Create a Generation of Problem Solvers

OVERVIEW

EiE is an award-winning program of the Museum of Science, Boston. Our research-based, hands-on engineering curricula (preK-8) introduce learners to the engineering design process and create a generation of problem solvers. They are used in all 50 states and in more than 30 countries across the world. We design our engineering curricular materials, resources, and teacher professional development to best innovate for the reality of today’s educational landscape. EiE engages all learners and empowers students and educators to discover their inner engineer.

EiE aims to challenge the misconceptions about STEM, especially engineering, while building a generation of problem solvers who practice 21st century skills and apply engineering, science, and mathematics concepts across disciplines. Our commitment to equity and access is a foundational idea in our curriculum design, professional development, and research.

PRODUCTS AND CURRICULA

- **Wee Engineer**: The first-ever preschool engineering curriculum, Wee Engineer channels preschoolers' natural curiosity and creativity into structured problem solving.

- **EiE for Kindergarten**: EiE for Kindergarten inspires young learners to embrace the field of engineering before stereotypes about “who can engineer” take hold.

- **Engineering is Elementary**: Standards-aligned, teacher-tested engineering units build a foundation for STEM learning in elementary school while students identify and solve challenges in a real-world context.

- **Engineering Adventures.**: Fun, creative problem solving units are designed to help kids in grades 3–5 learn to collaborate, communicate, solve problems, and share their solutions with their peers, while being flexible to meet the time and budget constraints of out-of-school settings, including afterschool and summer camp.

- **Engineering Everywhere.**: Inspires learners in grades 6–8 to shape the world around them in engaging, learner-centered engineering challenges that can be used in a variety of afterschool, summer camp, and out-of-school settings.
BY THE NUMBERS

EiE was developed fifteen years ago by the Museum of Science, Boston—a time when it was unheard of to teach engineering to young children. Since then, we’ve developed the frameworks, curricula, and professional development—along with advocacy, research, and leadership—to help educators and learners think like engineers:

- Reaches 1.3 million students per year
- Supports more than 44,000 educators per year
- Founding Director Christine Cunningham published Engineering in Elementary STEM Education (MAY 2018, Teachers College Press)
- Used in all 50 U.S. states
- Appeared at over 12 conferences featuring our research and our pioneering approach to engineering education for young learners
- Awarded 9 awards for the curricula, including the 2017 McGraw Prize in Education
- Adopted in more than 30 countries internationally
- Reaches more than 44,000 educators per year internationally

VALUES

1. WE MAKE ENGINEERING ACCESSIBLE FOR ALL

We develop an engineering, problem solving, and critical thinking mindset in all learners.

- We deliberately start in early childhood to build on the natural inclination of young children to explore and shape the world around them, before societal stereotypes take hold.
- In addition, our curricula is purposefully designed to engage all students—particularly underrepresented, under-performing, and underserved students. We deploy early and frequent testing of our curricula in under-resourced, diverse schools to ensure curricular relevance to all populations.
- We’re committed to make engineering accessible for teachers. Curricular materials and resources are carefully created to support and scaffold teachers’ knowledge and comfort with engineering.

2. WE KNOW IT WORKS

We work closely with teachers to develop curricula that integrates easily with science, math, ELA, and social studies. We draw from extensive research to determine what high-quality engineering curriculum and instruction looks like and how to best prepare teachers. The curricula is aligned with standards (NGSS, State, WIDA, Common Core).
EiE research on students proves:

- Students who experience EiE learn science better.*
- After using EiE, girls do just as well as boys on engineering and science outcomes. *
- EiE promotes students’ interest in science and engineering careers.**
- EiE addresses students’ misconceptions about engineering and technology, helping them gain a more accurate, standards-based understanding. ***
- EiE promotes students’ knowledge of engineering content and awareness of the diverse fields of engineering.**

WE INNOVATE, INFLUENCE, AND LEAD EDUCATORS

We carefully consider our curricular choices to support innovation in the classroom. An engineering and problem solving mindset is at our core. We actively blend research with curriculum and professional development. We examine the impact of the curriculum, support teachers to implement new discipline and instructional strategies, and create high-quality curricular resources.

- Teachers who experience EiE’s professional development feel more prepared to teach engineering, technology, and problem solving.**
- Teachers rate EiE as “thoughtfully developed,” “easy to use,” and “more effective than traditional science curricula alone” in helping students make real-world connections to classroom learning.**
- Teachers find that EiE develops 21st century skills such as collaboration, creativity, and problem solving.**

PEDAGOGICAL THEORY

Rigorous, research-based design is the cornerstone of each unit in our curricula. Our recommended pedagogical methods are based in a constructivist view of learning. These include the following:

- **Contextual Learning and Problem Solving.** EiE engineering design challenges show students how what they learn in school connects with the world around them.

- **Collaborative Learning and Teamwork.** Most EiE activities involve small-group work that encourages students to consider more than one solution or idea and work collaboratively.

- **Communication.** All EiE curricula develop students’ communication skills and encourage them to share ideas in several ways: speaking, writing, drawing, and building.

- **Project-based Learning.** EiE’s engineering design challenges engage students in inquiry. As they analyze their own data and make decisions about their design, students engage with content, hone their critical-thinking skills, and take ownership of their learning.
HABITS OF MIND

A well-designed engineering curriculum develops positive strategies for problem solving that we call “Engineering Habits of Mind.” EiE helps teachers introduce engineering habits of mind to their students as early as first grade.

Overlapping with NGSS practices, EiE’s 16 engineering habits of mind anchor lessons, professional development, and research, guiding educators and helping them develop their understanding of what K-12 could look like.

<table>
<thead>
<tr>
<th>Children who develop habits of mind...</th>
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<tbody>
<tr>
<td>Investigate properties and uses of materials</td>
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<tr>
<td>Consider problems in context</td>
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<tr>
<td>Envision multiple solutions</td>
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<tr>
<td>Innovate processes, methods, and designs</td>
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<tr>
<td>Make tradeoffs between criteria and constraints</td>
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<tr>
<td>Use systems thinking</td>
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<tr>
<td>Apply math knowledge to problem solving</td>
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<td>Apply science knowledge to problem solving</td>
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STANDARDS:

EiE is developed with careful attention to standards in science and technology/engineering. Curricula are aligned to the NGSS, Common Core, ITEEA Standards for Technological Literacy, K-5 Science Standards for all 50 states, and the EQuIP Rubric. Learn more.
ANNETTE SAWYER
VICE PRESIDENT, EDUCATION DIVISION

Annette Sawyer is the Vice President of Education Division at the Museum of Science in Boston, Massachusetts. Annette leads the team that provides all programs for the Museum’s visitors, including Live Presentations; Exhibit Hall Interpretation; the Charles Hayden Planetarium; School Field Trips; Traveling Programs; Curriculum Development, Sales, and Operations; Youth Programs; Overnights; Teacher Professional Development; Adult Programs; Forum; and Summer Courses. Annette has spoken at national conferences on topics concerning bringing business practices to revenue-generating programs in museums. She is also a Lecturer at Tufts University, teaching Engineering Leadership to undergraduate engineering majors, and she brings that expertise to mentoring the next generation of leaders at the Museum of Science. Prior to joining the Museum of Science, Annette spent 21 years in the private sector, including 18 years at Polaroid Corporation.

Annette has a Bachelor’s Degree in Chemical Engineering from the Massachusetts Institute of Technology and an MBA from Boston University. She lives in Arlington and has a daughter, Rose, who volunteered and interned at the Museum during her high school career, providing Annette with firsthand knowledge of how the Museum’s Youth Programs build young leaders.
Nia Keith is the Director of Professional Development for EiE at the Museum of Science, Boston. She attended The Ohio State University, and received a Bachelor of Arts degree in Women’s Studies.

As a teen, Nia believed that she was “bad at science”, but with a passion for environmental advocacy, she began working as an environmental educator at the Student Conservation Association. This experience proved that she possessed an aptitude for science education. She went on to earn a Master of Science degree, with a focus on curriculum development, and to become a certified middle school science teacher in Massachusetts.

Since then Nia has lead several initiatives, in both formal and informal education, including Mass Audubon’s Urban Adventures program. Her professional goal is to help every child, regardless of gender, race, or background, find a love and a connection to the sciences.
Wee Engineer® (PRESCHOOL/PRE-K)

Wee Engineer channels preschoolers’ natural curiosity and creativity into structured problem solving. Designed as the first preschool engineering curriculum, Wee Engineer sets young learners up for success in school and life. Four hands-on engineering challenges ease learners into the worlds of science and technology as they practice social, fine motor, cognitive, and language skills. They’ll learn that there’s more than one way to solve a problem, and that it’s okay to fail and try again. With Wee Engineer, show children that anyone, even the youngest learners, can engineer.

EiE® for Kindergarten (KINDERGARTEN)

EiE for Kindergarten inspires young learners to embrace the field of engineering before stereotypes about “who can engineer” take hold. This teacher-tested curriculum introduces engineering and the engineering design process in engaging and accessible ways for all young learners and educators. Two hands-on units align to kindergarten engineering performance expectations and connect with other subject areas to prepare children for success in later grades. Young learners are invited to practice the 21st century skills they are already developing in social, emotional, physical, cognitive, and language domains.

Engineering is Elementary® (GRADES 1-5 IN-SCHOOL)

Engineering is Elementary empowers elementary students to become innovative problem solvers who think creatively as they identify and solve challenges in a real-world context. Twenty standards-aligned, teacher-tested engineering units build a foundation for STEM learning. Each hands-on unit is anchored in your science curriculum and designed to engage learners in ways that align with their learning style. With Engineering is Elementary, all students—including English learners, students who receive special education services, and those who have not flourished in traditional academic settings—can work together to find creative solutions and discover their inner engineer.
Engineering Adventures® (GRADES 3-5 AFTERSCHOOL/OUT-OF-SCHOOL)

Engineering Adventures engages learners in grades 3-5 in fun, creative problem solving. Ten hands-on units are low-cost and flexible to meet the time and budget constraints of out-of-school settings, including afterschool and summer camp. Each unit centers on meaningful, open-ended problems with a global context. Learners find out more about the role engineering plays in their lives and the world around them as they’re introduced to real engineering challenges and asked to design solutions with an engineering design process. Throughout each unit, kids learn to collaborate, communicate, solve problems, and share their solutions with their peers.

Engineering Everywhere® (GRADES 6-8 AFTERSCHOOL/OUT-OF-SCHOOL)

Engineering Everywhere inspires learners in grades 6-8 to shape the world around them. Our twelve hands-on units were tested in afterschool, summer camp, and out-of-school settings, and they are proven to engage learners in innovative problem solving. Each unit begins with a Special Report video, which sets the context for the engineering design challenge and explores problems like food scarcity, prosthetics, and disease control. As learners work through our design challenges, they’ll sharpen 21st century skills like critical thinking, teamwork, and communication, preparing them for success in school and in life.

PROFESSIONAL DEVELOPMENT

Empower innovation in the classroom in our learner-centered workshops. Educators learn the skills they need to foster student-centered, inquiry-based learning, while enhancing their knowledge of engineering content. Select from our existing Train-the-Trainer, Teacher Training, and Online PD workshops, or let us customize a professional development program that is tailored to your specific needs. Learn more at eie.org/pd.
From thought leaders to young learners, we work to be leaders in the field of engineering education, professional development, and research.

But, don’t just take our word for it:

TEACHERS

“I imagine my students in 12 years telling their high school guidance counselor that they want to go into engineering, fully confident they can do it because they started all the way back in kindergarten. More than any other curriculum I’ve ever taught, I believe that engaging in the EiE unit will continue to open doors for my students throughout their educational careers and their lives.”

Kelly Livingston, CESAR E. CHÁVEZ MULTICULTURAL ACADEMIC CENTER, CHICAGO, IL

“EiE has opened my students’ eyes to the possibility that they can help solve realistic problems. I’ve had some even tell me they never thought they could be an engineer because they weren’t smart enough, or didn’t speak English well enough. After working through an EiE unit successfully, they felt more confident in their ability to solve problems like an engineer.”

Roxanne Camel, VILLAS ELEMENTARY, FT. MYERS, FL

“As a result of the implementation of the EiE curriculum I have seen an increase of student awareness and desire to do science. It has become a favorite part of their day. They enjoy the collaboration and the hands on activities with their peers. They are becoming problem solvers and do not even realize how much they are learning.”

Meagan Willard, DESERT WILLOW ELEMENTARY SCHOOL, TUCSON, AZ

 “[EiE] has had a big impact on my students. They become better problem solvers, work better in teams, use the design process to learn from failures and improve on their ideas, and see themselves as engineers. I am often surprised at how well even my lowest performing students do when we work through one of these units. They get the science and feel such a sense of accomplishment when they do an engineering design challenge.”

Debbie Gordon, VISTA DEL MONTE ELEMENTARY, PALM SPRINGS, CA

“There are many strong connections between our state standards and EiE. Students always want to do more! Teachers who were skeptical about their students’ ability to engineer (and their own) soon realized all could have success and be excited about problem solving.”

Meg Gebert, TUCSON UNIFIED SCHOOL DISTRICT, TUCSON, AZ
I like to think I'm an intelligent and capable teacher, but the EiE workshop opened my eyes to what engineering really means. Now, instead of referencing engineering as a career path my students might wish to consider for the distant future, my students ARE engineers, and loving every minute of it.

Simone Ryals, TAMARAC ELEMENTARY SCHOOL, FT. MYERS, FL

STUDENTS

The following are interactive testimonials. Please click the links so you can see the students in action!

“I like engineering because you get to create stuff and learn and you get to learn more, too. You get to know a lot more when you engineer.” [0:13]

Julie Mock’s 1st Grade Class, LAKE ELMO, MN

“The lesson helped us communicate and get along better, because it was a lot of teamwork.” [1:32]

Vanessa Ford’s 4th Grade Class, WASHINGTON, DC

“When I grow up, I would like to be an engineer because I've been wanting to make things that would be helpful, and when I grow up I think I can make things that would be helpful for people.” [0:13]

Chentel Neat’s 2nd Grade Class, HOLLYWOOD, FL

THOUGHT LEADERS

Developing synergy with museums, schools, businesses and the National Science Foundation is absolutely necessary to build math and science educational opportunities. The [EiE] curriculum [developed by the Museum of Science, Boston] is a great tool to involve children in science and engineering at their own level so that they are excited about and enjoy learning.

Arden L. Bement, Jr., former director, NATIONAL SCIENCE FOUNDATION
EiE curricula provide socially and culturally relevant contexts for students through their well-designed storybooks and their engaging engineering design challenges. Students who experience EiE lessons continue to talk about the characters from the storybooks and the design challenges for a long time after the conclusion of the lessons.

Tamara J. Moore and Gillian H. Roehrig, Co-directors, STEM Education Center, University of Minnesota

Engineering is Elementary teaches students the thinking and reasoning skills they need to be successful learners and workers. Because EiE is built around the engineering design process, it teaches students how to solve problems systematically. It also creates the optimism that every problem can be solved, which is relevant to any subject area. These skills and attitudes are important for our kids’ future. Life is not multiple choice.

Laura J. Bottomley, Director, The Engineering Place, North Carolina State University