

Grand Challenges in K12 Education

The Challenge is that often Engineering is NOT
explicitly in the Curriculum

But Engineering is fact the Glue

ST **E** M

21st Century Engineering Global Vision

Continuation of Life on the Planet
making our world more **Sustainable,**
Safe, Healthy and Joyful



NAE GRAND CHALLENGES FOR ENGINEERING

NATIONAL ACADEMY OF ENGINEERING



Advance Personalized Learning



Enhance Virtual Reality



Engineer Better Medicines



Restore and Improve Urban Infrastructure



Provide Access to Clean Water



Manage the Nitrogen Cycle



Develop Carbon Sequestration Methods



Prevent Nuclear Terror



Make Solar Energy Economical



Reverse Engineer the Brain



Advance Health Informatics



Provide Energy from Fusion



Engineer the Tools of Scientific Discovery



Secure Cyberspace



Grand Challenges for Engineering (GCE) are ideal as a Coherent Theme for K-12 Instruction

Cross disciplinary

Motivation

Context

Societal Connection

Creativity

Relevance

A Wide Spectrum of Opportunities

High Schools

GCE as an instructional focus that extends through All subjects and through All 4 years

e.g. Wake STEM Early College High School; Raleigh, NC

A Learning Community within a School

e.g. Global STEM Challenges Program at Edison High School; Fairfax, VA

A STEM Lab Pathways framed around GCE's

e.g. Tesla STEM High School; Redmond, WA

A Wide Spectrum of Opportunities

Middle Schools and After School Programs

GCE in a daily research core class, each grade focusing on different challenges : 6-Water, 7-health, 8-Solar

e.g. STEM Academy at Bartlett Middle, Savannah, GA

Competitions

e.g. Annual competition on themes based on the Grand Challenges (2017 theme is “Engineering the Environment”)

Summer programs

e.g. SEEK (Summer Educational Experience at Kent)



Grand Challenges Scholars Program

- Program and ***experiences*** that prepare students (and others) for problems like the Grand Challenges
- **5 “competencies” of GCSP program:**
 - **Research/creative** – solution or project experience on GC like topic
 - **Multidisciplinarity** – understanding through hands-on experience
 - **Business/entrepreneurship** – viable business model for implementation
 - **Multicultural** understanding – through global experience
 - **Social consciousness - through service learning and outreach activities**

Partnering with a University with GCSP

- Grand Challenges Scholars as mentors for K12 students
- Grand Challenges Scholars as TA's for teachers for delivering lessons on Grand Challenges