Introduction

Defining Engineering
The National Academy of Engineering defines engineering as design under constraints, with the most fundamental of these constraints being the laws of nature. Engineers design solutions to particular problems and must take into account how objects behave in motion. Engineers design with the goal of meeting human needs and wants.

History of Engineering Education
The first official K-12 engineering curriculum program was introduced during the 1990’s. The acronym STEM, or Science, Technology, Engineering, and Mathematics was coined in 2001 by the National Science Foundation as a program that aims to educate all students in these disciplines, as opposed to previously developed programs which only focused on advanced students.

While science, mathematics, and technology education all have well established roots in elementary and secondary schools, engineering education still lacks a defined set of curriculum, standards, and assessments. The Committee on K-12 Engineering Education was established in 2006 by the National Academy of Engineering to institute standards for engineering education for future generations.

Engineering Education

Significance of Engineering Education
The world around us is changing – increasing in complexity, interconnectivity, competitiveness, and technology dependence – which poses new challenges for individuals and for nations that cannot be met by continuing education as usual.

— National Academy of Engineering

Positive outcomes which can result from engineering education for students in grades K-12 include:

- Enhanced Knowledge of Science and Mathematic Concepts
- Critical Thinking and Design Skills
- Improved Technological Capabilities
- Increased School Attendance and Retention of Students
- Increased Cognizance of Engineering and What Engineers Do
- Interest in Pursuing an Engineering Career

Standards for Engineering Education

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Techniques for Implementation

Methods
- Engineering Concepts
- Systems
- Optimization

Engineering Skills
- Drawing and Representing
- Experimenting and Testing

Teaching Strategies
- Allowance of an appropriate amount of class time for students to fully engage in the development of designs and revisions.
- Formatting material presented to students so that it builds upon itself, where a simple understanding of a topic precedes a more difficult concept.

Evaluation Techniques

Lessons Learned
- Assess Knowledge Gained
- Student Input to Evaluate Effectiveness of Activity

Results and Conclusion

“I came here,” said Reilly, “because I wanted to learn about engineering. I wanted to learn about building bridges and buildings.”

References


