POSITION STATEMENT

ENGINEERING IN PRIMARY AND SECONDARY (K-12) EDUCATION

Adopted by the IEEE-USA
Board of Directors, 19 November 2010

IEEE-USA recommends that Congress authorize a Federal incentive grants program administered by the U.S. Department of Education to competitively award planning, implementation, research and evaluation grants to enable state educational agencies to effectively integrate engineering design concepts and creative problem solving skills in K-12 educational curricula and courses of instruction.

State education agencies would be authorized to use the planning and implementation grants to (1) introduce challenging academic content and achievement standards ; 2) develop or obtain effective age-appropriate educational curricula; (3) develop or improve teacher training programs; (4) recruit qualified teachers for underperforming schools; (5) facilitate distance learning and online instruction; and (6) invest in after-school engineering education programs.

To ensure program effectiveness, state research and evaluation proposals should contain quantifiable benchmarks and metrics to facilitate assessments of activities supported by the requested grants. Also, qualified outside organizations should be retained to help plan and evaluate funded programs and to identify best practices and promising innovations in K-12 engineering education that can be disseminated by the Department of Education and other interested federal agencies.

This statement was developed by the IEEE-USA Career and Workforce Policy Committee and represents the considered judgment of a group of U.S. IEEE members with expertise in the subject field. IEEE-USA advances the public good and promotes the careers and public policy interests of more than 210,000 engineers, scientists and allied professionals who are U.S. members of IEEE. The positions taken by IEEE-USA do not necessarily reflect the views of IEEE or its other organizational units.

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Background

Engineering education in K-12 classrooms is important, not because of the number of students impacted, but because of its implications for the future of science, technology, engineering and mathematics (STEM) education in the United States.

As reported by the National Academy of Engineering in 2009, the introduction of engineering design concepts and practical applications in America's middle and high schools has the potential to improve student learning and achievement in science and mathematics, increase student interest in engineering and engineering careers and boost students' basic technological literacy. This, in turn, will help to ensure that U.S. schools are graduating students capable of succeeding in an increasingly sophisticated, technologically driven world, meeting America's high-tech workforce needs, and creating innovations that will drive the economy and solve the grand challenges that confront our nation and the global community.

The provision of federal financial support preserves the traditional responsibility of the states to establish K-12 educational standards and curriculum requirements, while at the same time providing appropriate incentives to the states to use engineering education to enhance the teaching of math and science.

Consistent with the National Academy of Engineering's findings and recommendations, IEEE-USA has endorsed enabling legislation – the Engineering Education for Innovation Act – as introduced in 2010 by Representative Paul Tonko (NY) and Senator Kirsten Gillibrand (NY) and will support its reintroduction and enactment in the 112th Congress.

Additional Resources

The Engineering Education for Innovation Act
http://thomas.loc.gov/cgi-bin/bdquery/z?d111:s.03043:
http://thomas.loc.gov/cgi-bin/bdquery/z?d111:h.r.04709:

Comments by Senators Gillibrand (NY) and Kaufman (DE) on introduction of the Engineering Education for Innovation Act (S 3043), Congressional Record, pp. S799-S800 (25 Feb. 2010).
http://thomas.loc.gov/cgi-bin/query/R?r111:FLD001:S50800

Linda Katehi, Greg Pearson and Michael Feder, "The Status and Nature of K-12 Engineering Education in the United States." The Bridge. National Academy of Engineering (Fall 2009).
http://www.nae.edu/Publications/TheBridge/16145/16161.aspx

Engineering in K-12 Education: Understanding the Status and Improving the Prospects, Committee on K-12 Engineering Education, National Academy of Engineering and National Research Council (Sep 2009).
http://www.nap.edu/catalog.php?record_id=12635

Standards for K-12 Engineering Education, Committee on Standards for K-12 Engineering Education, National Research Council (Oct. 2010)
http://www.nap.edu/catalog.php?record_id=12990