



FOSS Publisher Background | December 2019

FOSS: Research-based, classroom-proven, time-tested

Every student deserves the benefits of science education—not just exposure to scientific phenomena, but the opportunity to explore and explain them. The curriculum designers at the Lawrence Hall of Science created the FOSS® Program to expressly to afford that opportunity to all, regardless of background, culture, language, or ability. This research-based curriculum effectively engages all students through collaborative, active investigation of observable phenomena—a teaching philosophy subsequently codified with the arrival of the Next Generation Science Standards (NGSS).

- FOSS is grounded in classroom realities and in learners' interests and experiences. Its content is teachable and learnable over multiple grade levels, as students grow in ability to reason and integrate complex ideas within and between disciplines.
- FOSS is crafted with a structured, yet flexible, philosophy that embraces 21st century skills: collaborative teamwork, critical thinking, and problem solving. The FOSS curriculum design promotes a classroom culture that allows both teachers and students prominent roles in managing the learning experience.
- FOSS is built on the principle that scientific understanding and thinking are essential to citizenship and teachable in every classroom. Formative assessment in FOSS creates a community of reflective practice, mutual respect, and collaboration between teacher and students directed toward learning and growth.



Honoring the letter and spirit of NGSS for every student

While some recent programs place the phenomenon at the start of every lesson in a rigid “one size fits all” formula, FOSS lessons carefully create a level playing field so that all learners have a logical context to recognize a phenomenon’s significance as it is introduced. This student-centered approach honors the spirit of NGSS by ensuring that all learners can make sense of phenomena and solve problems, leading students to a coherent understanding of practices, crosscutting concepts, and disciplinary core ideas. FOSS makes science accessible and equitable for every student in every classroom, leading to its emergence as the nation’s most adopted science program.

Alignment with NGSS three-dimensional learning

Over a quarter century before the inception of *A Framework for K–12 Science Education* and NGSS, FOSS was applying research-based practices to engage students as scientists, challenging students to make sense of real-world phenomena as they learned how to solve problems. Today, FOSS embodies the ideas about three-dimensional learning upon which the standards were built—allowing for the development of the development of conceptual knowledge and scientific thinking as described below.

Each FOSS Next Generation course contains multiple investigations (3-4 investigations for half-length courses and 8-10 investigations for full-length courses). In every FOSS investigation, students develop increasingly complex knowledge and understanding through engagement with the three dimensions of NGSS.

- Science and engineering practices are the cognitive tools scientists and engineers use to answer questions and design solutions. FOSS students use these tools to gather evidence and explain real-world phenomena.
- Grade-level appropriate disciplinary core ideas are the concepts and established ideas of science. FOSS students develop these building blocks throughout investigations to make sense of phenomena.
- Crosscutting concepts help students connect the varied concepts and disciplines of science. FOSS students apply these concepts to different situations in order to make connections and develop comprehensive understanding.

The FOSS course sequence provides opportunities for students to develop understanding over time, by building on foundational elements or intermediate knowledge that leads them to understanding of the core ideas. Students develop this understanding by engaging in the appropriate science and engineering practices and through exposure to the crosscutting concepts.

While FOSS is designed around active investigations that engage students with real-world phenomena, these firsthand investigations are surrounded and supported by a wide range of experiences that not only help build student understanding of core science concepts, but ingrain the habits of scientific thinking. Each course deploys a carefully integrated variety of pedagogies, all based in research and refined in real-world classroom experience. These include:

- Active investigation in collaborative groups, providing firsthand experiences with phenomena in the natural and designed worlds.
- Recording in science notebooks to answer a focus question dealing with the scientific phenomenon under investigation.
- Reading informational texts in FOSS Science Resources books.
- Online activities that let students acquire information and extend their investigations.
- Opportunities to apply knowledge to solve problems through the engineering design process or to address ecological issues.
- Embedded, performance, and benchmark assessments, during and after active investigations and readings, to monitor progress toward NGSS performance expectations.



In the Oakland Unified School District, we evaluated middle school science instructional materials based on six criteria: (1) NGSS alignment, (2) Supports for Language, Literacy, and Common Core connections, (3) Equity and Access, (4) Assessment, (5) Teacher Usability, (6) Quality of Student Materials. Our teachers and students rated Next Generation FOSS highest in every single category. We are proud to provide teachers and students with instructional materials that promote both teacher and student learning.

Brenda Tuohy, STEM Director, Oakland Unified School District
California

Classroom-proven efficacy

FOSS has earned educators' confidence through decades of classroom-proven results. No other science curriculum comes close to the record of successful implementation amassed in grades K–8 by FOSS. FOSS has brought active-science learning to **more classrooms** than any other program.

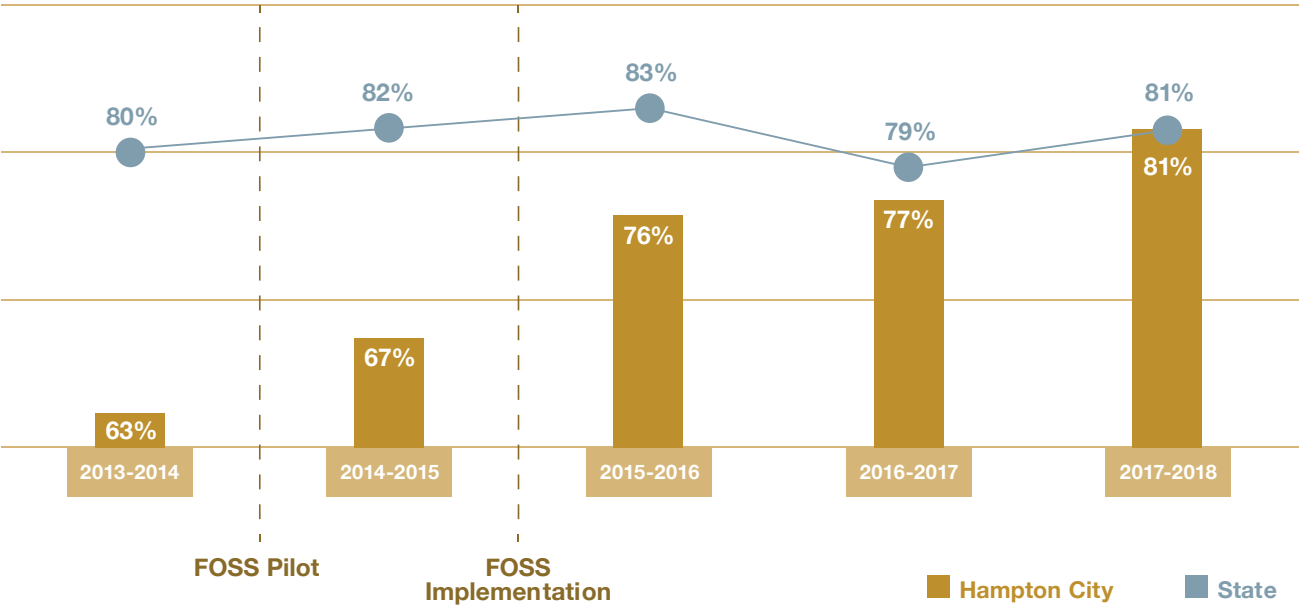
- FOSS has contributed to the development of **hundreds of thousands** of science graduates, critical thinkers, and scientifically literate citizens over three decades.
- FOSS has provided **more professional learning** to educators than any other science program.
- FOSS has played a significant role in the development of **science education leaders** across the nation.
- And FOSS is field-proven to implement active-science teaching on a scale **unmatched in American classrooms** by any other science curriculum.

The most awarded, most adopted U.S. science program

FOSS has been taught by over 100,000 teachers to more than 3.5 million students in all 50 states. Developed and continually refined at UC Berkeley's Lawrence Hall of Science, FOSS consistently applies its principles of active investigation across the middle school and elementary grades, where it has earned recognition by experts and organizations for its proven quality, rigor, support, and effectiveness.



Proven nationwide to raise standardized test scores



VA Standards of Learning Science Pass Rate for Hampton City, VA

FOSS was implemented in a large Virginia district that lagged nationwide test norms by 17 percentage points. By 2018, just three years after full-scale FOSS implementation, the gap was completely closed.

As a science teacher I used FOSS exclusively to provide my students with a wonderful inquiry-based hands-on experience. This experience helped to foster a love of science in all of my students. As a result, my students exceeded norms on the state Science Assessment, which catapulted me into this new position where I am charged with sharing this passion for hands-on exploratory activities for a portfolio of 36 schools within my network.

Wesley M., Science Instructional Support Leader
Illinois



Supplemental services beyond the curriculum — and beyond any competitor

Professional learning unmatched by any other science program

FOSS delivers more professional learning to science educators than any other curriculum. FOSS builds strong and lasting partnerships with district and school science leaders. Moreover, FOSS develops collaborative experiences of professional learning, engaging teachers with effective instructional pedagogies and important science concepts using FOSS classroom materials. FOSS helps you build a multi-year customized plan for your district, providing experienced consultants to facilitate workshops and developers to provide online assistance, then sustaining the progress of your implementation through ongoing support.

Spanish language support

FOSS supports Spanish speaking students and Two-Way Immersion (TWI) schools. Spanish editions of FOSS Science Resources are offered both in print and eBook. FOSSweb provides audio files for FOSS Science Resources, as well as notebook, assessment, and teacher masters, module vocabulary and definitions, teaching slides, and Focus Questions—a total package of support proven superior in real-world pilot testing.

Technology integrated into the learning experience

FOSS employs digital teaching tools fully integrated into every module. FOSSweb offers online simulations and virtual investigations. Online activities provide differentiating instruction. Student eBooks and streaming video are also included. Teachers find extra support in comprehensive preparatory videos and instructional slides.

Ongoing revision and teacher support

Printed and online resources include grade-level chapters on sense-making and three-dimensional teaching and learning; connections to Common Core ELA and Math standards; taking FOSS outdoors; access and equity in science; science-centered language development; using science notebooks; and notebook, teacher, and assessment masters.

Standards alignment in principle and practice

FOSS® Next Generation™ fulfills the vision of NGSS and the Framework. Designed around learning as a developmental progression, it integrates scientific knowledge with the practices of science and engineering. FOSS is aligned closely with NGSS Performance Expectations, and each module includes an explicit list of the core ideas, practices, and crosscutting concepts it will teach.

Published by the industry leader

Delta Education, a division within School Specialty Inc., is the largest publisher of curriculum-based elementary school science kits in the United States. Together with our partners at the Lawrence Hall of Science, Delta Education is delighted to supply FOSS nationwide, and proud to provide best-in-class support befitting the established gold standard of science education.

