The Smithsonian Science Education Center
Lessons from our shared history, and the path forward

Katherine Pedersen Blanchard
Who are we and what do we do?
The Smithsonian is the world’s largest museum, education, and research complex.

- 19 museums
- 5 education centers
- 9 research centers
- 1 zoo

Collection of over 154 million objects, works of art, and specimens.
The Smithsonian Institution

- Believes in lifelong, experiential learning
- Seek to drive large, visionary interdisciplinary and scholarly
- Catalyze critical conversations and address complex challenges (and support others in this work!)
Smithsonian Science Education Center

We are the only formal education unit within the Smithsonian and has been a leader in science education for over 30 years.

Founded in 1985

Renamed in 2013
Our Mission

Transform science education for all students in the United States and throughout the world.
In partnership with local schools, school districts, and ministries of education, we work on a long-term basis to improve science or STEM education programs through our Leadership and Assistance for Science Education Reform (LASER) model. This model provides the infrastructure to build local capacity, local ownership, and sustainability.
The LASER Model

- Professional Development
- Curriculum
- Shared Vision and Goals
- Assessment
- Administrative and Community Support
- Materials Support

76 Strategic Planning Institutes (SPIs) in the U.S. with over 1000 leadership teams from 47 states and 25 countries
Leadership Development

We support schools, districts, and communities as they implement the LASER model through a series of scaffolded programs:

1. Building Awareness for STEM Education (BASE)
2. Strategic Planning Institute (SPI)
3. Implementation Institutes
### K-8 Science Curriculum (STC™)

<table>
<thead>
<tr>
<th>Life Sciences</th>
<th>Earth Sciences</th>
<th>Physical Sciences</th>
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<tbody>
<tr>
<td>Life on Earth</td>
<td>Earth's Dynamic Systems</td>
<td>Chemistry</td>
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<tr>
<td>Exploring Plants and Animals</td>
<td>Exploring My Weather</td>
<td>Exploring Forces and Motion</td>
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<tr>
<td>Organisms</td>
<td>Weather</td>
<td>Solids and Liquids</td>
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<td>The Life Cycle of Butterflies</td>
<td>Soils</td>
<td>Comparing and Measuring</td>
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<td>Plant Growth and Development</td>
<td>Rocks and Minerals</td>
<td>Changes</td>
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<td>Animal Studies</td>
<td>Land and Water</td>
<td>Balancing and Weighing</td>
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<td>Microworlds</td>
<td>Ecosystems</td>
<td>Sound</td>
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<tr>
<td>Investigating Dispersion and Motion</td>
<td>Exploring the Properties of Matter</td>
<td>Electric Circuits</td>
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<td>Exploring Respiration and Circulation</td>
<td>Experimenting with Mixtures, Compounds, and Elements</td>
<td>Motion and Design</td>
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<tr>
<td>Investigating Biodiversity and Interdependence</td>
<td>Exploring Planetary Systems</td>
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<tr>
<td>Studying the Development and Reproduction of Organisms</td>
<td>Exploring Plate Tectonics</td>
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**Science and Technology Concepts (STC™)**

*Materials from our Electricity, Waves, and Information Transfer middle school STC™ unit.*
Professional Development

- **Introductory Level**
  Occurs prior to a teacher using a Smithsonian-developed curricular unit; *curriculum-focused to provide teachers with experience using the materials.*

- **Intermediate Level**
  Occurs after a teacher has taught a unit; *content- and pedagogy-focused* but based on teachers’ classroom experiences.

- **Expert Level**
  Select teachers were invited to a *train-the-facilitator* training to create a sustainable model of PD at the local level.
How do we know it works?
The LASER i3 Study

- The “LASER i3” study refers to the 5-year longitudinal study of LASER + STC™ model.
  - Funded by the U.S. Department of Education (ED)
  - Externally evaluated by the Center for Research in Educational Policy (CREP) at the University of Memphis
  - Cohort: 2010-2015
  - 3 U.S. States (NM, TX, NC)
  - 16 school districts, 125 schools, and 60,000 students
  - Randomized Controlled Trial
  - Pre- vs. post-tests assessing science, math, and reading skills

Funded by the U.S. Department of Education’s Investing in Innovation (i3) program Grant # (U396B100097)
Students were able to apply what they learned to solve real science problems.
Classroom observations showed students in LASER schools demonstrated more collaboration and worked in teams to solve problems.

Observational data presented was collected during the 2013-13 school year. Adapted from CREP, “The LASER Model, Summative Report, Section 2” (Memphis: CREP / University of Memphis, July 15, 2015).
Underserved students scored higher on the PASS PT compared to their peers.
Our interdisciplinary approach to teaching science led to higher reading scores

**NM Elementary – Standards-Based Assessment in Reading**

<table>
<thead>
<tr>
<th>Adjusted Mean Scaled Score</th>
<th>IEP</th>
<th>#</th>
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<tbody>
<tr>
<td>530</td>
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<td>532</td>
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**HISD Middle School – Stanford Reading Test**

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<tr>
<th>Adjusted Mean NCE</th>
<th>Comparison</th>
<th>LASER</th>
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"#" indicates educationally meaningful results. Comparison group (n=44) and LASER (n=64). Adapted from CREP, “The LASER Model, Summative Report, Section 6” (Memphis: CREP / University of Memphis, July 15, 2015).

"**^**" indicates statistically significant results. "**^**" indicates nearly educationally meaningful results as defined by Hedge's g=0.24. NCE is the Normal Curve Equivalent score. Comparison group (n=143) and LASER (n=148). Adapted from CREP, “The LASER Model, Summative Report, Section 6” (Memphis: CREP / University of Memphis, July 15, 2015).

IEP = Individualized education programs
Our interdisciplinary approach to teaching science led to higher math scores.

**HISD Middle School – Stanford Mathematics Test**

**NC Middle School – End-of-Grade Test, Mathematics**

“**” indicates statistically significant results. “#” indicates educationally meaningful results. NCE is the Normal Curve Equivalent score. Comparison group (n=113) and LASER (n=131). Adapted from CREP, “The LASER Model, Summative Report, Section 6” (Memphis: CREP / University of Memphis, July 15, 2015).
Summary: LASER Promotes Inquiry and Problem Solving Skills for All Students

We now have rigorous evidence that LASER improves achievement not only in science but in reading and math for all students including English language learners, students with special needs, and those qualifying for free or reduced price lunch.

Learning by doing – the great equalizer.
Where do we go from here?
Curriculum for the Next Generation

- New Elementary (Primary) curriculum aligned to the Next Generation Science Standards.
- Built on Smithsonian resources and driven by questions.
- STCMS has also been updated.
Curriculum for Sustainable Development

- Hands-on, inquiry-driven curriculum based on the UN SDGs
- Accessible to educators across the globe free of charge.
- Conceived of by the Inter-Academy Partnership
- Funded by the Gordon & Betty Moore Foundation
Globalizing AND Localizing PD

- Bringing together scientists and educators
- Consider how local work can have a global impact
- Reaching teachers that have not traditionally had access to professional development.
Focus on Sustainability

- Education plays the long game.
  - issues facing our world can not be solved in a single day or with a single intervention.
  - Success, requires buy-in from stakeholders at every level within an educational ecosystem.

- We need to construct a shared vision for Global Science Education that supports a scientifically literate, career-ready citizenry.
  - Our Shared Vision must be global.
  - Our Shared Vision must serve tomorrow’s populations.
  - We must close the scholar-practitioner gap.
Thank you!

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