

Supporting Coherence Across a System of Assessment for NGSS

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Stanford NGSS Assessment Project (SNAP)

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SNAP

Stanford NGSS Assessment Project

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“Important decisions about individuals should not be made based on a single test score. Policy makers should instead invest in the development of assessment systems that use multiple measures of student performance, particularly when high stakes are attached to the results”

Knowing What Students Know (NRC, 2001)

Pg. 310

“Considerable concern has been expressed in the Commission about the artificiality of ‘stand-alone’ or ‘Drop-in from the Sky’ tests.... It is recommended that assessment in education move progressively toward the development and use of **diversified assessment systems** for the generation and collection of educational assessment data.”

–*Assess, To Teach, To Learn: A Vision for the Future of Assessment*, Gordon Commission (2015)

p. 24

Features of High-Quality Assessment Systems

Tight alignment of assessment, curriculum, and teacher development to common standards

a balanced assessment system with challenging, authentic tasks

continuous feedback

involvement of teachers

timely reporting of results

Darling-Hammond, 2010

Research → Practice

How can researchers support a state in building on research-based practices to develop a system of assessment that can quickly and effectively guide implementation of the vision of science learning underpinning NGSS from policymakers to teachers?



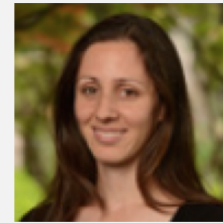
Jonathan
Osborne



Ray
Pecheone



Helen
Quinn



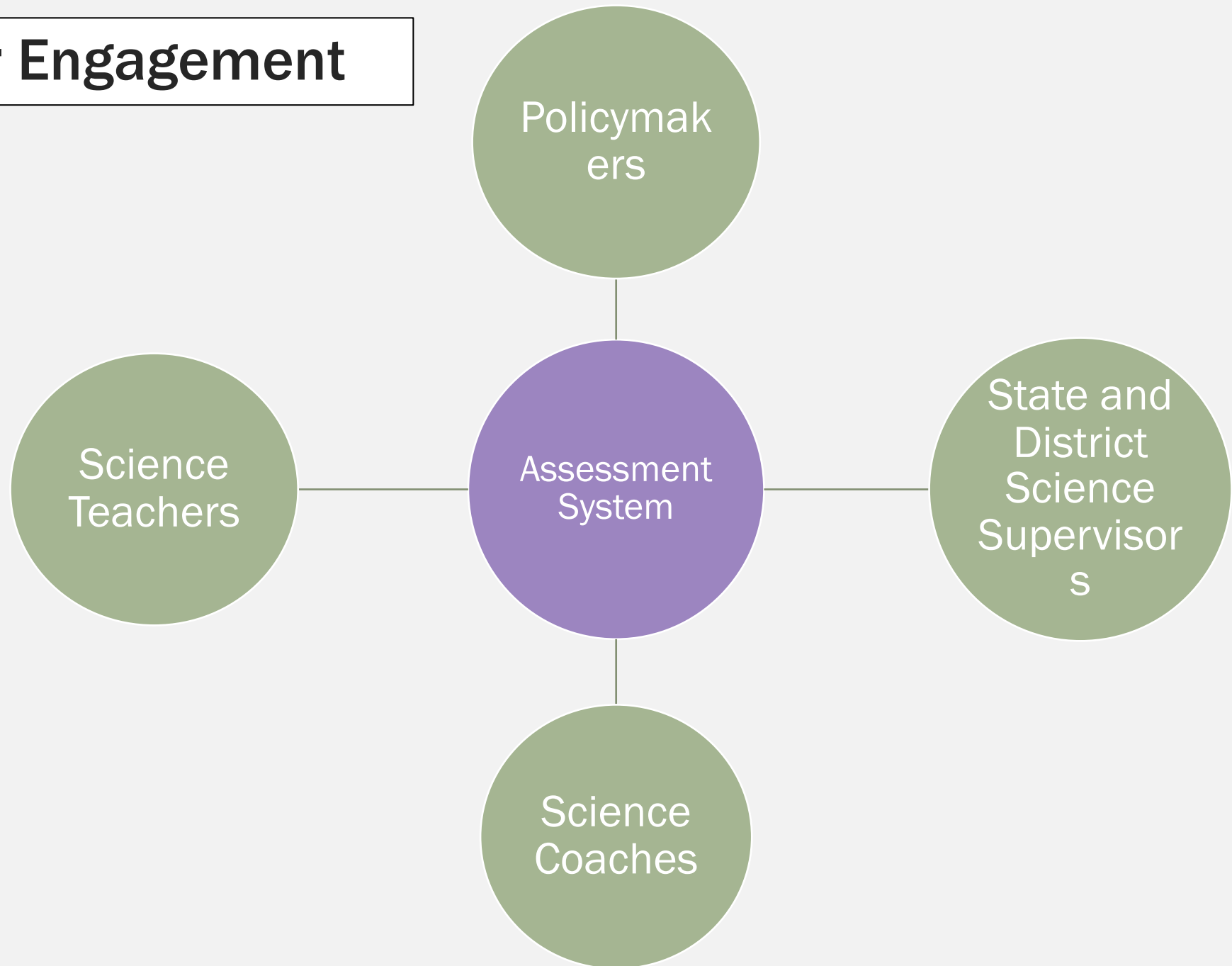
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Zozakiewcz

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Stakeholder Engagement



System of assessment

Tight alignment of assessment, curriculum, and teacher development to common standards

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timely reporting of results

I. Communication tools to support alignment of components of system

II. Exemplars for 3D tasks

III. Capacity-building for effective development and use

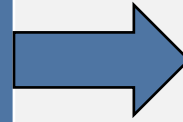
Darling-Hammond, 2010

Focus Area I. Communication tools about system design

Grade	Part 1: External Mandated Tests		Part 2: Periodic Classroom Assessments	
	Component A: Multi-item types	Component B: Performance Tasks	Component C: Stand-alone Performance Tasks	Component D: Curriculum Embedded Performance Tasks (CEPT)
1 st – 4 th			(x)	(x)
5 th	x	x	(x)	(x)
6 th – 7 th			(x)	(x)
8 th	x	x	(x)	(x)
9 th – 10 th			(x)	(x)
11 th	x	x	(x)	(x)
12 th				

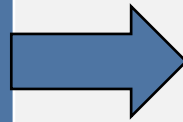
System of assessment

Tight alignment of assessment, curriculum, and teacher development to common standards



I. Communication tools to support alignment of components of system

a balanced assessment system with challenging, authentic tasks

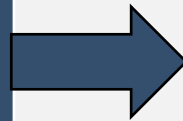


II. Exemplars for 3D tasks

continuous feedback

involvement of teachers

timely reporting of results



III. Capacity-building for effective development and use

Darling-Hammond, 2010

Focus Area II. Exemplar Assessments

Huge ships, called tankers, carry oil across the ocean. Sometimes the oil in the tankers spills into the ocean. Oil spills can spread out and harm plants and animals nearby. In this task, you are a scientist who is trying to find a way to collect the oil so you can remove it from the ocean.



Oil spill in the ocean



Oil moving toward plant life



Bird covered in oil

In the video your teacher will show you, a scientist, Dr. Warner, is doing an experiment. He is testing the research question: Can magnets be used to collect oil in water?

Dr. Warner designed an experiment with these steps:

1. Places water in a large plastic tub.
2. Pours oil into the water.
3. Puts black magnetic powder on the oil.
4. Places a large magnet on the side of the plastic tub.



Dr. Warner puts the black powder in a tub with water and oil (left). Then he holds a magnet outside the tub to pull the oil and powder toward it (right).

Answer the following questions to decide if Dr. Warner's solution could be used to collect a lot of oil in the ocean.

SNAP Principals for high-quality NGSS Assessment

- Engage students in sensemaking about real world questions and problems
- Evaluate what students can *do* with their knowledge
- Foreground students' assets
- Allow for student choice and decision-making
- Integrate peer and teacher feedback

Adapted from SCALE's Criteria for Performance Assessments

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Focus Area III. Capacity-building

Principles for effective hybrid professional learning

- Engage in collaborative analysis of student work and planning feedback
- Focus learning around the activities teachers will use in the classroom
- Apply learning to their own students and school context
- Immediate opportunities for practice and feedback



Performance Assessments in the
Session 3: Evaluating

Sessions

- Session 1: NGSS ... Completed
- Session 2: Measuring 3D Le...
- Session 3: Evalu... Completed
- Session 3: Evaluating Students' Multidimensional Reasoning 45 mins watch
- Session 4: Implications for ...
- Face-to-Face Meeting 2

SEP = Science & Engineering Practice
DCI = Content

SEP → Evaluate data for potential biases or limitations using knowledge of ways that historical data can be used to evaluate the likelihood of future occurrence → DCI

03:58 09:44 HD CC

Download the Natural Hazards SPA Rubric for Question 4 to use as reference during Session 3b.

A system of science assessment in CA

Results are mixed:

State: Expanded use of complex tasks

Did not use classroom tasks

PA does not look like our models

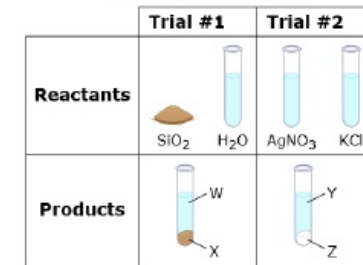
Sent a clear signal to other stakeholders about importance of PA

Leah is learning to use properties of substances to identify a chemical reaction. She conducts two trials.

For the first trial, she pours silicon dioxide (SiO_2) into water (H_2O).

For the second trial, she pours a silver nitrate (AgNO_3) solution into a test tube with a solution of potassium chloride (KCl). The diagram shows the reactants and products for both trials.

Reactants and Products for Trials #1 and #2



Leah records the properties of these substances before each trial. She also records the properties of the unknown products after the trial. The tables show some of the properties for each substance before and after the trials.

Table 1: Properties Before the Trials

Used in Trial #	Substance	State of Matter	Mass (g)	Color
1	H_2O	Liquid	10.0	Colorless
1	SiO_2	Solid	5.0	Tan
2	KCl	Liquid	12.5	Colorless
2	AgNO_3	Liquid	25.5	Colorless

Table 2: Properties After the Trials

Resulted from Trial #	Substance	State of Matter	Mass (g)	Color
1	W	Liquid	10.0	Colorless
1	X	Solid	5.0	Tan
2	Y	Liquid	16.5	Colorless
2	Z	Solid	21.5	White

Leah determines that a chemical reaction occurred in one of her trials. Click the terms that **best** complete the sentence.

A chemical reaction occurred in Trial because substances have properties that are the reactants.

Classroom Performance Assessments: a closer look

Positive developments

- Development has been focused on districts and schools
- Local agencies are using design, development tools, courses, and exemplar assessments to guide work at the local level
- Much of this work is TEACHER driven and is specifically targeted to informing instruction

Areas of concern

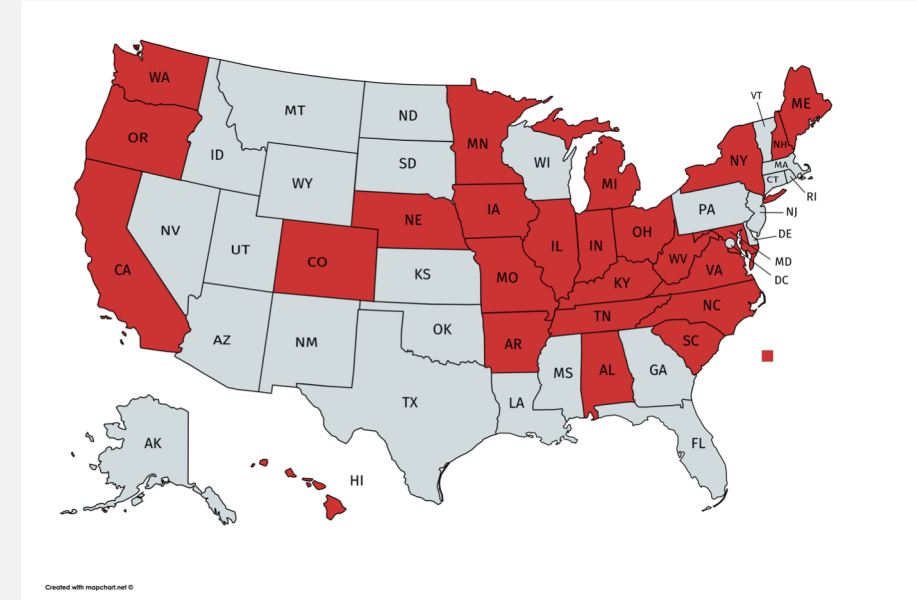
- Not necessarily supported by administrators/unaware
- Need structures to enable teachers to engage – collaboration time, incentives for other teachers
- Not tied into system, essentially a parallel system aligned to same standards

Beyond CA

State Performance Assessment Learning Community
(SPA-LC)

28 states considering use of PA for science

Common standards enable use of SNAP capacity-
building resources
(>1500 participants)



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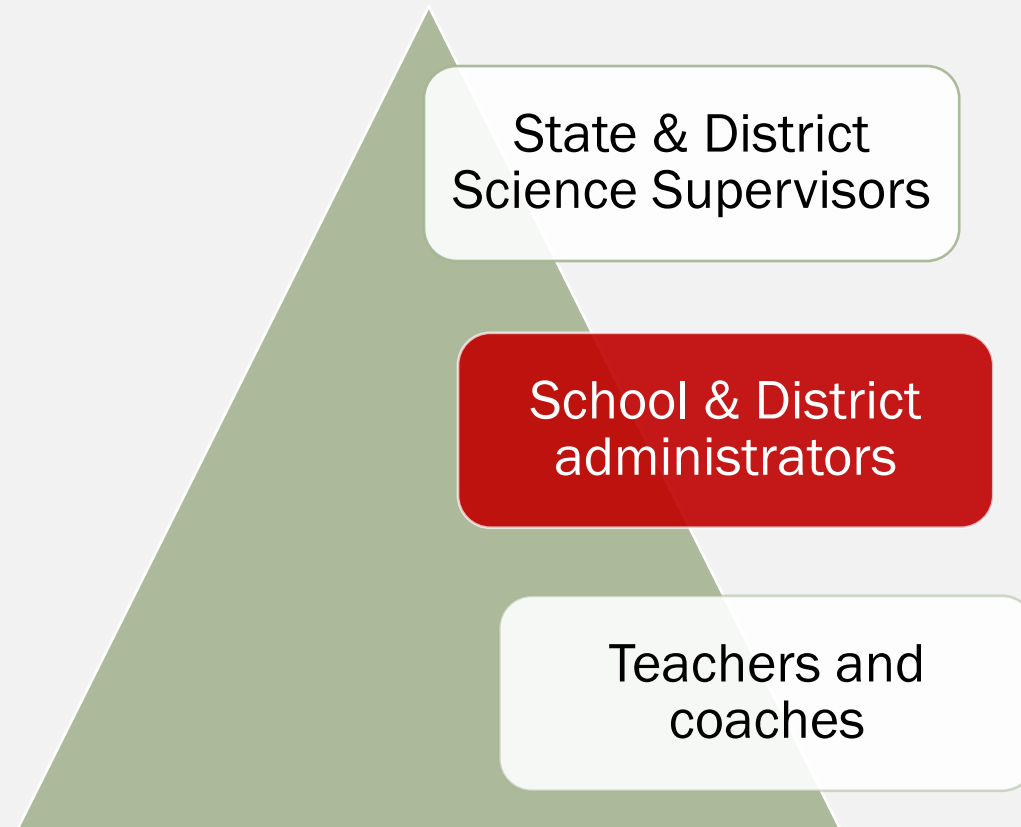
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Missing pieces for coherent systems: Professional learning for administrators



Missing pieces for coherent systems

Platform for collaboration

Filters Results: 106 Performance Tasks Sort by: Best Match Search Performance Tasks

FILTERS

TYPE OF TASK
Type of Task

SUBJECT
Science X

GRADE LEVEL
Grade Level

GRADE LEVEL SPAN
Grade Level Span

Project Certified

HIDE ADVANCED FILTERS

TASK DURATION
Task Duration

STUDENT COLLABORATION LEVEL
Student Collaboration Level

CRITICAL ABILITIES
Critical Abilities

SOURCE
Source

COURSE
Course

Includes Benchmark Samples
 Includes Work Samples

STANDARDS
Enter Standard Directly

[Help Me Select A Standard](#)

Should Animals Be Kept In Zoos? ✓ ★

TYPE OF TASK Curriculum Embedded Task	SUBJECT Science
SOURCE Literacy Design Collaborative (LDC)	GRADE LEVEL 3, 4
AUTHOR Sharon K. Thurman Angie Howard	GRADE LEVEL SPAN Elementary (K-5)

RATING
★★★★★ 0/5

While learning about the basic needs, adaptations, and ecosystems of animals, students will determine whether zoos are beneficial or harmful.

TAGS
#LDC OPINION/ARGUMENTATION RUBRIC #ANIMALS #ZOOS #ECOSYSTEM #ENVIRONMENT #ARGUMENTATION

Cyrobiology ✓ ★

TYPE OF TASK Curriculum Embedded Task	SUBJECT Science
SOURCE Literacy Design Collaborative (LDC)	GRADE LEVEL 7, 8, 9, 10, 11, 12
AUTHOR Catherine H. Miller Jeanne M. Coherd Shay C. Eli Theresa Bennett	GRADE LEVEL SPAN Middle (6-8) High (9-12)

RATING
★★★★★ 0/5

In this module, students will take previously learned concepts of states and properties of matter and expound upon them by examining the field of cryobiology.

Cryobiology is the study of living things at very low temperatures. This science is filled with many technological advances....

TAGS
#LDC ARGUMENTATION RUBRIC #CYROBIOLOGY #STATES OF MATTER #PROPERTIES OF MATTER #ARGUMENTATIVE ESSAY

Should Stem Cell Research Continue? ★

TYPE OF TASK Curriculum Embedded Task	SUBJECT Science
SOURCE Center For Collaborative Education (CCE)	COURSE Biology
AUTHOR Amy Troiano Rhonda Fortin Alex MacPhail Cari Sbardella	GRADE LEVEL 10
	GRADE LEVEL SPAN High (9-12)

RATING
★★★★★ 0/5

Based on their individual research conducted to answer the essential question: "Should stem cell research continue," students will take a position regarding stem cell research. Students will have a choice in the product they create to educate the public on stem cell research, to communicate.

Honey Bee Colony Analysis ✓ ★

TYPE OF TASK Curriculum Embedded Task	SUBJECT Interdisciplinary Mathematics Science
SOURCE Achieve	COURSE Algebra 2 Biology
RATING ★★★★★ 5/5	GRADE LEVEL 10, 11
	GRADE LEVEL SPAN High (9-12)

In this task, the students mathematically model changes in the bee colony numbers from the United States and from two individual states, California and South Dakota.

Students then use their constructed mathematical models to describe factors affecting the bee colony populations. The...

Missing pieces for coherent systems

Scoring vs grading



Goals for NGSS

Develop appreciation of the beauty and **wonder of science**

Have sufficient **knowledge of science and engineering** to engage in discussions

Are **careful consumers** of scientific and technological information

Have **skills** to enter careers of their choice

NRC, 2012