Oregon Statewide Assessment System Science Assessment

Technical Report Essential Information

2018-2019

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Executive Summary

This document provides essential information from the Oregon Statewide Assessment System Science Assessment technical report for the 2018-2019 school year. The Oregon Statewide Assessment System (OSAS) Science Assessment is an assessment for grades 5, 8, and 11. The full technical report document identifies all methods used in item development, test construction, psychometrics, standard setting, test administration, and score reporting, including summaries of student results, and evidence and support for intended uses and interpretations of the test scores. Essential information from that report is located within this document.

Background and Historical Context

Oregon adopted three-dimensional science standards (the Next Generation Science Standards; NGSS) in 2014, based on *A Framework for K-12 Science Education* (National Research Council, 2012). The ODE and its assessment vendor, the American Institutes for Research (AIR), developed and administered a new online assessment to measure the new standards. Administered as an embedded field test in 2017-2018 and administered operationally for the first time in 2018-2019, the OSAS Science Assessment measures the science knowledge and skills of Oregon students in grades 5, 8, and 11.

The ODE provides an overview of the OSAS Science Assessment at: https://www.oregon.gov/ode/educator-resources/assessment/Pages/Science.aspx. Information about the NGSS is available at www.nextgenscience.org.

Purpose and Intended Uses of the OSAS Science Assessment

The purposes of the summative assessments are to:

- provide valid, reliable, and fair information concerning students' science achievement with respect to the Oregon Science Standards in grades 5, 8, and 11,
- measurement of students' status prior to grade 12 to determine whether they have demonstrated sufficient academic proficiency in science to be on track for achieving college and/or career readiness,
- how instruction can be improved at the classroom, school, district, and state levels, equitable achievement for all students and subgroups of students in science,
- and participation for federal accountability purposes and potentially for state and local accountability systems.

The OSAS Science Assessment is a criterion-referenced test established using principles of evidence-centered design to yield overall and discipline-level test scores at the student level and other levels of aggregation that reflect student achievement of the OSAS Science Assessment. The three-dimensional science standards (i.e., Oregon Science Standards/NGSS) establish a set of knowledge and skills that all students need to be prepared for a wide range of high-quality post-secondary opportunities, including higher education and entry to the workplace. The three-dimensional NGSS reflects the latest research and advances in modern science and differs from previous science standards in multiple ways. First, rather than describe general knowledge and skills that students should know and be able to do, they describe specific performances and demonstrate what students know and can do. The NGSS refers to such performed knowledge and skills as performance expectations (PE). Second, while unidimensionality is a typical goal of standards (and the items that measure them), the NGSS is intentionally multi-dimensional. Each performance expectation incorporates all three dimensions from the NGSS Framework – a science or engineering practice, a disciplinary core idea, and a crosscutting concept. Third, while traditional standards do not consider other subject areas, the NGSS connect to other subjects like the Common Core mathematics and English language arts (ELA) standards. Lastly, another unique feature of the NGSS is the assumption that students should learn all science disciplines, rather than a select few, as is traditionally done in many high schools, where students may elect, for example, to take biology and chemistry but not physics or astronomy.

Overview of the OSAS Science Assessment

Each item begins with a real-world phenomenon that engages students in an authentic science experience or engineering design challenge. Information in the form of pictures, diagrams, data, charts, graphs, maps, etc., is presented to students. Students must use this information along with their own science knowledge and skills to respond to questions that include a variety of item interaction types including copy interaction, edit task choice, equation editor response, experiment simulation, grid item, multi-select, multiple choice, and table item.

Each item is aligned to a single NGSS Performance Expectation. Some items include only one or two interactions and are called stand-alone items. Others are more complex, having several interactions, and are called cluster items. Each item assesses at least 2 of the 3 dimensions of the Oregon Science Standards (Next Generation Science Standards Performance Expectations). These dimensions are: Disciplinary Core Idea (DCI), Science and Engineering Practices (SEP), and Crosscutting Concepts (CCC). Disciplinary Core Ideas include Physical Science (PS), Earth and Space Science (ESS), and Life Science (LS). The standard is written as grade-DCI Strand-standard number. For example, the first standard of 1st strand (Matter and its Interactions) of a 5th grade physical science DCI would be written 5-PS1-1.

Grade 5 Matrix of Performance Expectations (NGSS SEPs vs. CCCs)

(Please note that Structure and Function and Stability and Change are not within the NGSS at grades 3-5)

	CCC-Patterns	CCC-Cause and Effect	CCC-Scale Proportion and Quantity	CCC-Systems and System Models	CCC-Energy and Matter	CCC-Structure and Function	CCC-Stability and Change
SEP-Asking Questions and Defining Problems*		DCI 3-PS2-3			DCI 4-PS3-3		
SEP-Obtaining, Evaluating and Communicating Information	DCI-3-ESS2-2	DCI-4-ESS3-1		DCI-5-ESS3-1			
SEP-Planning and Carrying Out Investigations	DCI-3-PS2-2	DCI-3-PS2-1, 4-ESS2-1, 5-PS1-4	DCI-5-PS1-3		DCI-4-PS3-2		
SEP-Developing and Using Models	DCI-3-LS1-1, 4-PS4-1	DCI-4-PS4-2	DCI-5-PS1-1	DCI-4-LS1-2 5-LS2-1 5-ESS2-1	DCI-5-PS3-1		

SEP- Analyzing and Interpreting Data	DCI- 3-LS3-1 3-ESS2-1 4-ESS2-2 5-ESS1-2		DCI- 3-LS4-1				
SEP- Using Mathematical and Computational Thinking			DCI- 5-PS1-2 5-ESS2-2				
SEP- Constructing Explanations and Designing Solutions	DCI- 4-PS4-3 4-ESS1-1	DCI- 3-LS3-2 3-LS4-2 4-ESS3-2			DCI- 4-PS3-1 4-PS3-4		
Engaging in Argument from Evidence		DCI- 3-LS2-1 3-LS4-3 3-ESS3-1 5-PS2-1	DCI- 5-ESS1-1	DCI- 3-LS4-4 4-LS1-1	DCI- 5-LS1-1		

**3-PS2-4 Is aligned to SEP Asking Questions and Defining Problems but is not aligned to a CCC.*

Grade 8 (Middle School) Matrix of Performance Expectations (NGSS SEPs vs. CCCs)

	CCC- Patterns	CCC- Cause and Effect	CCC- Scale Proportion and Quantity	CCC- Systems and System Models	CCC- Energy and Matter	CCC- Structure and Function	CCC- Stability and Change
SEP- Asking Questions and Defining Problems*		DCI- MS-PS2-3					DCI- MS-ESS3-5
SEP- Obtaining, Evaluating and Communicating Information		DCI- MS-LS1-8 MS-LS4-5				DCI- MS-PS1-3 MS-PS4-3	
SEP- Planning and Carrying Out Investigations		DCI- MS-ESS2-5 MS-PS2-5	DCI- MS-PS3-4 MS-LS1-1				DCI- MS-PS2-2
SEP- Developing and Using Models	DCI- MS-ESS1-1	DCI- MS-PS1-4 MS-LS3-2	DCI- MS-PS1-1	DCI- MS-PS3-2 MS-ESS1-2 MS-ESS2-6	DCI- MS-PS1-5 MS-LS1-7 MS-LS2-3 MS-ESS2-4	DCI- MS-PS4-2 MS-LS1-2 MS-LS3-1	DCI- MS-ESS2-1

SEP- Analyzing and Interpreting Data	DCI- MS-PS1-2 MS-LS4-1 MS-LS4-3 MS-ESS2-3 MS-ESS3-2	DCI- MS-LS2-1	DCI- MS-PS3-1 MS-ESS1-3				
SEP- Using Mathematical and Computational Thinking	DCI- MS-PS4-1	DCI- MS-LS4-6					
SEP- Constructing Explanations and Designing Solutions	DCI- MS-LS2-2 MS-LS4-2	DCI- MS-LS1-5 MS-LS4-4 MS-ESS3-1 MS-ESS3-3	DCI- MS-ESS1-4 MS-ESS2-2	DCI- MS-PS2-1	DCI- MS-PS1-6 MS-PS3-3 MS-LS1-6		
SEPEngaging in Argument from Evidence		DCI- MS-LS1-4 MS-ESS3-4		DCI- MS-PS2-4 MS-LS1-3	DCI- MS-PS3-5		DCI- MS-LS2-4 MS-LS2-5

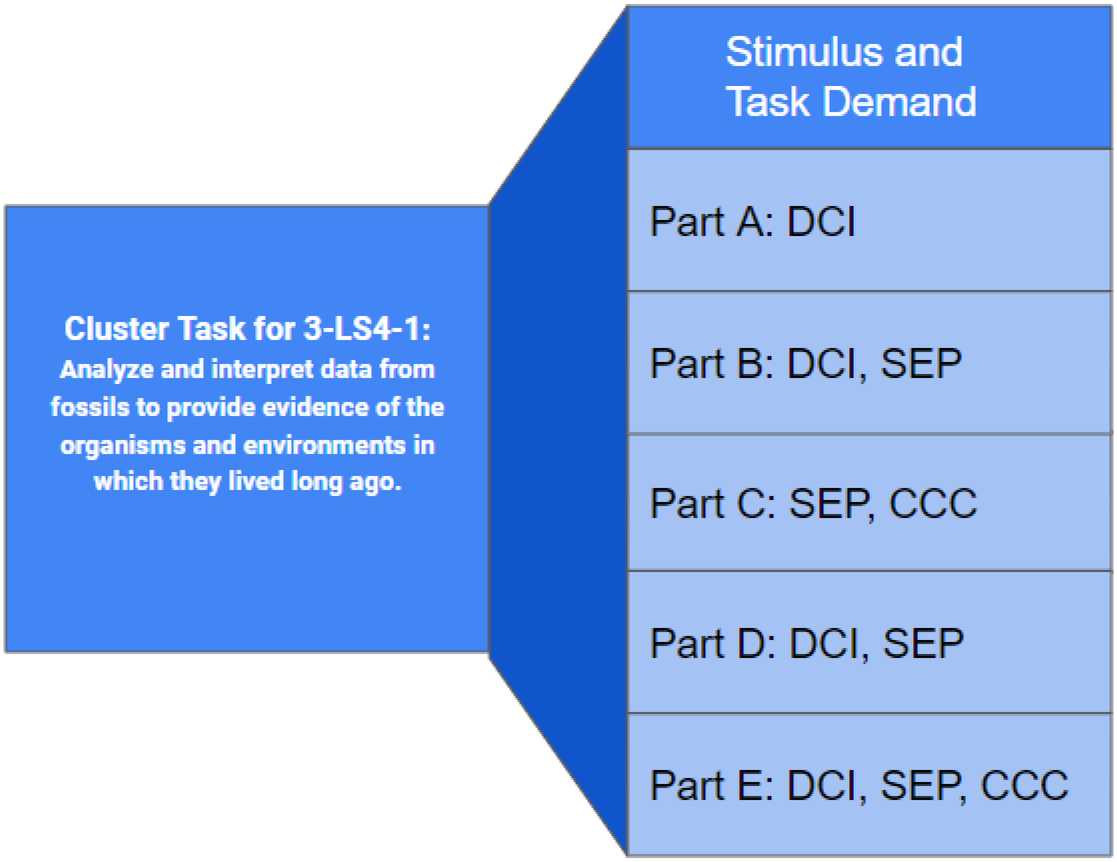
Grade 11 (High School) Matrix of Performance Expectations (NGSS SEPs vs. CCCs)

	CCC- Patterns	CCC- Cause and Effect	CCC- Scale Proportion and Quantity	CCC- Systems and System Models	CCC- Energy and Matter	CCC- Structure and Function	CCC- Stability and Change
SEP- Asking Questions and Defining Problems*		DCI- HS-LS3-1					DCI- HS-PS4-2
SEP- Obtaining, Evaluating and Communicating Information	DCI- HS-LS4-1	DCI- HS-PS4-4 HS-PS4-5			DCI- HS-ESS1-3	DCI- HS-PS2-6	
SEP- Planning and Carrying Out Investigations	DCI- HS-PS1-3	DCI- HS-PS2-5		DCI- HS-PS3-4		DCI- HS-ESS2-5	DCI- HS-LS1-3
SEP- Developing and Using Models	DCI- HS-PS1-1	DCI- HS-PS3-5	DCI- HS-ESS1-1	DCI- HS-LS1-2 HS-LS1-4	DCI- HS-PS1-4 HS-PS1-8		DCI- HS-ESS2-1

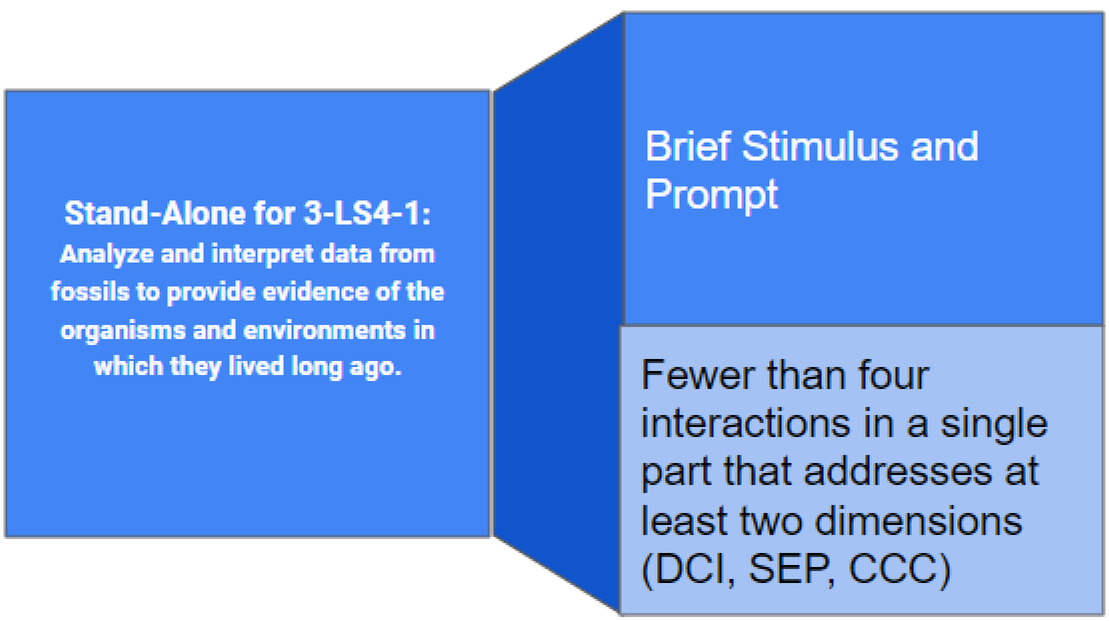
		HS-ESS2-4		HS-LS2-5	HS-PS3-2 HS-LS1-5 HS-LS1-7 HS-ESS2-3 HS-ESS2-6		
SEP- Analyzing and Interpreting Data	DCI- HS-LS4-3	DCI- HS-PS2-1	DCI- HS-LS3-3				DCI- HS-ESS3-5
SEP- Using Mathematical and Computational Thinking	DCI- HS-PS2-4	DCI- HS-PS4-1 HS-LS4-6	DCI- HS-LS2-1 HS-LS2-2 HS-ESS1-4	DCI- HS-PS2-2 HS-PS3-1 HS-ESS3-6	DCI- HS-PS1-7 HS-LS2-4		DCI- HS-ESS3-3
SEP- Constructing Explanations and Designing Solutions	DCI- HS-PS1-2 HS-PS1-5	DCI- HS-PS2-3 HS-LS4-2 HS-LS4-4 HS-ESS3-1			DCI- HS-PS3-3 HS-LS1-6 HS-LS2-3 HS-ESS1-2	DCI- HS-LS1-1	DCI- HS-PS1-6 HS-LS2-7 HS-ESS1-6 HS-ESS3-4
Engaging in Argument from Evidence	DCI- HS-ESS1-5	DCI- HS-LS2-8 HS-LS3-2 HS-LS4-5		DCI- HS-PS4-3			DCI- HS-LS2-6 HS-ESS2-7

Item Structure

OSAS Science assessments consist of two item types: Cluster and Stand-Alone. Cluster items are structured as a phenomena-driven task. The cluster stimulus provides background information about the phenomena and a task demand statement. The task is divided into multiple parts that incorporate the 3 dimensions of the standard into the student interactions. The interactions are scored based on the scoring assertion. Cluster items by design have 4 or more scoring assertions.



Stand-Alone items are shorter items that include a brief phenomena-driven stimulus and fewer interactions with less than 4 scoring assertions made from the student response selections.



Blueprints

The OSAS Science Assessment is required to be administered at grades 5, 8, and 11. Each of the assessments contains items aligned to the standards in that grade band. For example, the 5th Grade OSAS Science Assessment contains items written to standards for grades 3-5. The OSAS Science Assessment is a linear on the fly delivery with the following constraints:

1. Each cluster on the test will be from a different DCI (Disciplinary Core Idea).

2. No more than two stand-alones on the test will be from the same DCI (Disciplinary Core Idea).

3. No more than one cluster or stand alone on the test will be from the same standard (Performance Expectation).

4. All Items will appear in random order regardless of reporting category or type (cluster/task or stand-alone/independent).

5. One cluster or five stand-alone EFT (embedded field test) items will be placed randomly within each test.

An example of items a student might receive from a linear on the fly or adaptive algorithm on the 5th grade OSAS Science Assessment. Please note that Cognitive complexity refers to the consistency of cognitive engagement at the performance expectation (PE) level. Thus, assessment elicits work that is cognitively demanding as the expectations in the standards. This is also a criteria for item development.

Item Position	DCI Strand	Standard	Item Type	DCI	SEP	CCC	Cognitive Complexity of Standard
1	5-PS1	5-PS1-4	Stand-Alone	Matter and Its Interactions	Planning and Carrying out Investigations	Cause & Effect	3
2	4-ESS2	4-ESS2-2	Cluster	Earth's Systems	Analyzing and Interpreting Data	Patterns	2
3	5-PS3	5-PS3-1	Cluster	Energy	Developing and Using Models	Energy and Matter	2
4	5-ESS3	5-ESS3-1	Stand-Alone	Earth and Human Activity	Obtaining, Evaluating and Communicating Information	Systems and System Models	3
5	4-PS4	4-PS4-2	Cluster	Waves and Their Applications in	Developing and Using Models	Cause and Effect	2

				Technologies for Information Transfer			
6	4-ESS3	4-ESS3-2	Stand-Alone	Earth and Human Activity	Constructing Explanations and Designing Solutions	Cause and Effect	3
7	3-LS4	3-LS4-4	Stand-Alone	Biological Evolution: Unity and Diversity	Engaging in Argument from Evidence	Systems and System Models	3
8	4-LS1	4-LS1-2	Stand-Alone	From Molecules to Organisms	Engaging in Argument from Evidence	Systems and System Models	2
9	5-PS1	5-PS1-3	Stand-Alone	Matter and Its Interactions	Planning and Carrying Out Investigations	Scale, Proportion, and Quantity	2
10	5-ESS2	5-ESS2-2	Stand-Alone	Earth's Systems	Using Mathematical and Computational Thinking	Scale, Proportion, and Quantity	2
11	3-ESS2	3-ESS2-1	Stand-Alone	Earth's Systems	Analyzing and Interpreting Data	Patterns	2
12	3-LS1	3-LS1-1	Stand-Alone	From Molecules to Organisms: Structures and Processes	Developing and Using Models	Patterns	2
13	3-PS2	3-PS2-2	Stand-Alone	Motion and Stability: Forces and Interactions	Planning and Carrying Out Investigations	Patterns	3
14	3-LS3	3-LS3-1	Stand-Alone	Heredity: Inheritance and Variation of Traits	Analyzing and Interpreting Data	Patterns	2
15	5-LS1	5-LS1-1	Cluster	From Molecules to Organisms: Structures and Processes	Engaging in Argument from Evidence	Energy and Matter	2
16	3-LS2	3-LS2-1	Stand-Alone	Ecosystems: Interactions,	Engaging in Argument from Evidence	Cause and Effect	2

				Energy, and Dynamics			
17	3-PS2	3-PS2-4	Stand-Alone	Motion and Stability: Forces and Interactions	Asking Questions and Defining Problems	(No CCC)	3
18	5-ESS1	5-ESS1-1	Stand-Alone	Earth's Place in the Universe	Engaging in Argument from Evidence	Scale, Proportion, and Quantity	2

Exemplar forms for Grade 8 and Grade 11 can be found in **Appendix A**.

Student Participation

The OSAS Science Assessment is administered in the spring. Table 2 shows the number of students who were tested (number tested) and the number of students whose scores were included for the analyses in this technical report. The number of students reported excludes students who tested but did not have a valid score (e.g., the student opened the test and viewed the first item but abandoned the test without responding to any item). Table 3 shows the demographic characteristics of the student population, in counts and percentages, in the spring administration of the 2018-2019 OSAS Science Assessments. The subgroups reported here are gender, ethnicity, students with limited English proficiency (LEP), students in special education programs, and students from disadvantaged socioeconomic backgrounds.

Table 2. Number of Students Participating in the OSAS Science Assessment in Spring 2019

Grade	Number Tested	Number Reported
5	45,039	44,989
8	42,069	42,043
11	41,691	41,630

Table 3. Distribution of Demographic Characteristics of Student Population

Group	Grade 5		Grade 8		Grade 11	
	N	*%*	*N*	*%*	*N*	*%*
All Students	44,989	100.00	42,043	100.00	41,630	100.00
Female	22,104	49.13	20,349	48.40	20,438	49.09
Male	22,877	50.85	21,660	51.52	21,163	50.84
African American	1,042	2.32	907	2.16	767	1.84
American Indian/Native Alaskan	524	1.16	542	1.29	571	1.37
Asian	1,753	3.90	1,702	4.05	1,542	3.70
Hispanic	11,035	24.53	10,180	24.21	10,290	24.72
Multi-Racial	2,981	6.63	2,630	6.26	2,285	5.49
Pacific Islander	349	0.78	323	0.77	317	0.76
White	27,305	60.69	25,759	61.27	25,858	62.11
Limited English Proficiency	4,185	9.30	2,686	6.39	1,511	3.63
Special-Education	6,473	14.39	5,490	13.06	4,721	11.34

Overview of Oregon's Score Reports

Test scores from the spring 2019 assessment were provided to districts and schools through the ORS on March 10,2020, after the standard-setting workshop that occurred on August 19-21, 2019, and after the Oregon Board of Education approved the cut scores on February 20, 2020. The ORS provided information on student performance and aggregated summaries at three levels- district, school, and roster. During future administrations, real-time reporting will allow the ORS to report scores almost immediately after tests have been scored.

The ORS (https://or.reports/airast.org/) is a web-based application that provides OSAS Science Assessment results at various levels. Additional information about the ORS can be found in the ORS User Guide and Online Reporting System User guide available at https://www.oregon.gove/ode/educator-resources/assessment/Documents/osas_reports_userguide.pdf.

Overall Scores and Discipline-Level Scores

Each student receives a single scale score for each test subject if there is a valid score to report. A student's score is based only on the operational items in the assessment. A scale score is used to describe how well a student performed on a test and can be interpreted as an estimate of the student's knowledge and measured skills. The scale score is transformed from a theta score, which is estimated based on mathematical models. Low scale scores can be interpreted as an indication that the student does not yet possess sufficient knowledge and skills as measured by the test. Conversely, high scale scores can be interpreted as an indication that the student has proficient knowledge and skills as measured by the test. Interpretation of scale scores is more meaningful when the scale scores are used alone with achievement levels and Achievement-Level Descriptors (ALDs).

In addition to the overall score, students will receive discipline-level scores in 3-Dimensional Physical Science, 3-Dimensional Life Science, and 3-Dimensional Earth and Space Science. For the OSAS Science Assessment, student performance at each discipline level is reported on three achievement categories:

1. *Below Standard*

2. *At/Near Standard*

3. *Above Standard*

Unlike the achievement levels for the overall test, student performance on each of the discipline levels is evaluated with respect to the *Level 3* mark for the specific discipline.

Appropriate Uses for Scores and Reports

Assessment results can be used to provide information on an individual student's performance on the test. Overall, assessment results tell what a student knows and can do in certain subject areas and give further information on whether a student is on track to demonstrate the knowledge and skills necessary for college and career readiness. Additionally, assessment results can be used to identify a student's relative strengths and weaknesses in certain content areas. For example, achievement categories for reporting disciplines can be used to identify an individual student's relative strengths and weaknesses among reporting categories within a content area.

Assessment results of students' performance on the test can be used to help teachers at schools make decisions on how to support students' learning. Aggregate score reports at the teacher and school level provide information about the strengths and weaknesses of their students and can be used to improve teaching and student learning. For example, a group of students may have performed very well overall but did not perform as well in several individual standards compared to their overall performance. In this case, teachers or schools can identify strengths and weaknesses of their students through analyzing the group performance by individual standards and promote instruction on specific areas where student performance is below their overall performance.

Further, by narrowing down the student performance result by student group, teachers and schools can determine what strategies may be needed to improve teaching and student learning, particularly for students from disadvantaged student groups. For example, teachers might see student assessment results by race/ethnicity and observe that a particular group of students is struggling with physical sciences. Teachers can then provide additional instruction that focuses on physical science for these students.

In addition, assessment results can be used to compare student performance among different students and groups. Teachers can evaluate how their students perform compared with other students in school and districts by overall scores and discipline levels. Although all students are administered different sets of items under the linear-on-the-fly test design, scale scores are comparable across students.

While assessment results provide valuable information to understand student performance, these scores and reports should be used with caution. It is important to note that scale scores are estimates of true scores and hence do not present a precise measure of student performance. A student's scale score is associated with measurement error, and thus users need to consider measurement error when using student scores to make decisions about student performance. However, assessment scores should not be used as the only source of information for making important decisions. Given that assessment results measured by a test provide limited information about individual student performance, other sources of information, such as classroom assessment and teacher evaluation, should be considered when making decisions on student learning and performance.

Finally, when student performance is compared across groups, users must consider the group size. The smaller the group, the larger the measurement error related to these aggregate data, thus requiring a more cautious interpretation.

Appendix A

An example of items a student might receive from a linear on the fly or adaptive algorithm on the 8th grade OSAS Science Assessment.

Item Position	DCI Strand	Standard	Item Type	DCI	SEP	CCC	Cognitive Complexity of Standard
1	MS-PS4	MS-PS4-1	Cluster	Waves and Their Applications in Technologies for Information Transfer	Using Mathematics and Computational Thinking	Patterns	2
2	MS-ESS3	MS-ESS3-2	Standalone	Earth and Human Activity	Analyzing and Interpreting Data	Patterns	3
3	MS-LS1	MS-LS1-4	Standalone	From Molecules to Organisms: Structures and Processes	Engaging in Argument from Evidence	Cause and Effect	2
4	MS-PS3	MS-PS3-3	Standalone	Energy	Constructing Explanations and Designing Solutions	Energy and Matter	3
5	MS-LS4	MS-LS4-2	Cluster	Biological Evolution: Unity and Diversity	Constructing Explanations and Designing Solutions	Patterns	2
6	MS-ESS2	MS-ESS2-3	Cluster	Earth's Systems	Analyzing and Interpreting Data	Patterns	2
7	MS-LS3	MS-LS3-2	Standalone	Heredity: Inheritance and Variation of Traits	Developing and Using Models	Cause and Effect	2
8	MS-ESS1	MS-ESS1-1	Standalone	Earth's Place in the Universe	Developing and Using Models	Patterns	2
9	MS-PS2	MS-PS2-1	Standalone	Motion and Stability: Forces and Interactions	Constructing Explanations and Designing Solutions	Systems and System Models	3

10	MS-PS1	MS-PS1-1	Standalone	Matter and Interactions	Developing and Using Models	Scale, Proportion, and Quantity	2
11	MS-LS2	MS-LS2-5	Standalone	Ecosystems: Interactions, Energy, and Dynamics	Engaging in Argument from Evidence	Stability and Change	3
12	MS-ESS2	MS-ESS2-4	Standalone	Earth’s Systems	Developing and Using Models	Energy and Matter	2
13	MS-PS4	MS-PS4-2	Standalone	Waves and Their Applications in Technologies for Information Transfer	Developing and Using Models	Structure and Function	2
14	MS-LS4	MS-LS4-3	Standalone	Biological Evolution: Unity and Diversity	Analyzing and Interpreting Data	Patterns	2
15	MS-ESS3	MS-ESS3-4	Standalone	Earth and Human Activity	Engaging in Argument from Evidence	Cause and Effect	3
16	MS-PS1	MS-PS1-2	Cluster	Matter and its Interactions	Analyzing and Interpreting Data	Patterns	2
17	MS-ESS1	MS-ESS1-3	Cluster	Earth’s Place in the Universe	Analyzing and Interpreting Data	Scale, Proportion, and Quantity	2
18	MS-LS2	MS-LS2-4	Standalone	Ecosystems: Interactions, Energy, and Dynamics	Engaging in Argument from Evidence	Stability and Change	2

An example of items a student might receive from a linear on the fly or adaptive algorithm on the High School OSAS Science Assessment.

Item Position	DCI Strand	Standard	Item Type	DCI	SEP	CCC	Cognitive Complexity of Standard
1	HS-ESS2	HS-ESS2-1	Cluster	Earth's Systems	Developing and Using Models	no CCC	2

2	HS.LS1	HS-LS1-2	Cluster	From Molecules to Organisms: Structures and Processes	Developing and Using Models	Systems and System Models	2
3	HS.PS1	HS-PS1-5	Stand alone	Matter and Interactions	Constructing Explanations and Designing Solutions	Patterns	2
4	HS-LS4	HS-LS4-5	Stand alone	Biological Evolution: Unity and Diversity	Engaging in Argument from Evidence	Cause and Effect	3
5	HS-PS2	HS-PS2-1	Cluster	Motion and Stability: Forces and Interactions	Analyzing and Interpreting Data	Cause and Effect	2
6	HS-ESS1	HS-ESS1-1	Cluster	Earth's Place in the Universe	Developing and Using Models	Scale, Proportion and Quantity	2
7	HS-LS2	HS-LS2-4	Stand alone	Ecosystems: Interactions, Energy, and Dynamics	Using Mathematics and Computational Thinking	Energy and Matter	2
8	HS-ESS3	HS-ESS3-5	Stand alone	Earth and Human Activity	Analyzing and Interpreting Data	no CCC	4
9	HS-PS3	HS-PS3-1	Stand alone	Energy	Using Mathematics and Computational Thinking	Systems and System Models	2
10	HS-LS3	HS-LS3-1	Cluster	Heredity: Inheritance and Variation of Traits	Asking Questions and Defining Problems	Cause and Effect	2
11	HS-ESS1	HS-ESS1-3	Stand alone	Earth's Place in the Universe	no SEP	Energy and Matter	2
12	HS-PS4	HS-PS4-1	cluster	Waves and Their Applications in Technologies for	Using Mathematics and Computational Thinking	Cause and Effect	2

				Information Transfer			
13	HS-LS1	HS-LS1-4	Stand alone	From Molecules to Organisms: Structures and Processes	Developing and Using Models	Systems and System Models	2
14	HS-PS2	HS-PS2-2	Stand alone	Motion and Stability: Forces and Interactions	Using Mathematics and Computational Thinking	Systems and System Models	2
15	HS-ESS2	HS-ESS2-7	Cluster	Earth's Systems	Engaging in Argument from Evidence	Stability and Change	2
16	HS-LS3	HS-LS3-2	Stand alone	Heredity: Inheritance and Variation of Traits	Engaging in Argument from Evidence	Cause and Effect	2
17	HS-PS3	HS-PS3-2	Stand alone	Energy	Developing and Using Models	Energy and Matter	2
18	HS-ESS3	HS-ESS3-1	Stand alone	Earth and Human Activity	Constructing Explanations and Designing Solutions	Cause and Effect	2