

Background Information: Discovery Education

Science Techbook for California NGSS (2017-2018)

Description and Detail on NGSS Design:

Science Techbook was designed and written to the Next Generation Science Standards (NGSS) and immerses students into real world anchor and investigative phenomena to drive learning. Designed to change the way students and teachers experience science, Science Techbook helps teachers transform instruction with a simple-to-use and highly interactive program.

Science Techbook addresses the requirements of the NGSS through a rigorous set of standards and three-dimensional experiences. Each concept within Science Techbook identifies the performance expectations with appropriate disciplinary core ideas, crosscutting concepts, and science and engineering practices (DCI, CCC, and SEP)—creating a progression of learning opportunities for students and setting a high bar for content acquisition.

The three dimensions of DCI, CCC, and SEP are also color coded and labeled throughout each concept. Science Techbook students will become immersed in the work of scientists and engineers, developing their own scientific explanations by:

- > exploring the overarching themes of science,
- > asking questions,
- > making claims,
- > supporting claims with evidence,
- > designing solutions to real-world problems,
- > developing the practices that scientists and engineers use daily, and
- > identifying the cross-cutting connections between science

Each unit of Science Techbook begins with anchor phenomena-driven questions used as catalysts student-activated investigation, and brought to life with dynamic multimedia, triggering students' natural sense of curiosity. Within each unit, students progress through concepts (think of a concept as a "chapter" in a traditional textbook) organized using the 5E instructional model (Engage, Explore, Explain, Elaborate, Evaluate).

Every concept includes a Model Lesson only viewable by teachers. Model Lessons utilize the 5E Instructional Model, which facilitates a student-centered approach to learning. The Model Lesson includes an overview of the applicable standards and essential learnings, support for planning instruction including: materials, common misconceptions related to that concept, instructional strategies and recommendations for differentiation, safety information, and links to related Discovery Education resources. Each Model Lesson is a multi-day instructional pathway through the content. Teachers can toggle instantly between a student-view and teacher-view for each concept. In teacher-view, teachers have embedded teacher notes at point-of-use, answer keys, rubrics, and additional teacher resources.

Below is a more detailed overview of the 5E instructional flow within a concept:

ENGAGE: Science Techbook introduces concepts to students as real-world phenomena. This is the opportunity to engage students and inspire them to ask questions they want to investigate. Students can interact with a variety of text and multimedia resources to match their diverse learning styles. Interactive formative assessments are embedded and provide feedback to teachers on prior knowledge and common misconceptions students may be bringing to the concept. These assessment items feed directly into the student and teacher dashboard.

The Can You Explain section at the bottom of the page provides framing questions that students should be able to answer, as a claim with evidence, at the end of their learning progression. This driving question will display for students again during the Explain portion of the lesson.

EXPLORE: Students will obtain and analyze information to collect evidence to support their claim related to the Can You Explain question. Students complete a variety of activities to make sense of disciplinary core ideas and demonstrate three-dimensional learning. Through the interface constructed to support Universal Design for Learning, students will access the Core Interactive Text, or CIT. The CIT blends text and media for students with different abilities and learning styles. To assist students in accessing the text and unlocking the content, students can:

- highlight,
- add sticky notes,
- have the text read aloud,
- toggle between two differentiated reading levels,
- toggle between English and Spanish versions of the text,
- access the interactive glossary, which uses animation, text, video and images to help students comprehend the scientific language

This interactive and multimodal approach helps students make sense of complex topics. In addition, Science Techbook includes Virtual Labs and nearly 2,000 hands-on activities allow students to practice designing and carrying out investigations and using models. Virtual Labs provide a simulation where students can collect and analyze data, use computational thinking, construct explanations, and evaluate information. In the hands-on labs and activities, students can design and conduct scientific investigations. Teacher guides suggest how to guide students through the procedure or how they can have students develop their own questions, investigations, and explanations.

Within Explore there are additional formative checks for understanding that allow students to apply their content knowledge in a variety of assessment type items. Technology Enhances Items (TEI's) have been embedded throughout each concept to uncover what students know and allow students to demonstrate three-dimensional proficiency of the academic standards. Scaffolded remediation is automated and built right in! Students can try up to three times and get feedback, and then a full explanation. Student responses feed directly to the teacher dashboard, providing instant access to data to inform instruction. The Teaching Learning Dashboard in Science Techbook allows teachers to track student progress on assessment items in real-time, with easy to read color coding.

EXPLAIN: Students use evidence collected during Engage and Explore to construct scientific explanations. They can analyze both empirical and textual evidence to make a claim and provide reasoning on how the evidence supports the claim. After completing their explanation, students present

it to their peers, critique others' explanations, and refine their own through various modes of media. This can all be done through online entry or printed for student use.

ELABORATE with STEM: The elaborate tab provides students with additional opportunities to apply three dimensional learning. Students can extend their understanding through additional real-world connections. There's an emphasis on problem solving and real-world connections to math and literacy, including careers related to the science concepts. Students can work through the resources provided or teachers can assign specific projects located in the STEM Project Starters section. These project starters clearly connect science to technology, engineering and/or mathematics.

EVALUATE: Students can review concepts with Self Assessments graded in real time that provide remedial resources for any questions that students get incorrect. In the teacher view, teachers can also assign a constructed response item, summative concept assessment, or create their own assessment.

Science Techbook is easy to use, anywhere, anytime. The streamlined design provides an easy-to-follow experience, accessible from any device, 24/7. Plus, a one-to-one classroom is not needed. Science Techbook can be used with any amount of technology—a classroom full of laptops, tablets, individual smart phones, or a single interactive white board.

Efficacy:

Discovery Education digital solutions and professional development have been vetted by school districts, state adoption teacher panels, and independent third parties. Research results link Science Techbook to positive impacts on student learning throughout the United States and the world.

Teacher panels using the IMET and EQiP rubrics favorably reviewed NGSS versions of Science Techbook as part of the adoption processes in California, West Virginia, and Oregon.

A recent study found 34 performance indicators to show that schools with Discovery Education's services performed better on North Carolina's state assessments. [The analysis of student assessment data in 2016-2017 at North Carolina's 2,404 public schools](#) also revealed striking results among African-American students, demonstrating up to an 11-point statistically significant advantage over schools without Discovery Education services such as Science Techbook, Math Techbook, and Streaming Plus.

[Research results show that students in Collier County Public Schools in Florida benefited from using Science Techbook.](#)

- 66% of ELL students more likely to score at proficient or higher on FCAT
- 17-point increase in 8th grade FCAT scores
- 4-point increase in 5th grade FCAT scores
- 27.7% increase in Biology EOC proficiency

Evidence shows that when educators within Charlotte-Mecklenburg Schools in North Carolina used Discovery Education Science with students, [it led to increased student performance on end-of-course exams.](#)

Substantial association has been found between the use of Discovery Education Science and the change in the percentage of students who reached proficiency after a retest. [Research shows that an increase in](#)

[Discovery Education Science use produced a proportional increase in the change in this percentage.](#)

Science Techbook came out on top in a recent analysis of SpotOn™ ratings of over 200 digital resources. SpotOn, an initiative of The Ohio State University, is a free online database created to support the evaluation and selection of K-12 digital content. Science Techbook (K-12) had the...

- highest overall SpotOn Score, on average.
- highest average rating in the Pedagogy and Technology SpotOn Dimensions.
- second highest average rating in the Content and Standards SpotOn Dimensions.

Science Techbook was certified through a new framework for STEM education developed by the [New York Academy of Sciences](#). The Global STEM Alliance (GSA)'s STEM Education Framework is a new standard for STEM education promoting 21st-century skills. Science Techbook was evaluated by an advisory board of education experts, including members of SRI Education, an established leader in STEM education research. The framework is used to help evaluate quality STEM instruction based on 26 criteria, grouped into three categories of core competencies, instructional design, and implementation.