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K-12 EDUCATION SHOULD INCLUDE ENGINEERING

A significant new publication from the National Academy Press.

The introduction of K-12 engineering education has the potential to improve student learning and achievement in science and mathematics, increase awareness about what engineers do and of engineering as a potential career, and boost students' technological literacy, according to a new report from the National Academy of Engineering and the National Research Council. "Engineering in K-12 Education: Understanding the Status and Improving the Prospects" examines the status and nature of efforts to teach engineering in U.S. schools.

According to the report, engineering education at the K-12 level should emphasize engineering design and a creative problem-solving process. It should include relevant concepts in mathematics, science, and technology, as well as support the development of skills many believe essential for the 21st century, including systems thinking, collaboration, and communication. While science, technology, engineering, and mathematics instruction is collectively referred to as "STEM education," the report finds that the engineering component is often absent in policy discussions and in the classroom. In fact, engineering might be called the missing letter in STEM, the report says.

Those who contributed to the report developed an in-depth analysis of 15 K-12 engineering curricula; reviewed scientific literature related to learning engineering concepts and skills; evaluated evidence on the impact of K-12 engineering education initiatives; and collected preliminary information about pre-collegiate engineering education programs in other countries. The report found that engineering education opportunities in K-12 schools have expanded considerably in the past 15 years. Since the early 1990s, for example, about 6 million children have been exposed to some formal engineering coursework. However, this number is still small compared with the overall number of students in K-12 schools (approximately 56 million in 2008).

The committee noted that there remain many challenges to expanding the availability – and improving the quality – of these programs, including the absence of content standards to guide development of instructional materials, limited pre-service education for engineering teachers, and structural and policy impediments to including this new subject in an already crowded school curriculum. Among the report's recommendations include considering a formal credentialing process for K-12 engineering teachers, continued research to determine how science inquiry and mathematical reasoning can be connected to engineering design in curricula and professional development, and clarifying the meaning of "STEM literacy."

The report may be read online at

http://books.nap.edu/openbook.php?record_id=12635&page=R1

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