



## Amplify Science

A collaboration between the science education experts at UC Berkeley's Lawrence Hall of Science and the instructional technology experts at Amplify, Amplify Science is an NGSS-designed curriculum built to empower students to investigate, talk, read, write, think, and argue like real scientists and engineers through investigations of real-world problems and scientific phenomena.

## NGSS-designed

The Amplify Science program adheres to the letter and spirit of the Next Generation Science Standards. Students build knowledge across disciplines each year so that past learning is connected to new concepts, applied to new phenomena, and further developed in each successive year. Moreover, the Amplify Science curriculum boasts the following three-dimensional features:

- **Learning organized around the explanation of real-world phenomena.** Each Amplify Science unit introduces students to a realistic problem that they must solve by developing the ability to explain a surprising or mysterious phenomenon. This emphasis on phenomena, especially those that foster cross domain connections, strengthens the three-dimensional integration.

- **Careful bundling and sequencing of performance expectations to support deep understanding.** Amplify Science units bundle and sequence the performance expectations to support the development of deep and coherent understanding. Each course of Amplify Science includes a set of units, which together, completely address the NGSS performance expectations across Grades 6-8. There are also opportunities to revisit ideas across courses when that provides an opportunity to deepen or extend understanding.
- **Meaningful focus on crosscutting concepts (CCCs).** Explicit attention to a CCC will help students use prior experience with the same CCC to make sense of the phenomenon they are currently investigating. That experience can also deepen their understanding of the concept itself, thereby amplifying the explanatory power of that specific CCC as a conceptual tool when encountering a new phenomenon. Every unit of Amplify Science has one or more emphasized CCCs that are focal to instruction, and students have opportunities to connect to the same CCCs featured in other units.
- **Thoughtful inclusion and sequencing of science and engineering practices (SEPs).** While each performance expectation cites just one SEP, students must explore that performance expectation's disciplinary core ideas via multiple SEPs across multiple lessons. In each unit, students engage, investigate, explain, argue and apply via a carefully designed bundle of SEPs that lead to deep understanding of the disciplinary core ideas. By consistently, enjoyably, and successfully using multiple SEPs to understand phenomena across multiple domains, students gain depth of understanding and experience science as a unified, integrated whole.

In addition to three dimensional learning, the Lawrence Hall of Science and Amplify teams have wholeheartedly embraced the important NGSS principle of access and equity. Amplify Science has been carefully and thoughtfully designed to ensure that the scientists, engineers, and other people students encounter throughout the program represent the demographic diversity of our world. Additionally, to support teachers in providing the best possible daily instruction, every lesson includes an extensive differentiation section that describes what is built into the lesson to support diverse learning needs, highlights potential challenges teachers should be aware of, and provides specific strategies for differentiating instruction for students of varying abilities.

## Supplemental support

In addition to an array of instructional supports that are embedded within the curriculum itself, Amplify Science offers a robust menu of professional support options that empower teachers to implement the program effectively with all types of learners. From a district's initial decision to adopt Amplify Science through all stages of implementation that follow, we offer a range of valuable professional learning options, all led by Professional Learning Specialists who have trained with the program developers at UC Berkeley's Lawrence Hall of Science. Intensive onsite and/or remote trainings that address both Amplify Science technology and content are available to ensure every educator feels well-equipped and excited to use the program with their students.

## Research basis and program efficacy

The Amplify Science program is grounded in the ambitious vision articulated in the Framework for K–12 Science Education (National Research Council, 2012). It also incorporates the latest research in student learning, including but not limited to:

- **Emphasis on coherence.** Each Amplify Science unit is designed around a unit-specific learning progression (called a Progress Build) that describes the increasingly complex explanations of the unit's anchoring scientific phenomena that students should be able to make over the course of the unit. In developing the units, the Progress Builds provided structure for each unit's sequence of lessons, facilitated the productive integration of assessment and ensured that students have a clearly articulated path for engaging with each unit's targeted performance expectations.
- **Real-world problems and roles.** Each Amplify Science unit introduces students to a realistic problem that they must solve by developing the ability to explain a surprising or mysterious phenomenon. The focus on “figuring out phenomena” rather than on “learning about topics” provides structure and context to student investigations. Students also take on the role of a specific type of science or engineering professional throughout their investigation. Such authentic learning experiences have been widely demonstrated to increase cognitive engagement in science learning.

- **Expanding investigation opportunities through digital**

**enhancements.** Amplify Science is a digitally-enhanced curriculum, rather than a digital curriculum. In addition to hands-on experiences, scientific texts, and classroom conversations, units include digital simulations and tools that help students collect and analyze data, visualize complex phenomena, iteratively develop models, and design optimized engineering solutions. The Amplify Science simulations are highly interactive and allow multiple levels of investigation and exploration that are carefully aligned with each unit's learning progressions.

Leveraging research-based best practices was one part of the rigorous research and development process that was employed to create Amplify Science. This process also included frequent consultation with disciplinary experts and practicing scientists, developmental pilot tests, iterative content development, and large-scale field tests. Field testing enabled the Lawrence Hall of Science to research how well the materials worked in the hands of real teachers, and in a wide range of classroom contexts. More than 475 teachers and 34,000 students in cities, suburbs, and rural communities across the country used Amplify Science in their classrooms between 2014–2016. Students who participated benefited from their use of the curriculum, with data analysis showing, on average, a forty-six percent growth in student knowledge across the middle school units. Translated into letter grades, this is equivalent to a student increasing two grades. Additional efficacy research is currently underway, including two randomized control studies led by WestEd, an independent third-party research organization.