New Assessments of the California Next Generation Science Standards: What to Expect This Spring and Beyond

California Science Education Conference

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Presenters

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Agenda

1. Federal and State Science Requirements for Science Assessments

2. Upcoming Opportunities and Milestones

3. Role of Stakeholders in the Test Design Process

4. Overview of CAST Operational Design and 2017 Pilot

5. CAST Questions

6. CAA for Science Operational Concept Model and 2017 Pilot

7. CAA for Science Questions

8. Further Information

Federal and
State Requirements for Science Assessments

- Assessments are administered once annually at each grade span: grades three–five; grades six–nine; and grades ten–twelve.

- Once the system is operational, aggregate scores will be publicly released.

- Student participation rates must be collected and reported for accountability purposes.

- Alternate achievement standards will be used for students with significant cognitive disabilities provided that:

  - The standards are aligned with academic achievement standards.

  - The participating students have an individualized education program (IEP).

Upcoming Opportunities and Milestones

November 8–10, 2016
- CAST 2018 Field Test Item Writing Workshop

January 2017
- Training Tests for CAST and Training Samples for CAA for Science become available

2018
- CAST Field Test
- CAA for Science Pilot Year 2

2020
- CAA for Science Operational Administration

November 14–16, 2016
- CAA for Science 2017 Pilot Embedded Performance Task and Prioritization Scheme Review Meeting
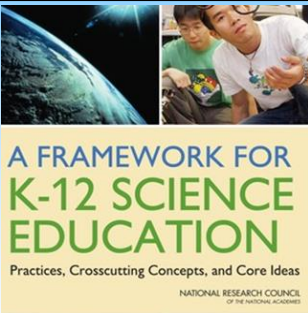
March 20, 2017
- Piloting of CAST and CAA for Science Begins

2019
- CAST Operational Administration
- CAA for Science Field Test

Role of Stakeholders in the Test Design Process

CAST and CAA for Science designs were informed by feedback from:

California science teachers, including representatives of the California Science Teachers Association (CSTA)	Higher education officials, including representatives of Stanford University's Next Generation Science Standards (NGSS) Assessment Program (SNAP)	STEM reform experts, including representatives from the National Research Council (NRC), which developed *A Framework for K–12 Science Education*	Representatives from various other advocacy groups

Stakeholder Priorities for Assessments of the California NGSS (CA NGSS)

- Focus on providing information to support the *improvement of teaching and learning.*

- Promote a dramatic shift in science instruction across <u>all</u> grades.

- Reflect fidelity to the CA NGSS.

# CAST Operational Design and 2017 Pilot
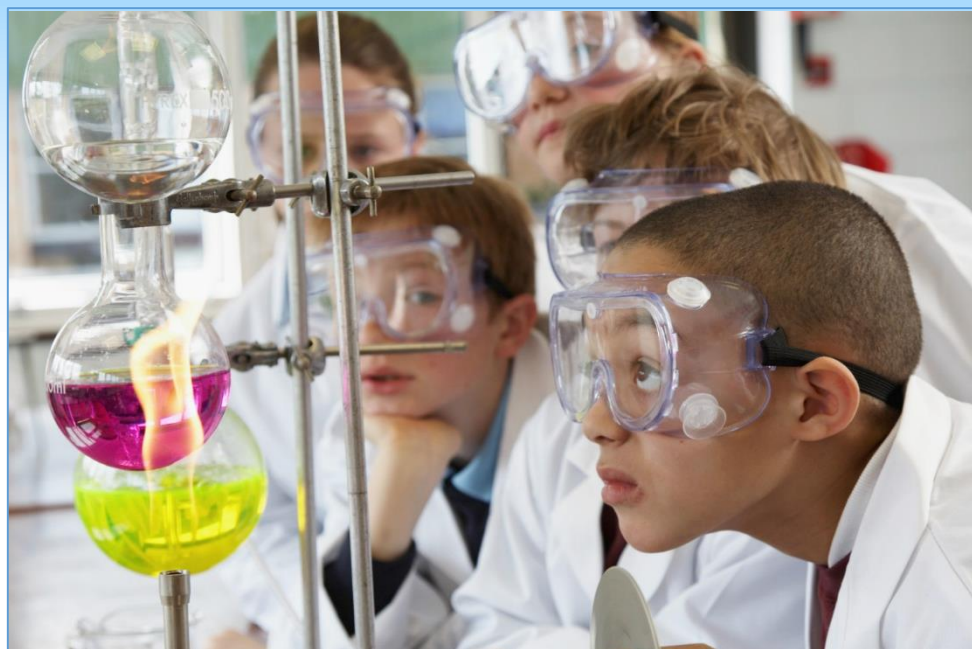
CAST Design Goals

- Emphasize the importance of group-level results to promote improvements to teaching and learning.

- Provide models of high quality, CA NGSS–aligned assessment items and performance tasks (PTs).

- Create incentives for schools to provide science instruction in <u>every</u> grade, not just in tested grades.

- Measure the range and depth of CA NGSS performance expectations (PEs) by leveraging the state's distinctly large student population.

- Minimize testing time and costs.
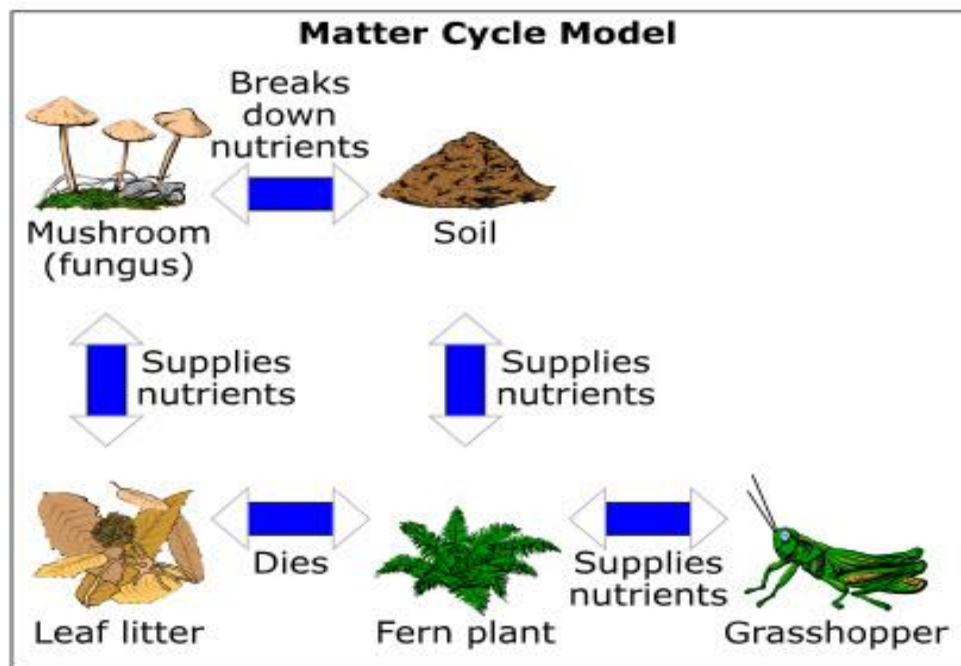
CAST Operational Design Features: Part 1

- Assessment design measures the range and depth of the CA NGSS PEs *over a three year cycle*

  - Includes the three dimensions: Disciplinary Core Ideas (DCIs), Science and Engineering Practices (SEPs), and Crosscutting Concepts (CCCs)
  - Includes the four science domains: Life Sciences; Physical Sciences; Earth and Space Sciences; and Engineering, Technology, and Applications of Science

- Assessment design makes use of a diverse range of item types

  - Both discrete items as well as PTs are used.

Integrating Aspects of the CA NGSS into Item Development

- Items are being developed to assess the PE and incorporate at least two of the three intertwined dimensions of knowledge.

- PTs may integrate two of the four science domains.
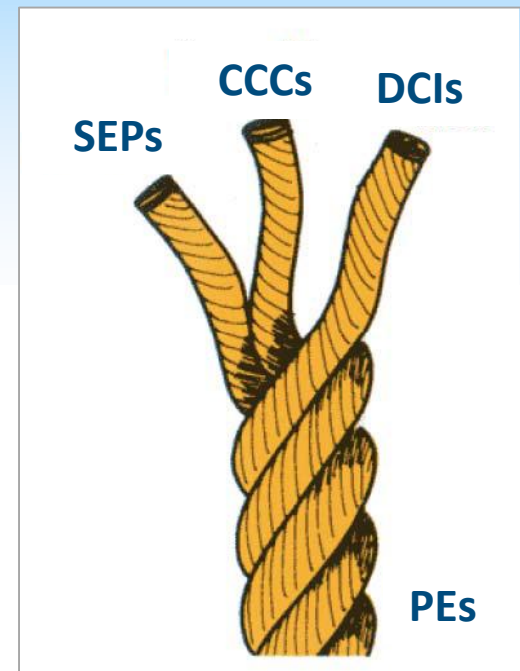
A science class is studying how matter is cycled within different parts of an ecosystem. The students in the class focus on a forest ecosystem to create a matter cycle model. Complete the model to best show how matter cycles in a forest ecosystem. Select the correct direction for each arrow.
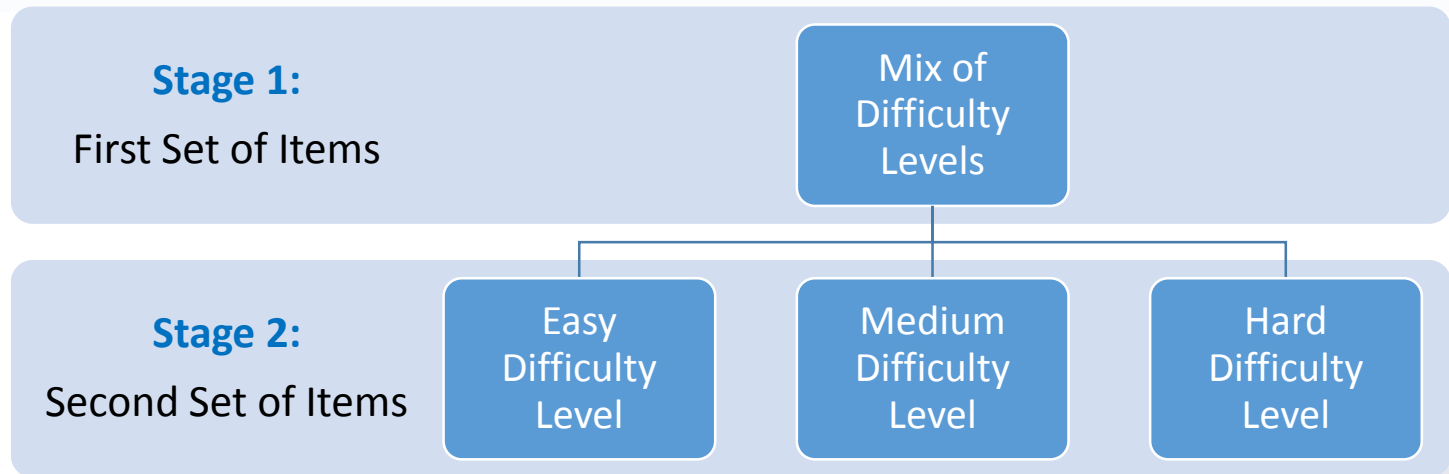
Matter Cycle Model

Breaks down nutrients

Mushroom (fungus) — Soil

Supplies nutrients

Supplies nutrients

Dies

Supplies nutrients

Leaf litter — Fern plant — Grasshopper

Describe the role in the ecosystem of the fern and the mushroom. Be sure to explain how both organisms cycle matter from the environment.

CAST Operational Design Features: Part 2

- The operational administration will
  - Be a two-stage adaptive assessment.
  - Use partial matrix sampling of content.
    - This approach provides group-level feedback while ensuring individual student performance is measured fairly and comparably.

- The operational assessment is designed to be administered in two hours or less.

- The operational assessment is administered at grades five and eight, and at either grade ten, eleven, or twelve for high school.
  - The design requires that all students in the tested grades participate in *three segments* (A, B, and C) of the test.
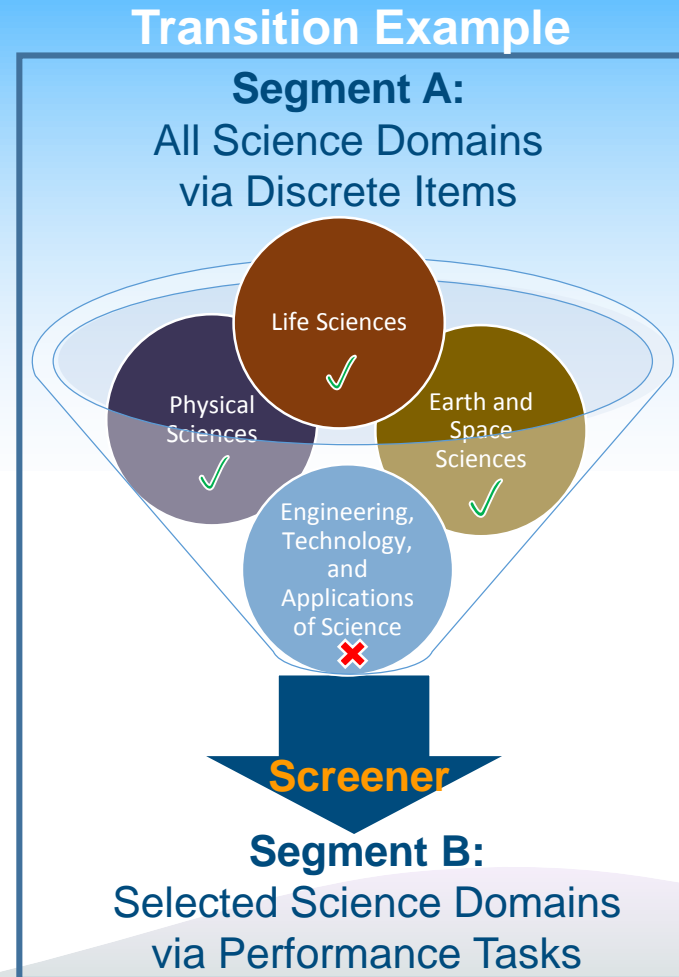
Operational Segment A

- **Segment A** is a two-stage adaptive segment.
  - Segment A combines machine-scorable short answer and selected response items that cover a very *broad* range of the CA NGSS PEs.
  - Segment A contributes to student and group scores.

Stage 1:

First Set of Items

Mix of Difficulty Levels

Stage 2:

Second Set of Items

Easy Difficulty Level

Medium Difficulty Level

Hard Difficulty Level

Transition from Segment A to Segment B

- Performance in **Segment A** guides the selection of science domains presented in **Segment B**.

- The assignment of the science domains in **Segment B** will be random unless performance on a particular science domain in **Segment A** is weak.

Transition Example

Segment A:
All Science Domains via Discrete Items

Life Sciences ✓

Physical Sciences ✓

Earth and Space Sciences ✓

Engineering, Technology, and Applications of Science ✗

Screener

Segment B:
Selected Science Domains via Performance Tasks

Operational Segment B

- **Segment B** includes PTs that require students to solve a series of complex problems set in *domain-specific* contexts, which deeply measure a student's command of selected CA NGSS PEs.

  - Contributes to student and group scores

Operational Segment C

- **Segment C** includes a range of items that, collectively, broadly and deeply measure the CA NGSS PEs associated with the tested *grade span*.
  - *All* CA NGSS PEs (minus those identified as not suitable for summative assessments) will be *collectively* assessed at the group level only.
    - Encourages the teaching of science at all grade levels
    - Contributes to group-level scores

2017 CAST Full Census Pilot

- Participation required for all students in grades five and eight

- High school sampling:
  - All high schools
  - Each high school assigned a single grade
    - All students enrolled in that grade are required to participate

State-level
high school sample
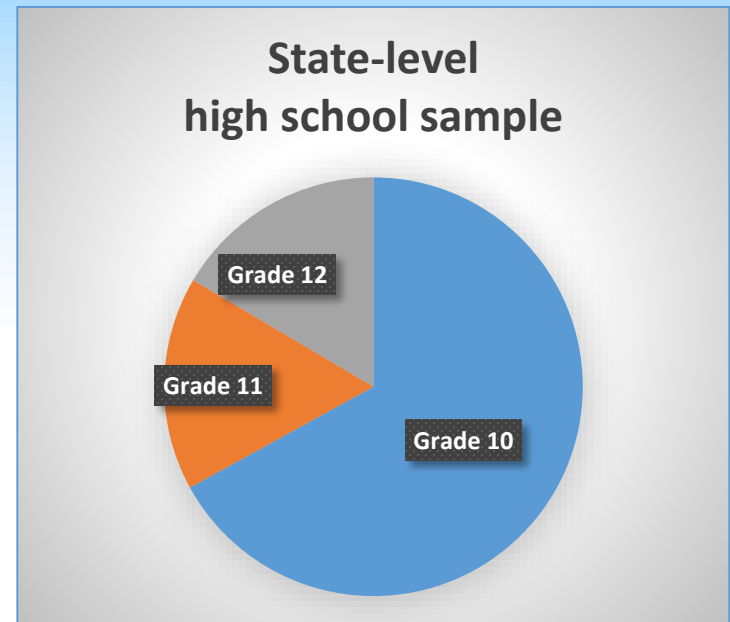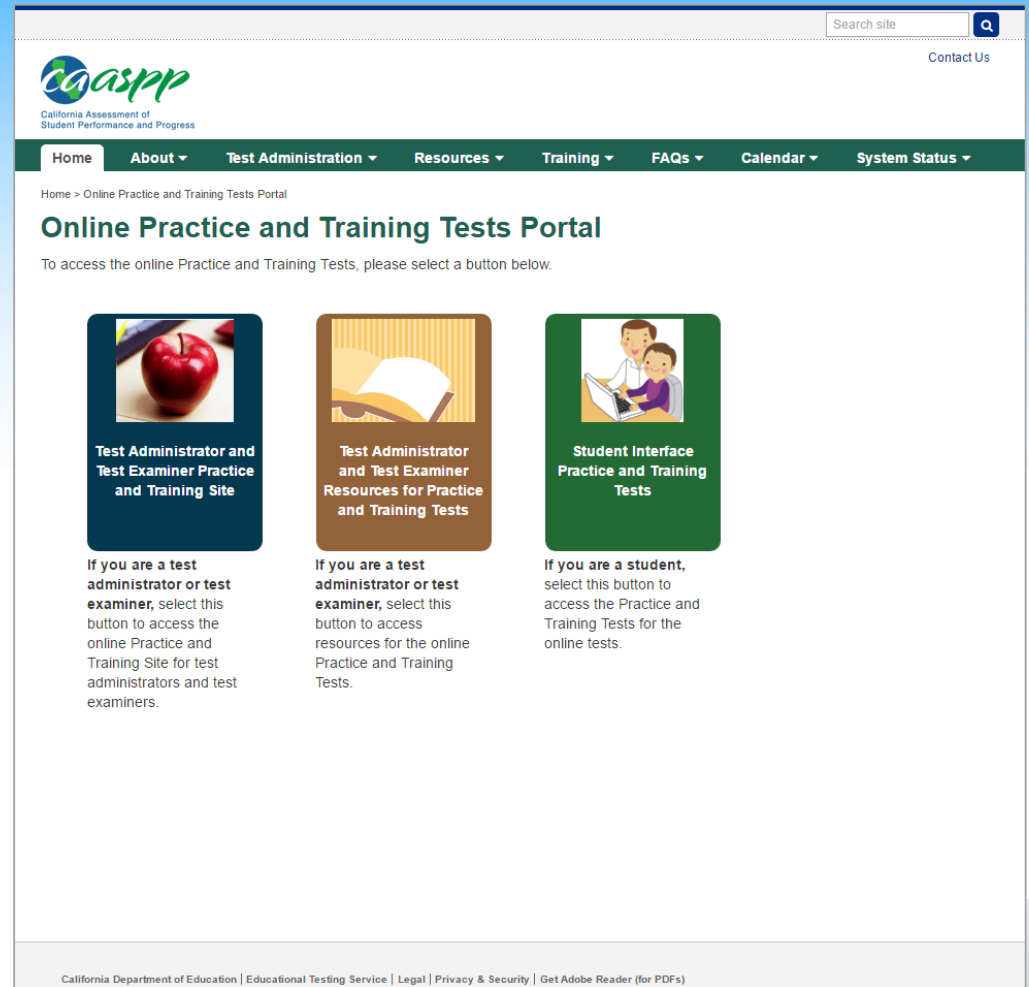
2017 CAST Pilot Components

Purpose: Collect participation status of students; try out newly developed item types and test system functionality

- Items
- Training tests
- Student survey
- Accessibility supports
- Teacher survey

Training Tests

- Purpose: Provide students with an opportunity to engage with CA NGSS–aligned items

- Educators and students are encouraged to access the training test/sample for each grade span to see a variety of science content and item types.

Overview of Accessibility Features

- Purpose: Evaluate functionality of some accessibility features
  - American Sign Language
  - Text-to-speech
  - Braille (refreshable and embosser)
  - Print on demand
- Student eligibility will be determined by the accommodations identified as required in the student's IEP and/or Section 504 plan.
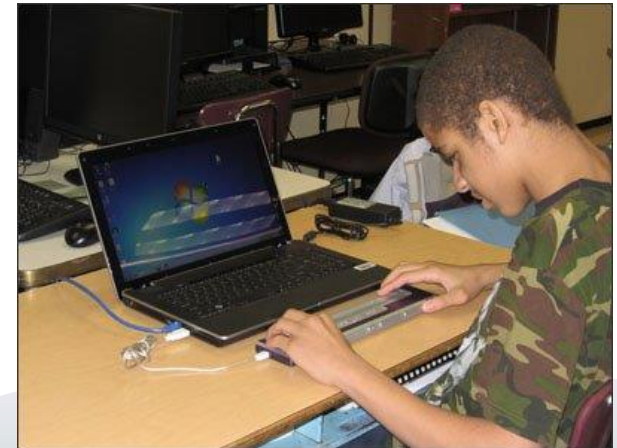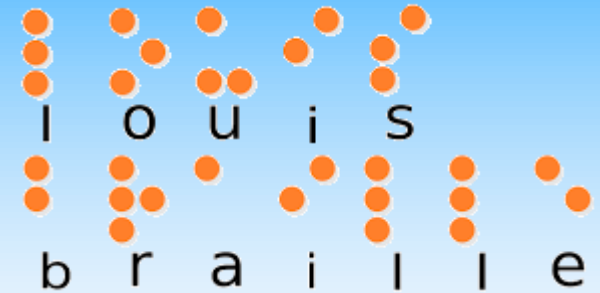
Teacher Survey

- Purpose: Collect feedback on the pilot test administration

- One survey per science teacher

- Approximately 10–12 questions

- No more than 15 minutes to complete

CAST Questions

CAA for Science Operational Concept Model and 2017 Pilot

Guiding Principles of the CAA for Science

1. Provide meaningful information to both students and educators

2. Support and promote educators' implementation of the CA NGSS

3. Embed assessment into instructional practice

4. Offer a developmentally appropriate opportunity for students with significant cognitive disabilities to be assessed

Assessment Models Considered: CAA for Science

- Linear on-demand assessment
  - Fixed set of questions presented in order of difficulty with starting and stopping points that may be used to eliminate questions that may be too easy or too difficult

- Multistage adaptive, on-demand assessment
  - Adapts the difficulty level of the succeeding *set* of items to the student's ability level based on the student's cumulative performance on the first set of items presented

- Collection of embedded performance tasks (EPTs)
  - Used to summatively evaluate student performance and are integrated with, or embedded in, classroom work
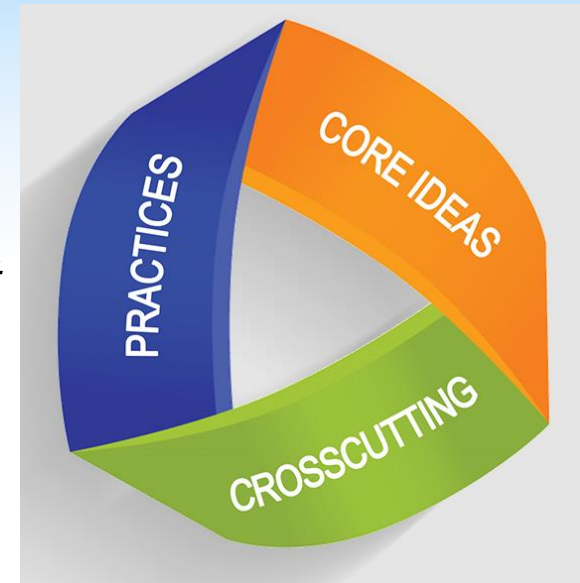
Evaluation of the Design Options
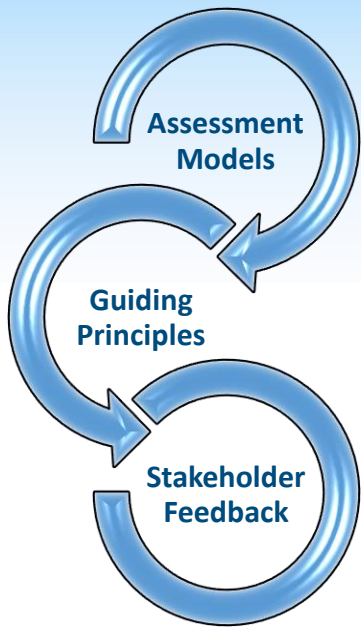
Design Options	Guiding Principles			
	1	2	3	4
Linear on-demand assessment	◯	◡	◯	◡
Multistage adaptive, on-demand assessment	◡	◡	◯	◡
Collection of embedded performance tasks	◡	⬤	⬤	⬤

Assessment Models

Guiding Principles

Stakeholder Feedback

Design: Collection of EPTs

- Development of EPTs may be done at the:
  - Local level (state-approved),
  - State level, or
  - A combination of these two approaches.
- The student's test examiner will administer EPTs:
  - At state-specified intervals.
  - With student responses recorded and scored according to state-defined criteria and protocols.

Connectors for the CAA for Science

Connector Term	Description
Performance Expectation (PE)*	Specifies what students should know, understand, and be able to do; integrates SEPs, CCCs, and DCIs; illustrates how students engage in SEPs to develop a better understanding of essential knowledge; supports targeted instruction and assessment by providing tasks that are measurable and observable
Core Content Connector (Connector)	Builds a bridge to the content of the PE
Focal Knowledge, Skills, and Abilities (FKSA)	Describe what students should know and be able to do in terms of the original PE and associated Connector
Essential Understanding (EU)	Defines a basic, foundational key idea or concept

Collection of EPTs: Benefits

- Shows student progress over time when collecting student work samples throughout the school year

- Provides an opportunity for students to demonstrate performance "in real time"

- Conforms to the principles of universal design

- Offers the least restrictive environment for teacher/students to select/produce evidence

- Supports the improvement of teaching and learning

- Provides a minimally stressful and burdensome process for students

- Promotes the delivery of challenging, yet developmentally appropriate, academic content to students

Collection of EPTs: Challenges

- Some educators may see the use of the EPTs as distinct from the instructional process.

- Scoring and professional development activities can be costly.

- Extra vigilance is required to ensure technical integrity.

CAA for Science Questions

For Further Information

Assessment Development and Administration Division Office
916-319-0803

California Assessment of Student Performance and Progress Office
caaspp@cde.ca.gov
916-445-8765

Educational Testing Service
California Technical Assistance Center
http://www.caaspp.org/contact/
caltac@ets.org
800-955-2954

How to Get Involved in the Development of CAST and the CAA for Science

Opportunities for California educator involvement may include:

- Item writing

- Item review

- Form review

- Scoring

- Data review

- Rangefinding

To get involved, complete the content reviewer application at http://caaspp.org/reviewers.html.