# The LASER Model: A Systemic and Sustainable Approach for Achieving High Standards in Science Education

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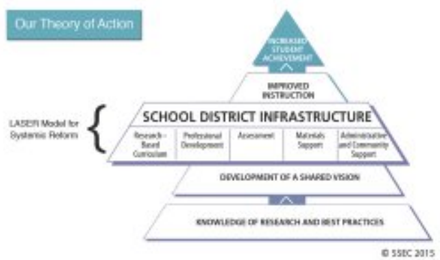
## Abstract

In 2010 the U.S. Department of Education awarded the Smithsonian Science Education Center an Investing in Innovation (i3) validation grant to evaluate the Leadership and Assistance for Science Education Reform (LASER) model's efficacy in systemically transforming science education. The LASER model for transforming science education consists of five elements: a research-based, inquiry-driven science curriculum; differentiated professional development; administrative and community support; materials support; and assessment. These elements, when planned around a shared vision for science, form the infrastructure to sustain student-centered learning and teaching. The resulting longitudinal study of the LASER model unequivocally demonstrated that inquiry-based science improves student achievement not only in science but also in reading and math at elementary and middle school. LASER plays a critical role in bolstering student learning, especially among underserved populations including children who are economically disadvantaged, require special education, or are English language learners.

## Background

In 1985 the Smithsonian Institution and National Academy of Sciences jointly established the National Science Resources Center (NSRC). Our name was changed in 2012 to the Smithsonian Science Education Center to better reflect our mission: transforming the learning and teaching of science for all students. To that end, the SSEC develops comprehensive K-8, research-based science curricula and supports the systemic needs of schools, districts, and states through our Leadership and Assistance for Science Education Reform (LASER) model:

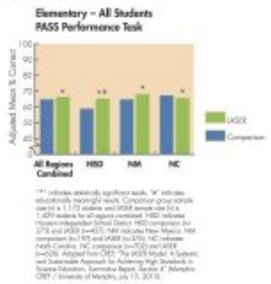


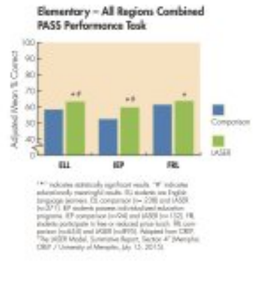

The i3 evaluation was conducted by the Center for Research in Educational Policy (CREP) at the University of Memphis, and followed students in grades 1-8 at schools implementing the LASER model using the inquiry-based science program Science and Technology Concepts™ (STC). Evaluators studied approximately 60,000 students attending public schools in (1) the Houston Independent School District, (2) eight school districts in northern New Mexico, and (3) seven school districts in North Carolina to investigate whether students in schools implementing the LASER model during a three-year period outperformed students not exposed to LASER during the same period.

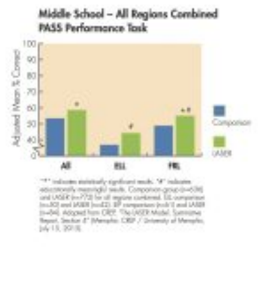
## Results

CREP evaluators assessed the cumulative impact of the SSEC's products and services over three successive school years for a subsample of more than 9,000 students in elementary (grades 3-5) and middle school (grades 6-8) cohorts. The LASER i3 validation study yielded many exciting outcomes related to the impact of research-based, hands-on science taught through inquiry including:

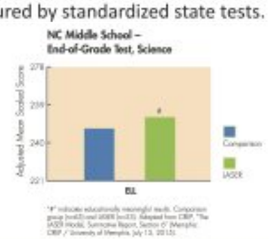
LASER students showed statistically significant gains on the Partnership for the Assessment of Standards-Based Science (PASS) performance assessment relative to the comparison group. When the data are disaggregated, statistically significant gains in science are also seen by LASER students identified as English language learners (ELL), students with individualized education programs (IEPs), and students receiving free or reduced price lunch (FRL) relative to the comparison group.

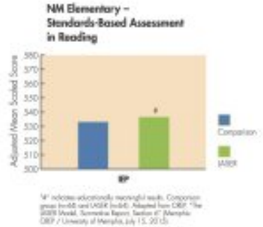


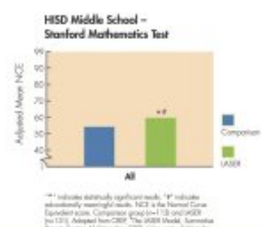




LASER elementary and middle school students also demonstrated positive gains in subject areas other than science as measured by standardized state tests.




## Conclusion

LASER students apply what they have learned to novel hands-on tasks.

All LASER students succeed including English language learners, special needs students with individualized education programs, and students receiving free or reduced-price lunch.

LASER students demonstrate gains not only in science but in other disciplines like reading and math.

## Getting Involved

***Good Thinking!*** An original web series of on-demand professional development. Through short, animated episodes, the series explores critical topics in education research, learning science, and common misconceptions in a fun and accessible way for teachers.


**Smithsonian Science Education Academies for Teachers (SSEATs)**

A week-long professional development course, which takes K-12 teachers behind-the-scenes at Smithsonian museums and research facilities combining training in science pedagogy with content presented by scientists and researchers who are experts in their fields.

June 19-24: Biodiversity
July 10-15: Energy
July 17-22: Earth's History

**Science Education Institute for Leadership Development and Strategic Planning**

An intensive institute for teams of dedicated educators, administrators and STEM stakeholders to gain an in-depth understanding of the LASER model, its elements for a successful science education program, and to plan strategically as a team for implementation at home.

## Acknowledgments

Alberg, Marty. The LASER Model: A Systemic and Sustainable Approach for Achieving High Standards in Science Education. Memphis, TN: CREP / University of Memphis, 2015.

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