twig SCIENCE





NGSS Framework Administrator Overview

This document introduces the NGSS Framework to school principals and administrators, providing an overview of the main instructional and conceptual shifts that the NGSS Framework requires. Principals play a critical part in the implementation process of the new standards, and this resource serves as a useful guide for administrators adjusting to the adoption of the K–12 Next Generation Science Standards (NGSS).

What are the Next Generation Science Standards?

The NGSS aim to prepare students to be future citizens and future scientists. Covering every grade and scientific discipline, they detail the scientific skills that students should acquire.

The standards emphasize "three-dimensional" (3-D) learning, incorporating three different dimensions: **Science and Engineering Practices (SEPs)**, **Disciplinary Core Ideas (DCIs)**, and **Crosscutting Concepts (CCCs)**.

These three dimensions encourage students to see science as more than just a series of isolated facts. Students are encouraged to view science as an interrelated world of inquiry and phenomena, and learn processes, ideas, and concepts that are relevant to all the sciences.

The NGSS represent a fundamental shift in science education, with a new approach to teaching. Teachers will be able to use numerous strategies to engage students and provide opportunities for them to show what they have learned.

There are 16 instructional shifts in science education that should be addressed by science programs used to teach the NGSS.

Use the checklist below as your guide to whether the program you are looking at will help you implement these instructional shifts in the classroom.

These instructional shifts are embedded at every level of Twig Science, and are called out to students through **BLUE** and **PINK** text in their Twig Books.

More of this...	Less of this...	Twig Feature	✓
"Students engage in the NGSS practices to build a deeper understanding of science and engineering content and make sense of phenomena and design solutions."	"Students study the meaning of science content that teachers explain to them. Students memorize definitions and rote procedures."	Each Twig Science module is built around an Anchor Phenomenon that students make sense of through a series of Driving Questions which investigate phenomena or problems.	☐
"Students develop models of systems within the natural world and use them to explain phenomena or solve problems."	"Teachers present models that describe phenomena in the natural world."	In the Grade 5 module Yellowstone: Uncovered, for example, students create models of food chains and food webs, and the interaction of the components within them—they then use their models to describe the movement of matter.	☐
"Students learn science as an iterative, dynamic, creative, and collaborative process similar to how real scientists and engineers do their work."	"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."	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 toward a common goal, just like real-life scientists and engineers.	☐
"Practices provide students with relevant, real-world learning in which they must investigate and problem solve using critical thinking."	"Students learn to conduct investigations following step-by-step instructions."	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 are learning matters.	☐

imagine learning

More of this...	Less of this...	Twig Feature	✓
"Students build science and engineering understanding using a variety of practices in investigations, experiments, and project-based experiences."	"Student use one practice per investigation/experiment."	The Grade 2 module A Garden for Life, for example, gets students exploring the structure and function of plant parts, and the body parts of the animals that pollinate them, via investigation, experiments, and an engineering project to design a pollinator garden.	☐
"Science content and science practice are integrated."	"Science content and practices taught in isolation."	In Twig Science, students use the full range of SEPs to investigate and make sense of phenomena—from planning experiments, to analyzing data, to making evidence-based arguments.	☐
"Student reasoning and argumentation play a central role in understanding labs and text."	"Student thinking is limited by a 'cook-book' approach to lab experiences and problems or end-of-the-chapter questions and test experiences."	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.	☐
"Science and engineering notebooks reflect student thinking using the science and engineering practices to understand content and show development and revision of students' scientific models."	"Science notebooks reflect only students' ability to take notes or copy teacher models."	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.	☐
"Engineering is integrated into all science disciplines."	"Engineering is treated as an add-on."	From designing an invention inspired by plants, to building communication devices and earthquake-proof buildings, Twig Science integrates engineering into all science disciplines across the grades.	☐
"Engaging in science and engineering practices allows students to revise their thinking and understanding."	"The science process is just a thing to learn/apply and 'be done.'"	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.	☐
"Students are actively engaged in the practices through investigations and experiments and technologies they have generated."	"Students are passively engaged in watching or participating in teacher-directed investigations and experiments."	In the Grade 3 module The Ultimate Playground, for example, students test out a new roller-coaster track, which challenges them to engage with SEPs by developing their own technological solutions to problems.	☐
"Crosscutting concepts build a deeper and more connected understanding of science as a whole."	"No connection among science content."	Every Twig Science lesson includes multiple opportunities for students to connect their learning to CCCs, linking the domains of science and placing science understanding in broader contexts.	☐
"Connection of the practices to the goals of literacy in science (purposeful reading and writing to strengthen science understanding)."	"Reading and writing disconnected from the purpose of learning."	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 Leveled Readers, trade books, supplemental Twig Science Tools, and weekly science news updates from Twig Science Reporter.	☐
"Student-to-student discourse is productive, using practices to explain [phenomena] or solve problems."	"Student-to-student discourse is limited due to activities that provide only one exact outcome."	Twig Science lessons promote productive and collaborative discourse. In the Grade 4 module Earthquake Engineering, for example, students regularly discuss their observations and progress in pairs, groups, and whole-class presentations.	☐
"Teacher questioning prompts and facilitates students' discourse and thinking."	"Teacher questions students to seek a confirmatory right answer."	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.	☐
"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."	"Learning only occurs indoors in the classroom."	From photographing plants in the school grounds, to monitoring the night sky, and getting family involved via outreach letters, students' learning in Twig Science connects science to the real, varied world around them.	☐

"More of this..." and "Less of this..." statements are quoted directly from the **2016 Science Framework for California Public Schools,** Chapter 11, pp.1444–1445.