



Publisher Background

[The Smithsonian Science for the Classroom](#) is a curriculum developed by the Smithsonian Science Education Center and sold by [Carolina Biological Supply Company](#). It is designed from the ground-up to meet the Next Generation Science Standards, engage students in phenomenon- and problem-driven learning, elicit and leverage students' prior knowledge and experiences, provide a comprehensive assessment system to monitor student progress, support every student, and provide teachers with implementation support. It was developed in consultation with teachers and content experts and field tested in a range of schools with diverse populations. It draws on the latest findings and best practices from educational research with proven results.



Bringing the Smithsonian into the Classroom

Through Smithsonian Science for the Classroom, we leverage the unparalleled network of scientists and artifacts across the Smithsonian’s museums and research centers to bring the history, art, culture, and science of the Smithsonian to students in their classrooms. Our science curriculum is designed so that students learn life science, earth and space science, physical science, and engineering in an integrated way through experiential learning. Each kit contains all of the hands-on materials, printed books, and digital interactives (simulations, digital games, videos, and eBooks) needed for one to three classrooms to ensure all students are engaged and challenged in science. A set of on-grade, below-grade, English, and Spanish readers called “Smithsonian Science Stories” accompanies each module. This literacy series has over 600 references and images to Smithsonian artifacts, museum exhibits, researchers, and even our beloved Smithsonian Zoo animals to capture the attention of all learners in a way that makes STEM accessible to them.

Curriculum Structure

Smithsonian Science for the Classroom has 24 modules and is designed to be a comprehensive core science program for grades K–5. We organized the NGSS Performance Expectations (PEs) into four “bundles” that correspond to four modules per grade. If all four modules are used within the year, then students should be prepared to meet all the NGSS PEs at that grade level. Within a grade level, the modules may be used in any sequence.

The modules are organized into four topical “strands”: life science, earth and space science, physical science, and engineering design. There is one module in each strand per grade level. While the strands serve as organizing themes, the modules themselves are interdisciplinary and always include PEs from at least one topic besides the designated strand.

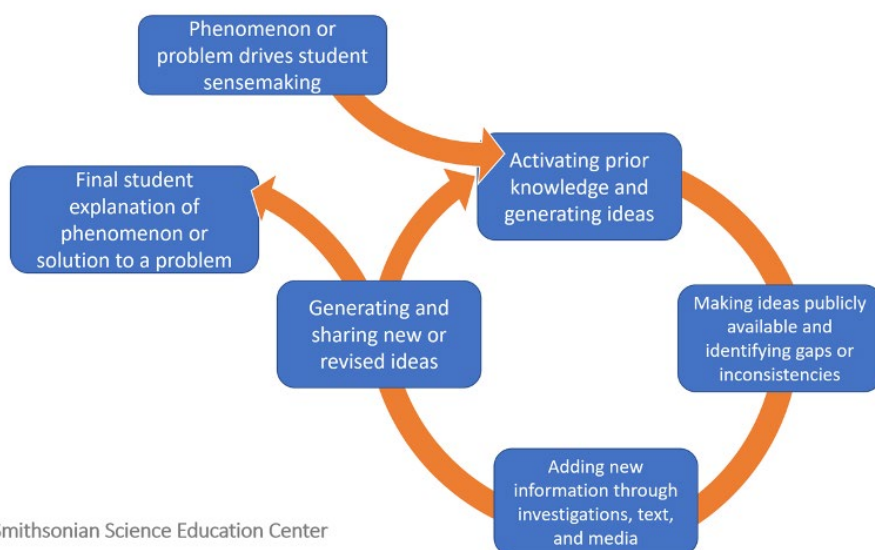
Phenomenon and Problem-Driven Learning

Each Smithsonian Science for the Classroom module --written by an experienced curriculum developer with classroom experiences--- includes multiple phenomena and problems. Phenomena are observable events in the universe, for example a fossil of an ocean organism that is found in a desert. A problem is a situation that engineers want to solve, such as a town not having access to enough freshwater for both farmland and industry. Some phenomena and problems may be familiar to



students, such as a tree that is wet on one side and dry on the other. Others may be less familiar, such as a piece of African silver jewelry made using wax. Whether familiar or unfamiliar, all phenomena and problems allow students to draw on their prior knowledge and experiences to come up with an initial explanation or solution. Students do a series of activities to collect evidence, and build on their initial ideas to develop a revised explanation of a phenomenon or solution to a problem.

Sensemaking in Science Education



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Students using Smithsonian Science for the Classroom have opportunities to collect evidence through hands-on investigations, informational text, and digital simulations before generating and sharing new or revised ideas about a phenomenon or problem.

Centered on Student Ideas

As a student-centered curriculum, Smithsonian Science for the Classroom recognizes that students' everyday experiences provide a rich foundation of science knowledge and skills. Research has shown that students' prior knowledge and experiences, even in the early grades, offer robust resources for making sense of natural phenomena and solving problems (National Research Council, 2007; Keifert & Stevens, 2019). Students' ideas are placed front and center through STEM notebooks, group work, class charts, and presenting ideas publicly in whole-class discussions.

Three-Dimensional Learning and Assessment

Smithsonian Science for the Classroom modules are designed to help students



construct and use elements of the Disciplinary Core Ideas (DCIs), Science and Engineering Practices (SEPs), and Crosscutting Concepts (CCCs). The series embeds opportunities for pre-, formative, and summative assessments within each module, and teachers are given tools to evaluate student performance across all three dimensions. Students complete a pre-assessment at points in the module where students encounter a new concept. During pre-assessments students have an opportunity to provide their initial explanations of a phenomenon or their initial understanding of or solutions to a problem. Reading, viewing, and/or hearing students' initial ideas provides teachers an opportunity to understand what students already know about key module concepts. Following the pre-assessment, subsequent lessons include tasks that require students to use their skills and knowledge in progressively complex ways. These formative assessment tasks incorporate at least two and often all three NGSS dimensions. Checkpoint assessments occur at key points where students should be able to explain certain science concepts before moving on. All modules have a culminating science or design challenge that serves as a summative performance assessment.

Coherence

Smithsonian Science for the Classroom provides students a coherent learning experience both within modules and across the series as a whole. Within a module, students' use key module concepts and practices with increasing sophistication as they progress through the module. As students move through the grades, they build on knowledge of earlier concepts and use science practices in more complex ways. Teacher background information and point-of-use series connections provide teachers support to make these connections explicit for students.

Support for All Students

Field testing, extensive teacher feedback, and a strong research base on how all students learn across a spectrum of human ability are integrated into the development of each module to ensure we provide support of all students. We used a universal design approach in our series development. Examples of this include offering a variety of ways for students to demonstrate their knowledge and skills; using large, sans serif fonts in student-facing materials such as notebook sheets; and providing picture-based or simple text directions for student reference during activities. Phenomena and problems were selected so that students from different backgrounds can connect with the content. For example, kindergarten phenomena include hot pavement and wet trees. Context is provided when phenomena may be



unfamiliar to students. For example, in grade 1 life science, students are introduced to penguins through video.

Evidence of Efficacy

This Second Edition evolved from the research-based STC program and Smithsonian Science for the Classroom First Edition, which were each shown in randomized controlled trial studies to demonstrate statistically significant, positive increases in students' science test scores relative to their "business as usual" counterparts. The most recent study was a five-year randomized controlled study in 37 rural, under resourced schools across seven school districts in two states. One group of schools utilized Smithsonian Science for the Classroom, First Edition for grades 3-5 with supporting professional development. The other group of schools continued with "business as usual." The Smithsonian Science for the Classroom group demonstrated statistically significant, positive increases in student achievement in science and positive effects in student achievement in reading and math relative to the "business as usual" counterparts.

Supplemental Services and Support for Implementation

Smithsonian Science for the Classroom is designed to support teachers to be successful. Teacher Guides include targeted background information before each lesson, margin call-outs to alert teachers to NGSS connections, assessment support, and safety call-outs. Teacher Resource Videos provide guidance to prepare materials and support students with hands-on investigations. Districts that adopt Smithsonian Science for the Classroom are fully supported throughout their implementation including materials support, technology support, and teacher professional learning. Curriculum developers at the Smithsonian Science Education Center collaborate with professional learning specialists at Carolina Biological Supply Company to meet the professional learning needs of districts implementing Smithsonian Science for the Classroom.

References

National Research Council. Taking science to school: Learning and teaching science in grades K-8. National Academies Press, 2007.

Keifert, Danielle, and Reed Stevens. "Inquiry as a members' phenomenon: Young children as competent inquirers." *Journal of the Learning Sciences* 28, no. 2 (2019): 240-278.

