# Engineering is Elementary®
# Engineering and Technology Lessons for Children

Problem Solving, Inquiry, and Innovation®

**www.mos.org/EiE**

Children are born engineers—they are fascinated with building, with taking things apart, and with how things work. However, K-12 educational settings have traditionally done little to develop children's engineering and technological literacy. The *Engineering is Elementary* (EiE) project fosters engineering and technological literacy among elementary school students and educators. EiE has created a research-based, standards-driven, and classroom-tested curriculum that integrates engineering and technology concepts and skills with elementary science topics. EiE lessons not only promote science, technology, engineering, and mathematics (STEM) learning in grades 1-5, but also connect with literacy and social studies. To date, EiE has reached over 2.7 million students and 32,000 teachers and is presently used in all fifty states.

## EiE Project Goals

- **Goal 1.** Increase children's technological literacy.
- **Goal 2.** Improve elementary educators' ability to teach engineering and technology.
- **Goal 3.** Increase the number of schools in the U.S. that include engineering at the elementary level.
- **Goal 4.** Conduct research and assessment to further the first three goals and contribute knowledge about engineering teaching and learning at the elementary level.

## The EiE Curriculum

Each EiE unit integrates an elementary school science topic with a specific field of engineering. EiE units are designed to engage students in the engineering design process and include:

- **Storybooks** featuring child characters from a variety of cultures, who introduce students to an engineering problem. Students are then challenged to solve a similar problem. In addition to providing context, the storybook also serves to introduce engineering and technology concepts and terms, and reinforce science vocabulary.
- **Lesson plans** for teachers. EiE teacher guides include vocabulary, learning objectives, tie-in science content, detailed materials and preparation sections, and step-by-step instructions on how to facilitate each EiE activity.
- **Duplication masters (DMs)** for student handouts. To accommodate differences in students' abilities, EiE units contain two versions of many DMs: Basic (lower reading level, less cognitively complex, suggested for grades 1 and 2) and Advanced (higher reading level, more cognitively complex, suggested for grades 3-5).
- **Student assessments and rubrics**. Multiple choice and open-ended questions that teachers can use to gauge their students' understanding and learning of engineering, technology, and science concepts are provided in each EiE unit. Rubrics are provided at the end of each lesson to help teachers evaluate students' progress.
- **Background information** and additional reference resources for teachers.

Each EiE unit takes about 8-10 hours of instructional time to complete. EiE has developed materials for 20 elementary science school topics and engineering fields. For a complete list of EiE units and their related science topics, please visit **www.mos.org/eie/20_unit.php**. All EiE units are designed to meet the ITEEA Standards for Technological Literacy. At its core, EiE is designed to have students engineer. The program develops interesting problems and contexts and invites children to have fun as they use their knowledge of science and engineering to design, create, and improve solutions.

## Professional Development

Engineering is a new discipline for many teachers. To learn more about engineering and technology content and pedagogy, the EiE project offers workshops for elementary school teachers and teacher educators. These sessions provide teachers with an overview of engineering and technology concepts and skills, review the structure and philosophy of the EiE curriculum, engage participants in activities from the curriculum, and foster reflection about effective instructional strategies. EiE workshops are held at the Museum of Science and EiE staff are also available to facilitate off-site workshops as requested. For more information on EiE professional development and a list of upcoming workshops, please visit **www.mos.org/eie/workshops_programs.php**.

## Research and Assessment

Research, evaluation, and assessment studies are integral to the development of the EiE curriculum, and an important facet of our curriculum development philosophy. The EiE team believes that a high-quality curriculum is one that is well-researched and thoroughly tested at all stages, from garnering a basic understanding of what students and teachers know about engineering and technology to the published product. From its inception in 2003, EiE has been committed to creating high-quality teacher guides and professional development for teachers and a world-class curriculum for students through multiple cycles of research, development, testing, and improvement. We are collecting qualitative and quantitative data from students and teachers across the nation to better understand how children best learn about engineering and how our materials impact their understandings.

National, statistical, controlled studies indicate that children who engage with EiE materials have a much better understanding of engineering and technology than children who do not use EiE. Findings have also shown that children who engage with EiE perform better on assessment questions about the related science topic than children who do not use EiE. For links to EiE's formal research findings and publications, please visit **www.mos.org/eie/research_assessment.php**.

## Multimedia Initiatives

The EiE website contains multimedia resources, such as a 16-minute informational video that provides an overview of the EiE project, footage of students engaged in EiE activities, and teacher interviews. The website also has a series of shorter videos designed to help educators organize and prepare materials for EiE lessons, as well as longer videos which capture footage of classroom teachers using EiE with their students. These longer videos include teacher interviews in which teachers reflect on their engineering practice and pedagogy. In addition to video resources, the website has a Content Connections page that contains a searchable, dynamic database of lessons, authored by EiE staff, teachers, and community members, that explicitly connects EiE lessons to mathematics, social studies, language arts, science, and fine arts.

## Out of School Time: Engineering Adventures

*Engineering Adventures* (EA) is a fun, engaging, hands-on, engineering curriculum being created by the EiE team for use in out-of-school-time (OST) settings such as after-school and camp programs. EA challenges children to solve design challenges using creativity, teamwork, science, and engineering. EA is arranged as a series of thematic units, each focusing on a field of engineering. EA is not yet available to the public. The first EA unit will be tested nationwide in the spring of 2011 thanks to the generous support of the S. D. Bechtel, Jr. Foundation. For more information on EA, please visit **www.mos.org/eie/engineeringadventures/**.

For much more information about the EiE project, please visit our website at **www.mos.org/eie**.