

E4 Conference

Excellence in Elementary Engineering Education



**February 6, 2009
College of St. Catherine
St. Paul, Minnesota**

This conference was made possible with generous support from the 3M Foundation, the Qwest Foundation, the College of St. Catherine and The Works, and with the guidance of the E4 Council.

E4 CONFERENCE

EXCELLENCE IN ELEMENTARY ENGINEERING EDUCATION

FEBRUARY 6, 2009

Elementary Engineering Extravaganza 8:00 to 9:15am

Hands-on engineering to start your day . . .

- The Works
- Leonardo's Basement
- Farnsworth Elementary & Minnesota Space Grant
- Society of Women Engineers
- The Bakken Library and Museum
- U of Minn Office of Outreach and Diversity
- First Lego League and High Tech Kids
- KidWind

Keynote Address 9:30 to 10:45am

Welcome

BALLROOM

Rebecca Schatz: President, The Works

Alice Seagren: Commissioner, Minnesota Dept of Education

Alex Cirillo: Vice President, 3M Foundation

Setting the Base for the Pace of the Race

The tremendous changes that we are undergoing, throughout the world are fueled by the discovery, design and application of knowledge. Technology, the "know-how" that leverages our innovation, offers incredible opportunities for productivity, capacity and well-being. Our society must be technologically literate for it to continue to lead the world. Our youth are our future to lead the way.

James Bensen: President Emeritus, Bemidji State University

Session 1

11:00am to 12:15pm

Elementary Engineering in Minnesota's New Science Standards

BALLROOM

Find out the philosophy, background and the content of the elementary engineering standards that are part of the new Minnesota Science Standards.

John Olson: Minnesota Department of Education

John Rapheal: Minnesota Department of Education

Mike Lindstrom: SciMathMN

An Engineer in Your Classroom

ROOM 370

Find out how to bring an engineer to your classroom for an educational program and other resources to promote engineering in your school!

A. J. Schwidder: SEH Inc.

Taylor Pettis: Minnesota High Technology Association

Anita Hall: Society of Women Engineers

Jeff Payne: 3M Visiting Wizard

Integrating Engineering in Kindergarten and Beyond

See how pioneering elementary engineering teachers develop curricula to motivate students, enhance learning and fulfill standards with hands-on engineering projects, including designing a new cereal.

ROOM 355

Rose Wippler, Doug Paulson, Sherilyn Hanson, Erik Anderson, Bre Zeman, Anna Bellefeuille, Deb Cone: Monroe Elementary, Anoka-Hennepin

Circuits, Switches and Invention

ROOM 361

Explore basic circuits while you build your own switch and flashlight, then learn about the invention process and keeping an invention journal.

Steve Walvig: The Bakken Library and Museum

Playing with your Food

SIDE BALLROOM

Explore chemical engineering, mechanisms and materials testing by playing with food. We'll use easy-to-find materials, and we can eat the results of many of our projects.

Jane Snell Copes: Science Outside the Box

Robbie Langenfeld: Engineer, General Mills

Wind & Water: STEM in the Elementary Classroom

Find out what a hydraulics engineer does and get some ideas about integrating STEM lessons into your curriculum.

ROOM 362

Lindsey Roberts McKenzie: Hydraulics Engineer, SEH, Inc.

Kim Kellum, Jen Steffes, Cathy Eiss, Cristin Caruso, Matt Marohn, & Elida Kane: Poplar Bridge Elementary, Bloomington Public Schools

LUNCH 12:15 - 1:15 pm

Session 2

1:30 to 2:45pm

Engineering Everywhere

ROOM 362

Engineers design everything from iPods to skateboards, from pacemakers to skyscrapers. Explore the world of mechanical engineering and see how engineering relates to your curriculum and to your students' lives.

John Bushey: Mechanical Engineer, MTS

Engineering Model School Roundtable

ROOM 370

Find out how two schools have created and sustained programs of engineering excellence: curricula, teacher professional development, special events, engineering labs and more...

Monica Foss, Kelli Ellickson: Cedar Park Elementary, Apple Valley
Kathe Nickleby, Mary George, Beth Sneed: Mahtomedi Schools

Engineering is Elementary

BALLROOM

Explore this multi-cultural, literature based engineering curriculum for elementary schools from Boston's Museum of Science.

Maija Sedzielar: Science Museum of Minnesota
Dana Tinsley: Trinity Catholic School St. Paul
Kris Strandness: Cedar Park Elementary, Apple Valley

Go Green!

SIDE BALLROOM

Real world developments in environmental energy and hands-on projects including wind turbines, fuel cell cars and more.

Matt Hardy: Cedar Ridge Elementary, Eden Prairie Schools
Joe Rand: KidWind

Project Lead the Way

ROOM 361

Learn about new Project Lead the Way units for elementary school that let students design a space colony and a Mars Rover.

Jim Mecklenburg: Project Lead the Way
Roxanne Cunningham: Pinewood Elementary, Mounds View Schools
Debbie Belfry: Bloomington Public Schools

Make It Work. Make It Better.

ROOM 355

Make a car, make it work, make it better, race it on a fast track, time it, fix it and more, guided by two pioneering engineering teachers from Galtier Elementary school in St. Paul.

Greg Childs: Elementary Science Coach, St. Paul Public Schools
Paul Krocheski: retired, St. Paul Public Schools

Session 3

3:00 to 4:15pm

Get Started Now: Beginner's Guide to Engineering in the Elementary Classroom

BALLROOM

Wondering how to connect engineering with lessons you are already doing? Learn lessons and activities that show how engineering can be done on a budget and how the engineering design process can be used in projects you may already be assigning. The session ends with Q&A and a quick check in with the standards.

Yvonne Ng: Director, Center for Women, Science and Technology
Lori Maxfield: Elementary Education, College of St. Catherine

Creating a Culture for Elementary Engineering

Why engineering is important, useful and fun and how can we create the best environment to encourage all kids to explore engineering.

Ron Bennett: MNCME
Ann Hornickel: U of MN Office of Outreach and Diversity
Fred Rose: High Tech Kids
Steve Jevning: Leonardo's Basement

How Can We Help? School/Industry Partnerships

Savvy school administrators and corporate leaders discuss how to plan, implement and sustain useful school/industry partnerships.

Debbie Belfry: Bloomington Public Schools
Doug Paulsen: Monroe Elementary School
Anita Hall: Engineer, General Mills

Hands-on Engineering Design

ROOM 355

Learn about the engineering design process and enjoy exploring hands-on engineering projects – from pasta bridges to a float-your-boat challenge to amusement park rides – that fulfill the new Minnesota engineering design standards.

Heidi Eschenbach, Jessalyn Johnson, Emily Carroll: The Works

Aerospace and How to Teach it to Kids

ROOM 361

Roll up your sleeves and launch gliders, build parachutes, play with rockets and more with experienced teachers and aerospace experts.

James Flaten: Minnesota Space Grant
Jill Wall: Farnsworth Aerospace Elementary School, St. Paul

Inventions

ROOM 370

Learn how to teach invention in your classroom, and how to participate in the Young Inventor's Fair (YIF.)

Peter Hoh: Science Museum of Minnesota
Cathy Macdonald: Success Beyond the Classroom

EVALUATION 4:15 - 4:45 pm

Local Organizations for Elementary Engineering

Bakken Library and Museum
www.thebakken.org

BEST www.bestoutreach.com

Destination Imagination www.mndi.org

First Lego League/ High Tech Kids
www.hightechkids.org

KidWind www.kidwind.org

Leonardo's Basement
www.leonardosbasement.org

Mad Science www.madscience.org

MN Planetarium www.mplanetarium.org

Minnesota Science Teachers Association
www.mnsta.org

Minnesota Technology Education Association
www.mtea.net

Pavek Museum www.pavekmuseum.org

Science Museum of Minnesota www.smm.org

Science Outside the Box
www.scienceoutsidethebox.com

SciMathMn www.scimathmn.org

SEEK: environmental education resources
www.seek.state.mn.us

Starbase Minnesota www.starbasemn.org

STEPS www.stthomas.edu/engineering/outreach/steps/default.html

Tronix Team www.tronixteam.org

U of M Office of Outreach and Diversity
<http://it.umn.edu/students/dao>

Urban Boatbuilders
www.urbanboatbuilders.org

The Works www.theworks.org

Young Inventor's Fair (YIF)
www.successbeyond.org/YIF.htm

Elementary Engineering Curricula and Resources

ASEE American Society for Engineering Education www.engineeringk12.org Useful curriculum ideas and terrific links. Great pamphlet called "Engineering: Go for It."

Design and Discovery is a comprehensive inquiry-based curriculum, which introduces students ages 11-15 to engineering through design. In 18 sequential sessions, students follow the design process, from identifying a design opportunity to developing a working prototype. Free to download from Intel.
<http://educate.intel.com/en/DesignDiscovery/>

Design It! Introductory Experiences in Engineering and Design available through Kelvin www.kelvin.com Bernie Zubrowski has written this and many other books with fantastic engineering projects; several are out of print but in public libraries.

Design Squad: This TV program produced by WGBH Boston features eight diverse high school students who tackle a series of intriguing and sometimes wacky design challenges for real clients in a fast paced team environment. Not showing on TV in Minnesota, but you can download the episodes and excellent activity and educator guides from their website: <http://pbskids.org/designsquad/>

Also check out the elementary engineering activities on other PBS shows:

Zoom <http://pbskids.org/zoom/activities/sci/>

Dragonfly TV <http://pbskids.org/dragonflytv/show/technologyinvention.html>

Building Big <http://www.pbs.org/wgbh/buildingbig/>

Engineering Education Service Center stocks books, supplies, movies & resources for teaching about engineering.
www.engineeringedu.com

Engineering is Elementary: EiE The Museum of Science in Boston is creating this research-based, standards-based, and classroom-tested curriculum that integrates engineering and technology concepts and skills with elementary science, social science and language topics. www.mos.org/eie

FOSS Kits: Full Option Science System from the Lawrence Hall of Science. Many FOSS kits have excellent potential for elementary engineering. <http://lhsfoss.org/index.html>

Future Scientists and Engineers of America (FSEA) Excellent elementary engineering kits that can be bought individually, or in quantity for after school programs.
www.discoverycube.org/fsea.aspx?q=47

International Technology Education Association (ITEA) is the professional organization for technology, innovation, design, and engineering educators. Published "Standards for Technological Literacy," the inspiration for many engineering standards nationally. Great links and resources include e-newsletters, films, publications and an elementary curriculum called I3: Invention, Innovation and Inquiry. www.iteaconnect.org

National Engineers Week www.eweek.org/Home.aspx

Pitsco: www.pitsco.com A catalog packed with engineering kits and materials

Project Lead the Way www.pltw.org Comprehensive engineering curriculum for secondary schools, with new elementary lessons.

Schoolyards to Skylines: Architecture lessons integrated with elementary subjects.
www.architecture.org/aboutschoolyards.html

The Science Source: A favorite source of materials and books for hands-on engineering.
www.thesciencesource.com/index.html Their catalog has a particularly good section of elementary engineering books from England.

Stuff That Works: Elementary engineering curriculum developed by the City College of New York. Download projects online: http://citytechnology.cuny.cuny.edu/Design_Tech.html or purchase curriculum books and resources.

TeachEngineering.com is a searchable, digital library with standards-based curricula to teach engineering in K-12 settings.
www.Teachengineering.org Also see www.engineeringpathway.com/ep/index.jhtml

A World In Motion® engineering challenges for elementary students. Curriculum and materials free from Society for Automotive Engineers. www.sae.org/exdomains/awim/aboutus

Compiled by The Works.