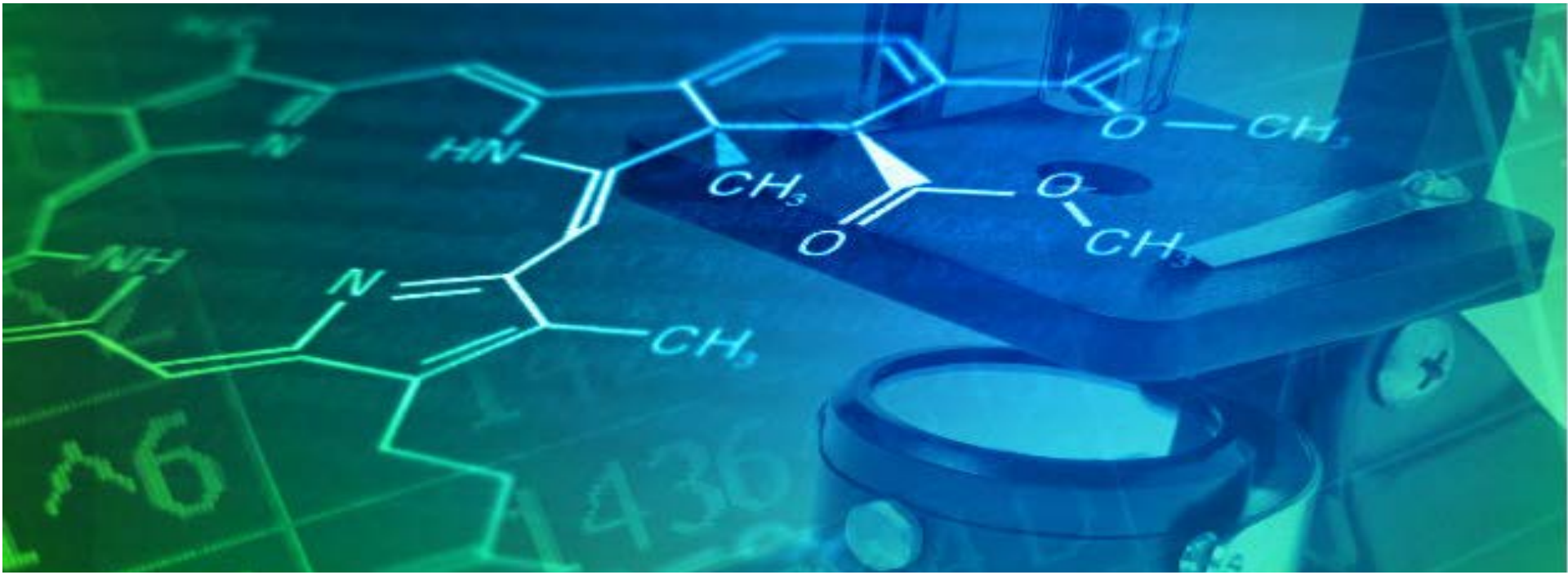


CDE Science Tuesday: Grades K–2

Publisher Briefing Webinar
August 1, 2017

TOM TORLAKSON
State Superintendent
Of Public Instruction

Welcome

California Department of Education (CDE) staff presenters:

Bryan D. Boyd , Education Programs Consultant

Cliff Rudnick, Administrator, Instructional Resources Unit

TOM TORLAKSON
State Superintendent
Of Public Instruction

California's 2018 Science Instructional Materials Adoption

- Kindergarten through Grade Eight Instructional Programs
- All the info: http://www.cde.ca.gov/ci/sc/im/
- Including:
- Schedule of Events
- Notices
- Frequently Asked Questions
- Prior Webinars
- Evaluation Criteria
- CA Science Framework

TOM TORLAKSON
State Superintendent
Of Public Instruction

The Bedrock of the California Next Generation Science Standards

- Phenomena
- Three Dimensions
- Performance Expectations and Instructional Segments

TOM TORLAKSON
State Superintendent
Of Public Instruction

What is Phenomena?

- Anchoring phenomena
- Investigative phenomena
- Everyday phenomena
- Everyday problem (engineering)

TOM TORLAKSON
State Superintendent
Of Public Instruction

Three Dimensional Learning

- **Science and Engineering Practices (SEPs)**
- **Disciplinary Core Ideas (DCIs)**
- **Crosscutting Concepts (CCCs)**

TOM TORLAKSON
State Superintendent
Of Public Instruction

Performance Expectations & Instructional Segments K–2

Table 3-5. Overview of Instructional Segments for Grade Two

	**1** Landscape Shapes	Students represent landscapes with … models and 2-D maps. They … in the shapes and loca… water bodies. Th… these fea…
	**3** …scape Changes	…ese …cannot. …of materials to …roperties important to …andforms include the strength …ls and their ability to absorb water. …me changes on Earth occur quickly while others occur slowly. Students investigate several processes that sculpt landforms and then create engineering solutions that slow down those changes.
	**4** Biodiversity in Landscapes	Different landscapes support different types and quantities of life. Students investigate the needs of plants and engineer models that mimic their pollination and seed dispersal structures. They then ask questions about how plant needs are met in the physical conditions of different habitats.

Source: M d'Alessio; Giel 2007; Woelber 2012; Abbe 2005.

Disclaimer These are just examples.. You can teach topics in using any instructional approach you determine as a professional educator.

TOM TORLAKSON
State Superintendent
Of Public Instruction

Science & Engineering Practices

Table 3-1. Age Appropriate Science and Engineering Practices

AS STATED IN STANDARDS	ADAPTED FOR K–2
Asking questions (science) / Defining problems (engineering)	Wondering (science) / Deciding the "rules" (engineering)
Developing and using models	Drawing diagrams and building models to represent how things work.
Planning and carrying out investigations	Doing "exploriments"
Analyzing and interpreting data	Comparing and looking for patterns
Using mathematical and computational thinking	Counting and measuring
Constructing explanations (science) / designing solutions (engineering)	Describing what happened (science) / Tinkering (engineering)
Engaging in argument from evidence	"I think ____ because I see or know ____."
Obtaining, evaluating, and communicating information	Writing, drawing, or talking (acting out) about what we know, read, and understand about new discoveries (things) (ELA connections)

Evaluation Criteria Category 1, Criterion 12

Student assignments make linkages and are consistent with the grade-level appropriate expectations in the CA CCSS for ELA and Literacy in History/Social Studies, Science, and Technical Subjects (CA CCSS for ELA/Literacy), the CA ELD Standards, and CA CCSS Mathematics (CA CCSSM) and are consistent with the guidance in the CA Science Framework.

TOM TORLAKSON
State Superintendent
Of Public Instruction

Kindergarten - Phenomena

Kindergarten Vignette-Made for the Shade

Anchor phenomenon: Some areas of the schoolyard are sunny and some are shady at different times throughout the day.

Everyday phenomenon: Rabbits spend time in the shade on hot sunny days.

Investigative problem: How do we keep a pet rabbit out of the Sun?

TOM TORLAKSON
State Superintendent
Of Public Instruction

Kindergarten – Engineering through a Practice or Disciplinary Core Idea

K-PS2-2 Motion and Stability: Forces and Interactions

Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.*

K-PS3-2 Energy

Use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface.*

K-ESS3-2 Earth and Human Activity

Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.*

K-ESS3-3 Earth and Human Activity

Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.*

TOM TORLAKSON
State Superintendent
Of Public Instruction

Kindergarten - Disciplinary Core Ideas

- LS1.C: Organization for Matter and Energy Flow in Organisms
- ESS2.D: Weather and Climate
- ESS2.E: Biogeology
- ESS3.C: Human Impacts on Earth Systems
- ESS3.A: Natural Resources
- ESS3.B: Natural Hazards
- ESS3.C: Human Impacts on Earth Systems

TOM TORLAKSON
State Superintendent
Of Public Instruction

Kindergarten - Disciplinary Core Ideas

- PS2.A: Forces and Motion
- PS2.B: Types of Interactions
- PS3.B: Conservation of Energy and Energy Transfer
- PS3.C: Relationship Between Energy and Forces
- ETS1.A: Defining and Delimiting Engineering Problems
- ETS1.B: Developing Possible Solutions
- ETS1.C: Optimizing the Design Solution

TOM TORLAKSON
State Superintendent
Of Public Instruction

Kindergarten - Crosscutting Concepts

- CCC-1. Patterns
- CCC-2. Cause and effect: Mechanism and explanation
- CCC-3. Scale, proportion, and quantity
- CCC-4. Systems and system models
- CCC-5. Energy and matter: Flows, cycles, and conservation
- CCC-6. Structure and function
- CCC-7. Stability and Change

TOM TORLAKSON
State Superintendent
Of Public Instruction

Kindergarten - Performance Expectations

- Plant and Animal Needs
- Plants and Animals Change Their Environment
- Weather Patterns
- Pushes and Pulls

TOM TORLAKSON
State Superintendent
Of Public Instruction

Kindergarten - Engineering Connections

Engineering Connection — Reduce, Reuse, Recycle

Once students understand that producing everyday objects affects natural systems, they can begin to come up with **solutions [SEP-6]** that reduce the effects (K–2-ETS1-1). For example, students can brainstorm ways that they can save water or paper. Their solutions probably fall into the categories of reducing, reusing, or recycling, so teachers can introduce these terms and help students categorize their suggestions. Students might come up systems for reusing materials in the classroom or design a way to capture wasted water in their classroom sink. To **communicate [SEP-8]** their solutions (K-ESS3-3), students can draw a picture of one of their ideas and then choose the appropriate label for their suggestion ("reduce," "reuse," or "recycle"). Students should be able to identify the natural system that benefits from the action and **explain [SEP-6]** how their solution will help).

TOM TORLAKSON
State Superintendent
Of Public Instruction

Kindergarten – Math Connections

Kindergarten students use attributes to sort objects (K.MD.3). For example, a large portion of IS1 involves sorting plants and animals based on patterns in their needs. Students can sort organisms based on whether they are a plant or an animal, whether they live on water or land, and whether an animal eats only plants, only animals, or both.

CA Math Standards: MP. 2, K.CC.1-3, K.MD.2-3

TOM TORLAKSON
State Superintendent
Of Public Instruction

Kindergarten – ELA/ELD Connections

- Select four or five books about different ecosystems to read aloud to the class;
- As each book is read, prompt student engagement using similar questions about the biome;
- Divide students into small groups, with each group assigned a different book, to compose (through dictation and/or pictures) an explanatory piece about their biome, including some text-based details.

CA CCSS ELA/Literacy Standards: RI.K.1, 2, 10; SL.K. 2, 3, 5; W.K.2, 7, 8; L.K.1, 2
CA ELD Standards: ELD.PI.K.2, 5, 6

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 1 - Phenomena

Grade One Snapshot 3.4: “Sounds Wild” Engineering Challenge

Anchoring phenomenon: Crickets make sounds with their bodies.

Investigative phenomenon: When objects rub together, they make sounds.

Everyday phenomenon: Different animals make sounds.

Investigative problem: How do we create a device that simulates a baby animal crying out loud enough to communicate with its parents?

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 1 – Engineering through a Practice or Disciplinary Core Idea

1-PS4-4 Waves and Their Applications in Technologies for Information Transfer

Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.*

1-LS1-1 From Molecules to Organisms: Structures and Processes

Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 1 - Disciplinary Core Ideas

- LS1.A: Structure and Function
- LS1.B: Growth and Development of Organisms
- LS1.D: Information Processing
- LS3.A: Inheritance of Traits
- LS3.B: Variation of Traits
- ESS1.A: The Universe and its Stars
- ESS1.B: Earth and the Solar System

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 1 - Disciplinary Core Ideas

- PS4.A: Wave Properties
- PS4.B: Electromagnetic Radiation
- PS4.C: Information Technologies and Instrumentation
- ETS1.A: Defining and Delimiting Engineering Problems
- ETS1.B: Developing Possible Solutions
- ETS1.C: Optimizing the Design Solution

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 1 – Crosscutting Concepts

- CCC-1. Patterns
- CCC-2. Cause and effect: Mechanism and explanation
- CCC-3. Scale, proportion, and quantity
- CCC-4. Systems and system models
- CCC-5. Energy and matter: Flows, cycles, and conservation
- CCC-6. Structure and function
- CCC-7. Stability and Change

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 1- Performance Expectations

- Plant Shapes
- Animal Sounds
- Shadows and Light
- Patterns of Motion of Objects in the Sky

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 1 - Engineering Connections

Engineering Connection: Using Bio-mimicking to Solve a Problem

Nature gives humans ideas that can be used as design examples for objects that solve a problem (bio-mimicking). Students should be able to use plant structures to **design [SEP-6]** something that solves a problem they have at school. For example, students design a coat rack that has enough hooks to hold their jackets. How thick should the base be? How should it connect to the ground in order to be stable? Students can look at trees to help decide. Perhaps they want to send a message across the schoolyard. Students could design a message carrier based on the shape of seeds that disperse in the wind. Or perhaps they want to construct a new rope ladder for their playground structure. How will they attach it? They can look to the tendrils of a snap pea. Students should be able to describe how the **structure of their object helps achieve its function [CCC-6]**, possibly illustrating it with a simple sketch or diagram showing their invention and the plant structure that inspired it (K 2 ETS1-2).

Grade 1 - Math Connections

Opportunities for Mathematics Connections

Students could be challenged to create a model of a seed that depends on wind to disperse it (for example a dandelion seed). On a breezy day, the seed models could be flown to determine which models go the farthest. Students measure how far the model flew in standard or non-standard units. Questions that could be asked are: Which model flew the farthest? What about its design allowed it to fly farther? (Students could also be asked to put the models in order of how far they flew.)

CA Math Standards: 1.MD.2

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 1 - ELA/ELD Connections

"Opportunities for ELA/ELD Connections"

Guiding document:

- Integrating the CA ELD Standards into K–12 Mathematics and Science Teaching and Learning-A Supplementary Resource for Educators Implementing in Tandem the California English Language Development Standards, the California Common Core State Standards for Mathematics, and the Next Generation Science Standards for California Public Schools

Sample Integration of Science and ELD Standards in the Classroom

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 2 - Phenomena

Grade Two Vignette 3.3. Biodiversity in Changing Environments

Anchor phenomenon: Different numbers of organisms and types of organisms live in different locations on the schoolyard.

Everyday phenomenon: Blackberry plants and Joshua trees grow in different places with different physical conditions.

Investigative phenomenon: Different numbers of organisms and types of organisms live in different locations on the schoolyard. (returning to investigate the anchoring phenomenon)

Investigative phenomenon: Different regions of California have different plants and animals.

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 2 – Engineering through a Practice or Disciplinary Core Idea

2-PS1-2 Matter and Its Interactions

Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*

2-LS2-2 Ecosystems: Interactions, Energy, and Dynamics

Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

2-ESS2-1 Earth's Systems

Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 2 – Disciplinary Core Ideas

- LS2.A: Interdependent Relationships in Ecosystems
- ETS1.B: Developing Possible Solutions
- LS4.D: Biodiversity and Humans
- ESS1.C: The History of Planet Earth
- ESS2.A: Earth Materials and Systems
- ESS2.B: Plate Tectonics and Large-Scale System Interactions
- ESS2.C: The Roles of Water in Earth's Surface Processes

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 2 – Disciplinary Core Ideas

- PS1.A: Structure and Properties of Matter
- PS1.B: Chemical Reactions
- ETS1.A: Defining and Delimiting Engineering Problems
- ETS1.B: Developing Possible Solutions
- ETS1.C: Optimizing the Design Solution

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 2 – Crosscutting Concepts

- CCC-1. Patterns
- CCC-2. Cause and effect: Mechanism and explanation
- CCC-3. Scale, proportion, and quantity
- CCC-4. Systems and system models
- CCC-5. Energy and matter: Flows, cycles, and conservation
- CCC-6. Structure and function
- CCC-7. Stability and Change

Grade 2- Performance Expectations

- Landscape Shapes
- Landscape Materials
- Landscape Changes
- Biodiversity in Landscapes

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 2 – Engineering Connections

Engineering Connection: Create a Better Soil

Engineering Connection: Create a New Toy with Old Parts

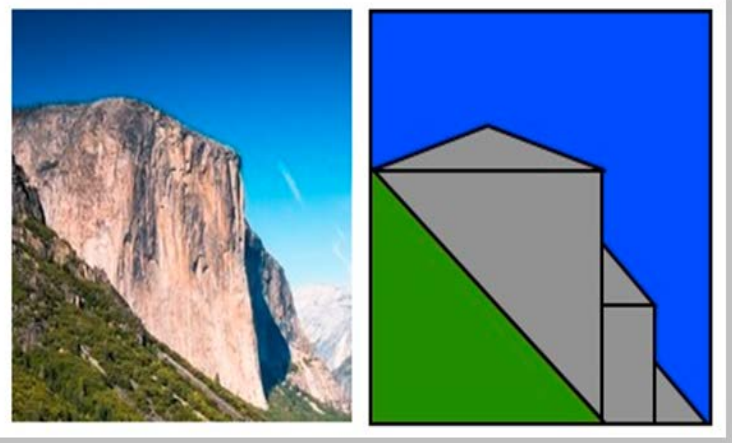
TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 2 – Math Connections

Opportunities for Mathematics Connections

Paralleling the study of shapes in the CA CCSSM for K–2, the CA NGSS has students exploring the significantly more complex shapes of natural landscapes. While students have mastered the ability to identify simple shapes (CA CCSSM K.G.1) and create composite shapes (1.G.2), how can they represent the bends and curves of real life objects in nature?

Figure 3.7. Using Shapes to Represent Natural Landscapes



Source: Cook 2013 (left); M. d'Alessio (right)

CA CCSS Math standards: 2.G.1

TOM TORLAKSON
State Superintendent
Of Public Instruction

Grade 2 - ELA/ELD Connections

Opportunities for ELA/ELD Connections

To help students develop their understanding of **causality [CCC-2]**, have them think of several effects for a cause or circumstance involving plants in different habitats using "If/Then" (either in narrative text or a poem). For example:

If a plant lives in the desert where there is not much water,

... *then* it needs long roots to get water.

... *then* it often has few leaves or a protective coating on the stem.

... *then* it won't grow much during times with little water.

CA CCSS ELA/Literacy Standards: W.2.3, 4, 8, 10

CA ELD Standards: ELD.PI.2.2, 6, ELD.PII.2.6

TOM TORLAKSON
State Superintendent
Of Public Instruction

K–2 Progressions

Appendix 1: Progression of the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in Kindergarten Through Grade Twelve

Why are these important?

Why is this in the CA Science Framework?

https://www.cde.ca.gov/ci/sc/cf/documents/scifwappendix1.pdf

TOM TORLAKSON
State Superintendent
Of Public Instruction

Examples of Phenomena

Anchoring phenomenon:

crickets make sounds with their bodies

Investigative phenomenon:

when objects rub together, they make sounds

Everyday phenomenon:

different animals make different sounds

TOM TORLAKSON
State Superintendent
Of Public Instruction

Vignettes/ Snapshots

Chapter 1- Overview Table 1.2 Instructional Shifts Required by the CA NGSS

Chapter 11- Instructional Strategies Snapshot 11.3. Scientific Methods and the Nature of Science

TOM TORLAKSON
State Superintendent
Of Public Instruction

DATA

Helpful Hint: Start Early! And Provide Data Sets

DATA is another area where teachers need support. Make sure that if your performance expectations or lesson deal with longitudinal data you provide reminders throughout the year for teachers to have the students continue to collect data. So when it is time to assess the standard students have actual data to work with.

TOM TORLAKSON
State Superintendent
Of Public Instruction

More Info

Integrating the CA ELD Standards into K–12 Mathematics and Science Teaching and Learning

~~http://www.cde.ca.gov/sp/el/er/documents/fnl1516agmnteldstndab899.doc~~ [Preceding link not valid]

TOM TORLAKSON
State Superintendent
Of Public Instruction

Questions

At this point, we'll answer the questions we can.

We may need to wait to answer other questions, so continue to monitor the FAQ Web page for updates.

Next Steps

- ✓ “CDE Science Tuesday: Grades K-2” August 1, 2017, 1-2 p.m.
- “CDE Science Tuesday: Grades 3-5” August 8, 2017, 1-2 p.m.
- “CDE Science Tuesday: Grades 6-8” August 15, 2017, 1-3 p.m.
- “CDE Science Tuesday: Cal Recycle Environmental Principles and Concepts Presentation” August 29, 2017, 1–3 p.m.

(The final meeting may also be attended in person, in Sacramento, at 1500 Capitol Mall - conference rooms A, B, C)

TOM TORLAKSON
State Superintendent
Of Public Instruction

Information

All relevant information about the 2018 Science Instructional Materials adoption is posted online at the following CDE Web site:

http://www.cde.ca.gov/ci/sc/im/

TOM TORLAKSON
State Superintendent
Of Public Instruction

Contacts

David Almquist, Publisher Liaison

dalmquis@cde.ca.gov

Cliff Rudnick, Administrator

~~crudnick@cde.ca.gov~~ [Preceding link not valid]

Bryan Boyd, Adoption Lead

~~bboyd@cde.ca.gov~~ [Preceding link not valid]

TOM TORLAKSON
State Superintendent
Of Public Instruction

Thank you!

TOM TORLAKSON
State Superintendent
Of Public Instruction