Smithsonian Science Education Center: Investing in Our Future

Strategic Plan

2015-2020
Our Mission

The Smithsonian Science Education Center is the formal education arm of the Smithsonian. Our mission is to transform the teaching and learning of science by bringing experiential scientific and engineering practices to classrooms all over the world for K-12 students and teachers.

Our Impact

Our curriculum is used in all 50 U.S. states reaching, 6.4 million students in 13,450 schools and in 1,454 school districts nationally. Our materials are used in 25 countries around the world.

Since its inception in 1985, the Smithsonian Science Education Center has held 74 National Strategic Planning Institutes to support teachers and education leaders, reaching 923 district leadership teams from 47 U.S. states.

Our History

The Smithsonian Science Education Center was jointly founded in 1985 by the Smithsonian Institution and the National Academy of Sciences. As the only formal science education unit of the Smithsonian, and in collaboration with the National Academy of Sciences and the 14 Federal agency partners in CoSTEM, we are nationally and internationally recognized for the quality and impact of our education programs.
Executive Summary

Science education has undergone extraordinary change in recent years. As noted in the Smithsonian’s strategic plan, “We live in a time when technology is changing before our eyes. Delivery channels that seemed like science fiction a decade ago now live on every desktop.”

The challenge facing the Smithsonian’s Science Education Center (SSEC) is to thrive on the forefront of science education—innovating and engaging on the leading edge, providing the tools and approaches that will most effectively prepare learners for the future.

The Smithsonian Science Education Center’s strategic plan aligns with the Smithsonian Institution’s strategic plan, including its core values, vision, and guiding principles.

SMITHSONIAN INSTITUTION VISION

Shaping the future by preserving our heritage, discovering new knowledge, and sharing our resources with the world.

SMITHSONIAN CORE VALUES

- Discovery: Explore, bring to light new knowledge and ideas and better ways of doing business
- Creativity: Instill our work with imagination and innovation
- Excellence: Deliver the highest—quality products and services in all endeavors
- Diversity: Capitalize on the richness inherent in differences
- Integrity: Carry out all our work with the greatest responsibility and accountability
- Service: Be of benefit to the public and our stakeholders
SMITHSONIAN GUIDING PRINCIPLES

- Embrace and support the common Smithsonian vision
- Break down barriers among the sciences, between the sciences and the humanities, and between science and the public
- Redefine, deepen, and broaden external collaboration
- Experiment, innovate, and share
- Embrace a more global role

Of the seven strategic priorities of the Smithsonian Institution, the ones that most closely align with the SSEC’s mission and vision are revitalizing education, broadening access, fostering a culture of evaluation, and building a learning community. These strategic priorities guided and informed the strategic planning process.
SMITHSONIAN SCIENCE EDUCATION CENTER VISION

People around the world are prepared to innovate, compete, and thrive as global citizens in a world of unprecedented scientific and technological change.

SMITHSONIAN SCIENCE EDUCATION CENTER MISSION

Our mission is to transform the teaching and learning of science by bringing experiential scientific and engineering practices to classrooms all over the world for K-12 students and teachers.

SMITHSONIAN SCIENCE EDUCATION CENTER STRATEGIC IMPERATIVES

Strategic imperatives are clearly defined outcomes that pursue the SSEC’s vision and mission, promise to transform its effectiveness, and position it for success. The SSEC’s strategic imperatives are the following:

- Own and manage aspects of development and delivery of products, services, and brand; build a strong relationship with our publisher
- Operate from a reliable and sustainable revenue model/stream
- Design and produce a true transmedia curriculum that increases student achievement
- Deliver leadership development services that offer multiple points for engagement (within the LASER model)
- Create self-sustaining learning communities of educators
- Contribute new knowledge within the corpus of science education
Why Is Science Education Particularly Important?

In the growing global marketplace, American students need to excel in science, technology, engineering, and math (STEM) to compete internationally for jobs and the most sought-after careers of the future. In the 21st century, American students need to become scientifically literate citizens both inside and outside of the classroom who can make informed decisions about their health, careers, the environment, finances, and government.

Yet less than half of American students have consistently performed at or above the proficient level in math and science; and reading scores nationally are stagnant.
Why the Smithsonian Science Education Center?

The Smithsonian Science Education Center has been producing world-class science curriculum for decades that integrates the arts, history, culture, and science of the Smithsonian. At the Smithsonian we don’t just understand science, we know how to enable students to learn science the way scientists do science—by creating authentic and engaging STEM experiences for students wherever they are.

What We Do

The frontiers of science, technology, engineering, and math have changed since we first began developing curriculum 25 years ago. Not only has our understanding of these subjects grown dramatically over the last two-and-a-half decades, but research into how children learn science has grown. At the Smithsonian, we have front-row seats to innovations from distant black holes to fragile ecosystems, and the Smithsonian Science Education Center is uniquely placed to bring these innovations to classrooms across the world.

Our Curriculum

The challenges of the 21st century require a citizenry educated to think critically, acquire new knowledge, and produce and apply creative solutions. The Smithsonian Science Education Center is ideally positioned to apply proven strategies in the teaching of STEM to increase student achievement for all students and improve teacher practice in K-8 classrooms and beyond. As a result, students become better readers, critical thinkers, and math problem solvers.
Our curriculum developers design curriculum that employs the latest research on how children learn college- and career-ready skills as part of a comprehensive STEM curriculum. Our new line of curriculum for grades 1 through 5, *Smithsonian Science in the Classroom*, includes the following features:

- Driven by real-world problems: Teachers facilitate learning as students work together in groups to tackle real-world problems such as how to deliver drinking water to those in need, how to use sound to send a message, or how to identify mosquitos that carry diseases.

- Accountability: With each question, students receive their own *Smithsonian Science in the Classroom* notebook where they keep track of their efforts in answering the driving question. Upon successful completion of their notebook, they receive a reward (such as a certificate declaring them a “Smithsonian Scientist in the Classroom”) for that particular topic, and teachers can track student progress via an online portal that provides data on student progress.

- Interdisciplinary, like the world we live in: Students examine the interdependent relationships among science, technology, engineering, and math, integrating the history, art, and culture found around the Smithsonian so that they gain authentic science experiences in the greater context of human endeavors.
Digital Outreach

The Smithsonian Science Education Center is extending the reach of our knowledge and resources by developing digital assets. These inspire students to explore scientific phenomenon through digital activities, games, simulations, and online activities. They provide teachers across the nation and beyond with professional development.

We are creating a robust library of digital assets accessible to students, teachers, and lifelong learners. These assets ensure that teachers in all corners of the world can engage in authentic STEM experiences that can be immediately applied to their science classroom.

- Differentiated learning experiences for diverse students: Whether students are English language learners, have learning challenges, or are gifted and talented, *Smithsonian Science in the Classroom* can be adapted so that all students are engaged and challenged.
• Fully integrated digital assets are designed to assist students in accessing cutting-edge science research at a level that is accessible and understandable to them.

• Digital data collection for online collaborative learning: Successfully working in teams is not only a vital skill to learn for students’ academic success in college but a highly valued career skill in today’s workplace. Students conducting scientific experiments and engineering solutions work in virtual groups to collect, share, analyze, and graph data; record designs; and post responses. Students collaborate electronically to communicate their findings to others.

• Online learning materials for teachers and students: A rich library of online videos, interactives, and simulations allows students to investigate their interests. But the learning doesn’t stop with students. We address the learning needs of elementary teachers searching for resources to enhance their STEM teaching skills, including ways to address common misconceptions in science.
Our Professional Services

The Smithsonian Science Education Center creates professional learning communities (PLCs) among educators, scientists, and corporate and community leaders. These PLCs with rich online resources help teachers improve their understanding of scientific concepts, engage teachers in informative dialogues with scientists and engineers, and expand teachers’ awareness of the application of history, culture, and art to STEM innovation.

- **Teacher professional development**: We offer teachers robust, blended in-person and online professional learning opportunities that allow them to engage in authentic STEM experiences. Our pedagogical and content-rich trainings build upon teachers’ classroom experiences and leverage resources throughout the Smithsonian to enrich and build confidence in their STEM teaching skills. Through these experiences, teachers learn to engage students in scientific and engineering practices.

- **Leadership development**: Given the changing landscape in education and the global workplace, the need to prepare for the future is now! The systemic changes needed to build awareness and support for inquiry STEM teaching and learning are possible only with programming that develops buy-in at all levels of a school system and community. Rigorous evaluation has demonstrated that our leadership institutes support teams of leaders to plan strategically for implementing quality STEM programs that improve student achievement.
Backed by Research
Through the U.S. Department of Education’s Investing in Innovations program, the Smithsonian Science Education Center, through an independent evaluator at the University of Memphis, conducted a five-year, matched pair randomized control trial (RCT) from 2010-2015. The study involved approximately 60,000 students and teachers in grades 1-8 in the Houston Independent Schools District, eight school districts in northern New Mexico, and seven school districts in North Carolina, each of whom implemented the Smithsonian Science Education Center’s Leadership and Assistance for Science Education Reform (LASER) model using our inquiry-based K-8 science program *Science and Technology Concepts™* (STC).

What did we learn about student outcomes?
The study resulted in many statistically significant and educationally meaningful improvements in student achievement in science as well as in reading and mathematics. The effects were particularly high for subgroups of students who are most in need relative to the comparison group: English language learners, students with individualized education programs, and students participating in free or reduced price lunch.

The strongest gains by Smithsonian students relative to the comparison group were seen in hands-on performance tasks. These gains are particularly noteworthy as they indicate students are able to apply what they have learned in science to hands-on tasks, just as professional scientists apply their expertise to conduct investigations and solve problems.
After receiving three Smithsonian curriculum units and accompanying professional development, 64.7% of Smithsonian teachers reported feeling “well prepared” or “very well prepared” to teach inquiry-based science relative to only 44% of teachers at comparison schools.

Learning by doing - it’s the great equalizer.
Revitalizing Education through Federal Coordination: CoSTEM

The Smithsonian Science Education Center provides authentic and inspiring Science, Technology, Engineering, and Mathematics (STEM) experiences for teachers and students by drawing on the scientific and engineering assets of the Federal government. In particular, the Smithsonian Science Education Center advances STEM goals nationally by sitting on the Federal Committee on STEM Education (CoSTEM), which serves as a conduit between 14 Federal mission agencies to ensure their coordination; leading the Engagement Interagency Working Group (IWG) along with NASA; and, serving on the P-12 Teacher Education IWG along with the U.S. Department of Education. The Smithsonian Science Education Center works with these other 13 Federal agencies offering STEM programs so that together we can identify and disseminate content that takes advantage of each agency’s unique assets, create complementary materials and avoid duplication of effort, and contribute content to a centralized portal developed by NSF for the broad dissemination of our educational offerings. Our collective goal—to engage youth in authentic STEM experiences!
The Smithsonian Science Education Center—through its numerous MOUs with outside organizations—also builds and supports learning communities that include educators in schools and informal learning settings; assists with the identification and development of curricula in various modalities; and works with other non-profit partners to identify, develop, and disseminate STEM engagement materials and experiences. Our STEM initiatives advance professional development opportunities that take the Next-Generation Science Standards into consideration and align with rapidly changing individual state education standards. We have expertise in formal education that other units at the Smithsonian can draw upon; and, because we are part of the Smithsonian, we can connect CoSTEM Federal agencies to Smithsonian experts who understand informal learning.
**Pan-institutional Interdisciplinary Approach**

The Smithsonian Science Education Center is a relationship builder, content generator, and convener. Through its pan-institutional efforts, the Smithsonian Science Education Center works collaboratively with other Smithsonian education units and non-profits to bring formal education content beyond the Mall to teachers and students across the country and world.

Building partnerships and sharing best practices, the SSEC:

- Works collaboratively with other Smithsonian education units, Federal agencies, and educational institutions nationally and internationally through MOUs to bring their content to all students.
- Serves as an educational resource to units throughout the Smithsonian who are interested in bringing their content into the hands of K-12 classrooms.
- Provides comprehensive authentic experiences for students and teachers working directly with scientists and researchers from across the Smithsonian and throughout the Washington, DC, area (NASA, NOAA, USDA, etc.).

Developing content and utilizing Smithsonian resources, the SSEC:

- Provides diverse offerings to learners P-12 that include: comprehensive basal K-8 classroom curriculum; digital P-12 digital resources; as well as professional development and learning communities for teachers, district leaders, and state educational agencies.
• Brings the Smithsonian's rich history, art, culture, and science and puts them into the hands of P-12 teachers and students throughout the nation and world.

Bringing Smithsonian content beyond the Mall both nationally and internationally, the SSEC:

• Extends the reach of the Smithsonian nationally and internationally by creating hands-on, active and “authentic” STEM learning experiences that extend the Smithsonian's reach in measurable ways.

• Reaches approximately 6.5 million students nationally as well as students in 25 countries through our Science and Technology Concepts (STC) curriculum.

• In collaboration with the National Academy of Sciences, serves on the InterAcademies Partnership Science Education Global Council and is nationally and internationally recognized for the quality and impact of our education programs.

• Has held over 75 Strategic Planning Institutes that have provided systemic reform support to 924 district teams in the United States and 25 countries internationally.

• Serves low-income students across the country and has an impact on closing the achievement gap in reading, math, and science as demonstrated through a study involving 60,000 students in three diverse regions of the United States, where 73% of the students were deemed economically disadvantaged.
Our Strategic Imperatives
SSEC Competencies and Strategic Imperatives

SSEC’s *winning value proposition* is to **convene communities to create and sustain scalable science education reform.** With the global Smithsonian brand and the intellectual capacities of the team, SSEC is poised to be the leader in science education.

As a result of the planning process, the Smithsonian Science Education Center identified six core **competencies.** These define SSEC’s expertise and its ability to deliver successfully with excellence.

- We create transmedia science education.
- We develop science curriculum.
- We provide professional development for science teachers.
- We deliver leadership development for science education stakeholders.
- We are science education thought leaders and translators.
- We are a convener of science education experts.

The leadership team identified six **strategic imperatives.** They emerged as the team’s response to the publishing and distribution challenges, the emerging trends in curriculum development and delivery, and SSEC’s current business model. These imperatives are juxtaposed against the following current realities: SSEC strives to be better recognized in the marketplace, since it has proven expertise in developing science curriculum and professional services; the curriculum is not yet adapted to the newest technology and modern delivery systems, though the team is working on this; and SSEC is contributing to the

“*What is SSEC’s winning value proposition?* The niche in the marketplace that it owns competently and confidently, and with competitive advantage.”
corpus of science education, and wants its team members to be leading thinkers in science education. The six strategic imperatives are the following:

- Own and manage aspects of development and delivery of products, services, and overall brand; build a strong relationship with our publisher
- Operate from a reliable and sustainable revenue model/stream
- Design and produce a true transmedia curriculum that increases student achievement
- Deliver leadership development services that offer multiple points for engagement (within the LASER model)
- Create self-sustaining learning communities of educators
- Contribute new knowledge within the corpus of science education

Following are the priority goals listed according to each Division within the SSEC organizational structure:

- Curriculum and Communication
- Professional Services
- Advancement
- Finance and Administration
- Board Development

**Division Goals**

Priority goals are identified for each division, indicating that they should be addressed early in the implementation process. These goals are considered critical to the success of the SSEC in achieving its strategic imperatives.

**Curriculum and Communication**

- A curriculum re-envisioned and aligned to Next Generation Science Standards (NGSS)—built from the ground up
- Robust online library of digital assets
• Integrated approach with Professional Services for professional development
• Presence within professional membership associations
• SSEC is the dissemination point of Smithsonian science to formal education

Professional Services

• SSEC is the dissemination point of Smithsonian science to formal education
• Integrated, hybrid model for leadership development
• Comprehensive customizable menu of professional development options
• Reputable in-house consultancy practice
• Presence within professional membership associations
• SSEC Professional Development Trainer Certification Program
• SSEC School Affiliate Program

Advancement

• Substantive planned giving program
• Dynamic major gifts program
• Electronic giving program
• Donor-centered, major-gifts-focused events
• Responsive stewardship program
• Advancement communications and brand strategy

Finance and Administration

• Comprehensive budget and budgeting process for the Center and for each of its Divisions, which integrate mission-related business revenue and philanthropy
• Smithsonian back-office system supports SSEC revenue model

**Board Development**

• Meaningful and effective engagement of members of the board of advisors as core to SSEC’s fundraising efforts
• Leadership giving council
• Thought-leader task group—a Scholarly Advisory Committee of education experts
Summary of Key Initiatives

Following is a summary of the Smithsonian Science Education Center’s key initiatives.

Establish a branded position in the marketplace

The SSEC has not yet met its full potential for recognition in the marketplace as both a leader in science education and as a curriculum developer. Further, its brand is not often prominent when its materials are published. Through conversations with internal Smithsonian education program experts, external customers, and subject matter experts, a consistent theme emerged: SSEC should establish itself and be viewed as a science education leader and convener. The strength of the Smithsonian brand offers SSEC an opportunity to position itself to influence systemic change and to collaborate with other SI units and museums to develop a broader Smithsonian-branded product.

Focus on the underserved

The SSEC now has strong evidence of the efficacy of its Leadership and Assistance for Science Education Reform (LASER) model using SSEC’s Science and Technology Concepts (STC) K-8 science curriculum and differentiated professional development. Results from the clustered Randomized Control Trial (RCT) of showed statistically significant and substantively important effects of LASER (with STC) on students who are typically underserved in STEM—English language learners (ELLs), girls, students with disabilities, and the economically disadvantaged. In addition, data from the National Center for Education Statistics (NCES) shows a lack of diversity in STEM teaching. The SSEC is committed to embarking on two initiatives to address the underserved in STEM: (1) supporting
teachers of English Language Learners through adapted professional development and active learning to enhance English language acquisition and STEM learning; and, (2) increasing the percentage of teachers from diverse backgrounds who enter the STEM teaching field and supporting diversity in STEM teacher leaders.

**Collaborate and leverage institutional strengths and competencies**

Within the Smithsonian Institution, the resources and opportunities for collaboration are vast. The SSEC has the opportunity to collaborate internally to develop educational experiences that can be offered in various settings: throughout the institution, virtually on the web, and at other educational organizations. The SSEC might also work with educators in units across the Smithsonian to increase the number of scientists actively engaged in the community and in the classroom. As the Smithsonian’s only formal education unit, another recommendation is for the SSEC to continue to leverage internal Smithsonian resources and collaborations to act as a conduit for Smithsonian objects, knowledge, and resources into the classroom.

**Align with the Next Generation Science Standards (NGSS)**

The Next Generation Science Standards (NGSS) are based on a framework for K–12 science education developed by the National Research Council (now called the “National Academies of Sciences, Engineering, and Medicine). The standards are deemed one of the highest priorities for science education. They promise to improve instruction in science, technology, engineering, and mathematics (STEM). Although the standards are not mandatory, they will be a differentiator in the choice of science curriculum by many school districts. As SSEC aligns its curriculum with the standards, it will have an advantage in appealing to school districts.
Identify SSEC’s niche in the technology revolution in education

Technology is reshaping education around the world—from the rapid proliferation of blended learning models, to massive open online courses (MOOCs), to open educational resources (OER) for teachers and students, to the widespread use of devices that support different types of learning and delivery. This rapid shift in education is presenting new challenges and new opportunities for connected learning and new opportunities for SSEC. The center is poised to help schools understand and embrace the evolving educational models without diminishing the importance of teachers and traditional systems.

Continue to focus on convenings to support systemic change

STEM is frequently featured in the news media, and the national conversation around high-stakes testing revolves around reading and math. Too often science is left out of the curriculum, especially in elementary schools. Not enough focus has been placed upon the fundamental issues—such as inquiry-based, experiential, and collaborative learning—that must be addressed in order to create a scientifically literate world. As the formal science education unit of the Smithsonian, and a member of the InterAcademies Partnership Science Education Program Global Council, SSEC is positioned to convene educators, experts in education, and other prominent individuals to bring these important issues to international attention and debate.

Professional development for teachers and administrators is also a critical part of reshaping the educational system. They are either not aware of the options available to them or do not take advantage of opportunities because of limited time and financial resources. Teachers, administrators, and school districts need professional development support systems and teaching frameworks in order to
thrive. The SSEC’s professional development services can identify the gaps and the required resources and then develop new, modular professional development offerings that provide the support teachers and administrators need to improve the teaching of science.

**Don’t lose STEAM: Intersection of arts, science, and technology**

Massachusetts Institute of Technology recently established a Center for Arts, Science, and Technology. The MIT center intends to advance MIT’s leadership in integrating the arts into the curriculum and research at institutions of higher learning. This is an example of how science and engineering are being integrated into curricula and used in cross-learning environments. This initiative is predicted to become increasingly important as the creative arts, science, and technology provide a significant educational value for collaboration and curriculum development. The SSEC’s intellectual capacities, products, and services—along with the Smithsonian brand—ideally position SSEC to provide leadership in this movement toward cross-disciplinary education.
Summary of Key Strengths, Challenges, and Opportunities

Strengths: The Smithsonian name; the passion and competence of the staff; the collaborative culture; a superior, scalable, evidence-based curriculum; professional development services; the LASER model, institutional resources; and power of the mission and vision

Challenges: Financial sustainability; current organizational capacity; limitations inherent in a large quasi-governmental organization; lack of recognition in the market; current lack of control over brand and curriculum distribution; and current lack of internal and external partnerships and collaborations

Opportunities: Fulfill the role of convener in global science education; develop a technology-infused curriculum; extend curriculum to younger children and to adults; build brand awareness as Smithsonian’s science education center; and create sustainable revenue sources through fundraising and optimizing curriculum sales