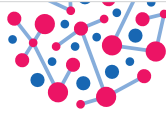


The Instructional Shift Challenge from **twig**Science



Welcome to the Instructional Shift Challenge! The **2016 Science Framework for California Public Schools** lists **16 instructional shifts** in science education that should be addressed by science programs used to teach the CA NGSS.

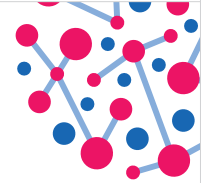
Use these cards as your guide to whether the program you're looking at will **help you implement these instructional shifts in the classroom**. Which side of each card best sums up the program—"More of this..." or "Less of this..."?

All of the "More of this..." instructional shifts are embedded at every level of Twig Science, but we've called out a few specific examples so you can see for yourself.

"More of this..." and "Less of this..." statements are quoted directly from the **2016 Science Framework for California Public Schools, Chapter 11, pp. 5–6**.

0

twigScience

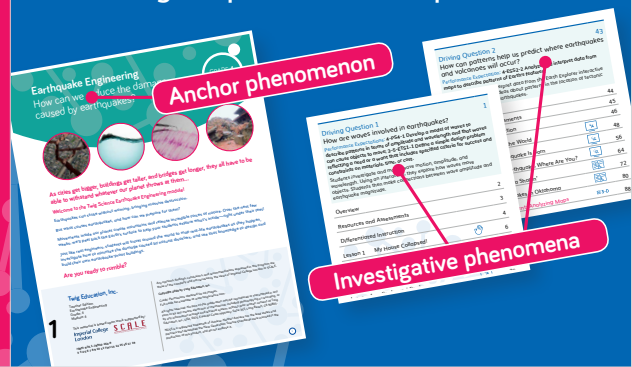


More of this...

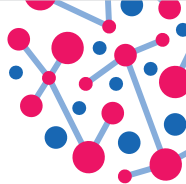
"Students engage in the CA NGSS practices to **build deeper understanding** of science and engineering content and **make sense of phenomena** and **design solutions**."

2016 Science Framework for California Public Schools

Each Twig Science module is built around an anchor phenomenon that students make sense of through a series of driving questions that investigate phenomena or problems.



twigScience



More of this...

"Students **develop models of systems** within the natural world and use them to **explain phenomena** or **solve problems**."

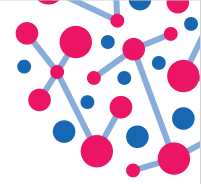
2016 Science Framework for California Public Schools

In the Grade 5 module **Yellowstone: Uncovered**, for example, students create models of food chains, food webs, and the interaction of the components within them—and then they use them to describe the movement of matter.



2

twigScience



More of this...

"Students learn science as an **iterative, dynamic, creative, and collaborative process** similar to how real scientists and engineers do their work."

2016 Science Framework for California Public Schools

Twig Science's **Spark-Investigate-Report-Connect-Reflect** structure gives students the freedom to share ideas and understand each other's roles as they work towards a common goal, just like real-life scientists and engineers.



3

1



Less of this...

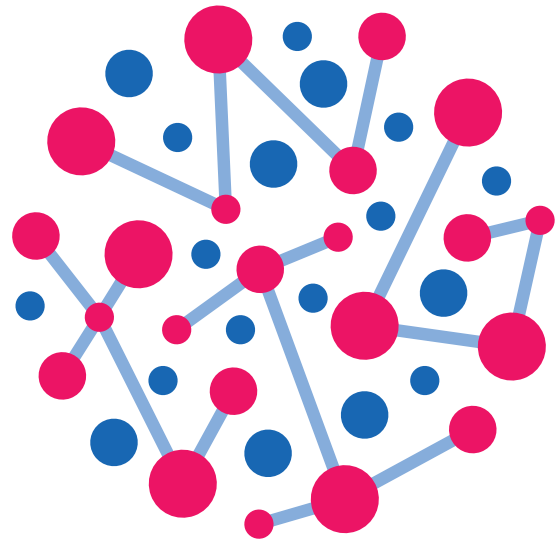
*"Students study the meaning of science content that teachers **explain to them.** Students **memorize definitions and rote procedures.**"*

2016 Science Framework for California Public Schools



1

twig Science



0

Less of this...

*"Students learn science as a **collection of facts** and learn that these facts were found using a **singular and linear 'scientific method,'** disconnected from how real scientists and engineers do their work."*

2016 Science Framework for California Public Schools



3

Less of this...

*"Teachers present **models that describe phenomena in the natural world.**"*

2016 Science Framework for California Public Schools



2

1

twig Science

More of this...

"Practices provide students with **relevant, real-world learning** in which they must **investigate** and **problem-solve** using **critical thinking**."

2016 Science Framework for California Public Schools

From investigating the energy needs of the United States to developing solutions to local water challenges, Twig Science embeds science challenges in real-life, relevant situations—so students understand why what they're learning matters.



4

twig Science

More of this...

"Students **build science and engineering understanding** using a variety of practices in **investigations, experiments, and project-based experiences**."

2016 Science Framework for California Public Schools

The BioTech Systems Worldwide module in Grade 6, for example, gets students exploring how the parts of the body work together via investigation, experiments, and an engineering project to design and build a prosthetic hand.



5

twig Science

More of this...

"Science content and science practice are **integrated**."

2016 Science Framework for California Public Schools

In Twig Science, students use the full range of Science and Engineering Practices (SEPs) to investigate and make sense of phenomena—from planning experiments, to analyzing data, to making evidence-based arguments.



6

twig Science

More of this...

"Student **reasoning and argumentation** play a central role in understanding labs and text."

2016 Science Framework for California Public Schools

Stanford SCALE language routines in Twig Science encourage students to develop as scientific thinkers, collaborators, and communicators—using evidence to explain and argue and understanding the importance of clarity and detail when presenting information.



7



2

Less of this...

"Student use one practice per investigation/experiment."

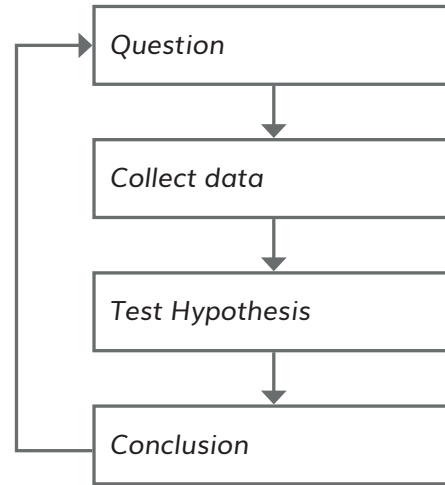
2016 Science Framework for California Public Schools



Less of this...

"Students learn to conduct investigations following step-by-step instructions."

2016 Science Framework for California Public Schools



Less of this...

Student thinking is limited by a 'cook book' approach to lab experiences and problems or end-of-the- chapter questions and test experiences.

2016 Science Framework for California Public Schools

Inquiry Activity
Get Rid Of Static Electricity

Materials

- Balloons
- Object made of wool (e.g. ball of yarn or a scarf)
- Paper confetti
- Spray bottle filled with water
- Dryer sheet
- Polyester cloth

Inquiry

1. Blow up the balloons
2. Rub one of the balloons with the woollen object
3. Hold the balloon above the confetti. Write down what you observe on a separate piece of paper.
4. Spray water onto the balloon and write down what you observe happening.
5. Repeat steps 2-4 using the dryer sheet instead of the water.
6. Repeat steps 2-4 using the polyester sheet instead of the water.

Result

7. Did the inquiry produce the result you predicted?

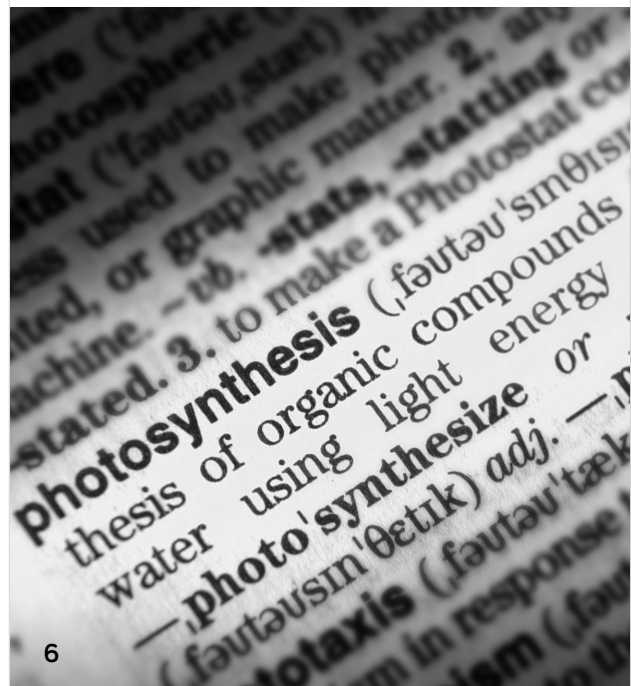
Sample Answer: The dryer sheet was the best at removing static electricity.

7

Less of this...

"Science content and practices taught in isolation."

2016 Science Framework for California Public Schools



twigScience

More of this...

"Science and engineering notebooks reflect student thinking using the science and engineering practices to understand content and show development and revision of student's scientific models."

2016 Science Framework for California Public Schools

Each Twig Science module includes an interactive, student-centered Twig Book—which becomes a portfolio of investigations, models, reflections, discourse, and revision of three-dimensional thinking.



8



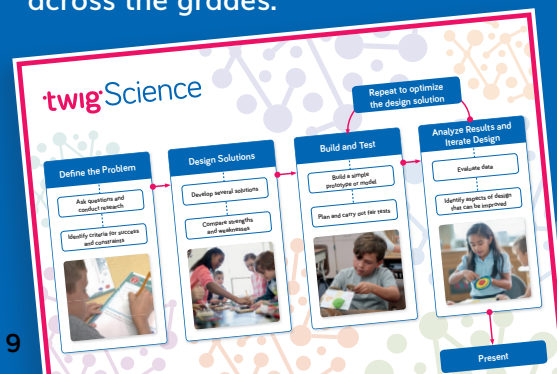
twigScience

More of this...

"Engineering is **integrated** into all science disciplines."

2016 Science Framework for California Public Schools

From designing an invention inspired by plants to building communication devices and earthquake-proof buildings, Twig Science integrates engineering into all science subjects across the grades.



9

twigScience

More of this...

"Engaging in science and engineering practices allows students to **revise their thinking and understanding.**"

2016 Science Framework for California Public Schools

Twig Science investigations encourage reflection and revision, with students finding solutions to fix things that don't work. Just as for scientists and engineers, there is no failure—only opportunity for learning and better understanding.



10



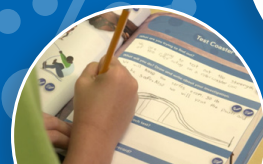
twigScience

More of this...

"Students are **actively** engaged in the practices through **investigations** and **experiments** and **technologies they have generated.**"

2016 Science Framework for California Public Schools

From testing out a new roller-coaster track in The Ultimate Playground to building a prototype prosthetic hand in Biotech Systems Worldwide, Twig Science challenges students to engage with SEPs by developing their own technological solutions to problems.



11

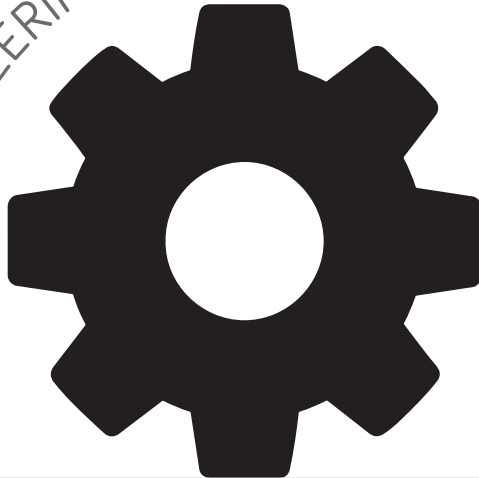


Less of this...

*"Engineering is treated as an **add-on.**"*

2016 Science Framework for California Public Schools

END-OF-UNIT
ENGINEERING CHALLENGE

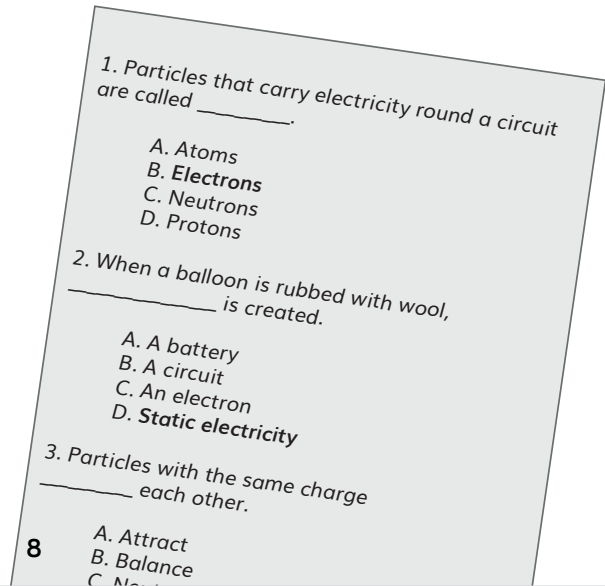


9

Less of this...

*"Science notebook reflects only students' ability to **take notes** or **copy teacher models.**"*

2016 Science Framework for California Public Schools



8

Less of this...

*"Students are **passively engaged** in watching or participating in **teacher-directed** investigations and experiments."*

2016 Science Framework for California Public Schools



11

Less of this...

*"The science process is just things to **learn/apply** and **'be done.'**"*

2016 Science Framework for California Public Schools



10

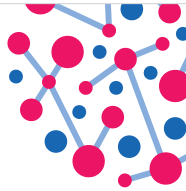
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twig Science

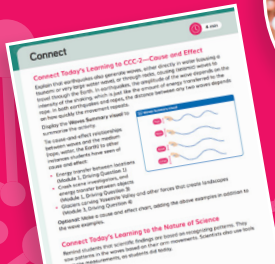
More of this...

"Crosscutting concepts **build deeper and connected understanding** of science as a whole."

2016 Science Framework for California Public Schools



Every Twig Science lesson includes multiple opportunities for students to connect their learning to Crosscutting Concepts, linking the domains of science and placing science understanding in broader contexts.



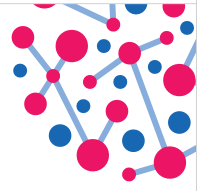
12

twig Science

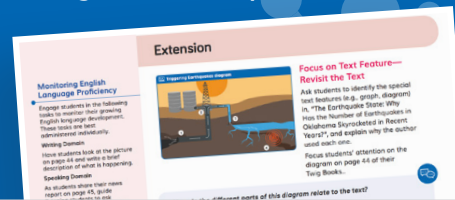
More of this...

"Connection of the practices to the **goals of literacy in science** (purposeful reading, writing, speaking, and listening to strengthen science understanding) is fostered."

2016 Science Framework for California Public Schools



In Twig Science, students listen, speak, read, and write using thousands of high-quality films, articles, and features, via student-centered Twig Books, magazine-style Levelled Readers, trade books, supplemental Twig Science Tools, and weekly science news roundups from Twig Science Reporter.



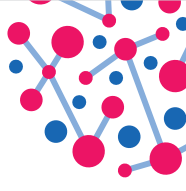
13

twig Science

More of this...

"**Student-to-student discourse is productive**, using practices to explain phenomenon or solve problems."

2016 Science Framework for California Public Schools



Twig Science lessons promote productive and collaborative discourse. For example, in the Grade 4 module Earthquake Engineering, students regularly discuss their observations and progress in pairs, groups, and whole-class presentations.



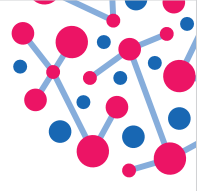
14

twig Science

More of this...

"**Teacher questioning prompts and facilitates students' discourse and thinking.**"

2016 Science Framework for California Public Schools



Twig Science questioning routines, with multiple and varied discussion prompts, are designed to involve as many students as possible and help to support and develop a classroom climate where learning can be most effective.



15

4



Less of this...

*"Reading and writing **disconnected** from the purpose of learning."*

2016 Science Framework for California Public Schools



13

Less of this...

*"**No connection** among science content."*

2016 Science Framework for California Public Schools

Life science



Physical science



Earth science



12

Less of this...

*"Teacher questions students to seek a **confirmatory right answer.**"*

2016 Science Framework for California Public Schools



15

Less of this...

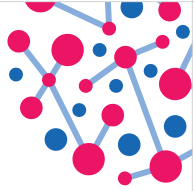
*"Student-to-student discourse is **limited** due to activities that provide only **one exact outcome.**"*

2016 Science Framework for California Public Schools



14

twigScience



More of this...

"Learning takes place routinely in **a variety of settings**: in the classroom, outdoors, in school gardens and in the field, in museums and aquariums, and in the community."

2016 Science Framework for California Public Schools

Photographing plants in the school grounds, monitoring the night sky, or getting family involved via outreach letters...student learning in Twig Science connects science to the real, varied world around them.



X

5

X

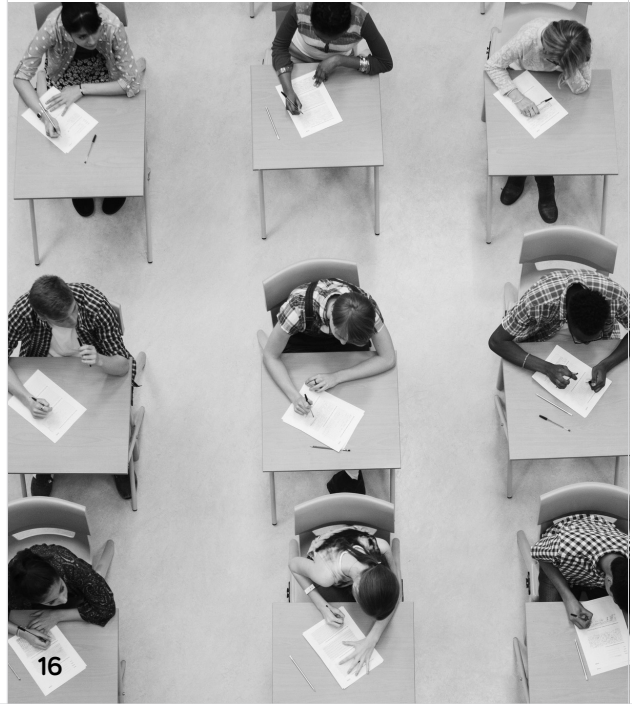
X



Less of this...

***"Learning only occurs indoors
in the classroom."***

2016 Science Framework for California Public Schools



x

5

x

x