consistent scoring of student work, • Highlights key considerations for effectively using the CASCIA scoring resources during the scoring process, and • Explains how to access the CASCIA scoring resources.	 Grade 5 Unit 1 – Chapter 3 Part 1 Recording	 Grade 5 Unit 1 – Chapter 3 Part 1 PDF (Accessible)	 Grade 5 Unit 1 – Chapter 3 Part 1 PowerPoint
3 Part 2	**Interactive Activity to Score CASCIA Student Work** This chapter: • Helps strengthen the ability to use CASCIA scoring rubrics, student exemplars, and annotated student responses to evaluate evidence of student science learning, and • Supports the identification of evidence of multi-dimensional science learning and the development of strategies to ensure accurate and consistent scoring across students, tasks, and time.	 Grade 5 Unit 1 – Chapter 3 Part 2 Recording	 Grade 5 Unit 1 – Chapter 3 Part 2 PDF (Accessible)	 Grade 5 Unit 1 – Chapter 3 Part 2 PowerPoint

4 Part 1	**Resources for Interpreting and Using CASCIA Assessment Results** This chapter: • Emphasizes the importance of interpreting and using assessment results and offers relevant considerations and strategies, • Strengthens understanding of the CASCIA reporting resources—including the individual student report, classroom roster report, interpretive guidance and instructional strategies for educators, family guidance, and task interpretation guide—and how they work together to support instructional practice and students' multi-dimensional learning, and • Explains how to access the CASCIA reporting resources.	 Grade 5 Unit 1 – Chapter 4 Part 1 Recording	 Grade 5 Unit 1 – Chapter 4 Part 1 PDF (Accessible)	 Grade 5 Unit 1 – Chapter 4 Part 1 PowerPoint
4 Part 2	**Interactive Activity to Interpret and Apply the CASCIA Assessment Results** This chapter: • Supports the use of CASCIA reporting resources to interpret student scores by performance category and determine the type and level of instructional support needed to meet science learning expectations, and • Guides the identification of patterns in student performance to inform next instructional steps for individuals, partners, small groups, and whole-class reteaching, extensions, and interventions.	 Grade 5 Unit 1 – Chapter 4 Part 2 Recording	 Grade 5 Unit 1 – Chapter 4 Part 2 PDF (Accessible)	 Grade 5 Unit 1 – Chapter 4 Part 2 PowerPoint

5	**Next Steps: Calibration and Capacity Building** This chapter: • Strengthens knowledge of how the CASCIA/SIPS scoring and reporting resources can be leveraged to interpret and use student performance data to inform instructional adjustments, • Deepens understanding of the importance of using multiple assessments of student learning when making instructional decisions, and • Introduces key considerations for using student results generated by the CASCIA/SIPS scoring resources to guide instruction.	 Grade 5 Unit 1 – Chapter 5 Recording	 Grade 5 Unit 1 – Chapter 5 PDF (Accessible)	 Grade 5 Unit 1 – Chapter 5 PowerPoint
Glossary	**CASCIA Grade 5 Unit 1 Interactive Training Module Glossed Terms/Phrases** This glossary: • Defines key terms and phrases used throughout the chapters to support understanding of the CASCIA/SIPS assessment system and related resources, • Provides slide references to help locate where each term is introduced or explained in the module content, and • Supports consistent interpretation of terminology related to assessment tasks, scoring, reporting, and instructional use across chapters and users.		 Grade 5 Unit 1 - Glossary	

Appendix B. Standards Verification Rubrics

Exhibit B-1. Domain Concurrence Rubric

Rating	Description
Fully Represent	The What These Results Mean (WTRM) statements fully represent the key knowledge and skills elicited by the prompts in the Performance Category (PC).
Somewhat Represent	The WTRM statements represent some of the key knowledge and skills elicited by the prompts in the PC, but there are gaps.
Do Not Represent	The WTRM statements barely represent or do not represent the key knowledge and skills elicited by the prompts in the PC.

Exhibit B-2. Differentiation Rubric

Rating	Description
Adequately Reflect Progression	The progressions from lower to higher levels in the WTRM statements clearly reflect reasonable progressions in the sophistication of student knowledge, skills, and abilities.
Somewhat Reflect Progression	The progressions from lower to higher levels in the WTRM statements reflect reasonable progressions in the sophistication of student knowledge, skills, and abilities, but are somewhat uneven in some level-to-level descriptors.
Do Not Reflect Progression	The progressions from lower to higher levels in the WTRM statements do not reflect reasonable progressions in the sophistication of student knowledge, skills, and abilities.

Exhibit B-3. Degree of Alignment Rubric

Rating	Description
Adequate Alignment	The student evidence reflects the key knowledge and skills found in the WTRM statements.
Partial Alignment	The student evidence reflects, with few gaps, the key knowledge and skills found in the WTRM statements.
Limited Alignment	The student evidence reflects, with major gaps, the key knowledge and skills found in the WTRM statements.

Appendix C. Detailed Results from the July 2025 Standards Verification

Exhibit C-1. Detailed Results for Grade 5 Standards Verification

EOU	Performance Category	Domain Concurrence	Differentiation	Red Alignment	Yellow Alignment	Green Alignment
EOU 1: Matter and Its Interactions	PC1 – Model the Structure of Matter	3 Fully	3 Adequate	2 Adequate 1 Partial	3 Adequate	NA
	PC3 – Use Observations and Measurements of Chemical Reactions	3 Fully	3 Adequate	NA	3 Adequate	3 Adequate
EOU 2: Matter and Energy in Organisms and Ecosystems	PC1 – Support Arguments About Energy and Matter Flow Among Plants and Animals	3 Fully	3 Adequate	2 Adequate 1 Partial	2 Adequate 1 Partial	NA
	PC2 – Model Relationships in Ecosystems	3 Fully	3 Adequate	NA	2 Adequate 1 Partial	3 Adequate
EOU 3: Earth Systems and the Solution of Water Problems	PC2 – Design the Best Solution to a Problem Involving Human Impacts on Earth Systems	3 Fully	2 Adequate 1 Somewhat	3 Adequate	3 Adequate	NA
	PC3 – Model Relationships to Communicate Information about Earth's Surface Materials and Processes	2 Fully 1 Somewhat	3 Adequate	NA	3 Adequate	3 Adequate
EOU 4: Earth and its Gravitational Force and Motion	PC1 – Support Arguments Related to Interactions Within the Earth, Sun, and Moon System	3 Fully	3 Adequate	3 Adequate	3 Adequate	NA

	PC3 – Support Arguments Related to the Apparent Brightness of Stars	3 Fully	3 Adequate	NA	3 Adequate	3 Adequate

Exhibit C-2. Detailed Results for Grade 8 Standards Verification

EOU	Performance Category	Domain Concurrence	Differentiation	Red Alignment	Yellow Alignment	Green Alignment
EOU 1: Forces and Energy	PC2 – Use Experimental Features of an Investigation to Explain Interactions Between Objects	3 Fully 1 Somewhat	4 Adequate	4 Adequate	3 Adequate 1 Partial	NA
	PC4 – Support Arguments About Interactions Between Objects, Forces, and Energy	3 Somewhat 1 Fully	4 Adequate	NA	4 Adequate	4 Adequate
EOU 2: Gravity and Motion of Objects in the Solar System	PC1 – Model Relationships Among Objects in Earth's Solar System	4 Fully	4 Adequate	4 Adequate	4 Adequate	NA
	PC2 – Support Arguments About Earth's Place in the Solar System and Universe	3 Fully 1 Somewhat	3 Adequate 1 Somewhat	NA	2 Adequate 2 Partial	4 Adequate
EOU 3: Understanding Earth History and the Origin of Species	PC2 – Analyze Data to Explain the Appearance of Specific Traits in Populations	3 Fully 1 Somewhat	4 Adequate	4 Adequate	3 Adequate 1 Partial	NA
	PC3 – Use Models to Describe Rock Formations and Fossils	2 Fully 2 Somewhat	3 Adequate 1 Somewhat	NA	2 Adequate 2 Limited	2 Adequate 1 Partial 1 Limited
EOU 4: Providing Solutions to Problems Using	PC1 – Analyze Data to Explain the Relationships Between Properties of Waves and Energy	4 Fully	4 Adequate	4 Adequate	4 Adequate	NA

Simple Wave Properties	PC3 – Design the Best Solution to a Problem Involving Properties of Sound Waves and Materials	4 Fully	4 Adequate	NA	4 Adequate	4 Adequate