

## EDUCATING THE ENGINEER OF 2020

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### ABSTRACT

How will engineering practice change in the next twenty years? What are the implications to engineering education? Will we have achieved gender equity? These questions will be discussed in the context of three recent reports of the US. National Academy of Engineering – *The Engineer of 2020: Global Visions of Engineering in the New Century*; *Educating the Engineer of 2020: Adapting Engineering Education to the New Century*; and *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*.

### 1. SUMMARY ON NATIONAL ACADEMY REPORTS

As one of the co-authors of these reports, I will summarize the major results and the implications on engineering education of the future.

#### 1.1 The Engineer of 2020: Global Visions of Engineering in the New Century

This report [1] describes future possibilities for the context in which engineers will practice and the technical and social challenges they might face. Future goals for the engineering profession are discussed, including the need to embrace diversity and globalization in the engineering workforce and in the professional activities of engineers, and increasing the roles of engineers in public policy.

#### 1.2 Educating the Engineer of 2020: Adapting Engineering Education to the New Century

The second report [2] builds on these findings to project educational needs for the new century and makes recommendations for creating a more adaptive, diverse and inclusive system of engineering education. This report recommends changes in the curricula to broaden the context of engineering, enhance the status of the engineering profession and improve technology literacy and the public understanding of engineering. The primary focus is undergraduate education.

#### 1.3 Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering

Finally, *Beyond Bias and Barriers* [3] takes a look at all scientific and engineering disciplines with a view to understanding why women are not equally represented in the profession, on the faculty and in graduate programs. Whereas forty years ago women only made up three percent of America's scientific and technical workers, by 2003 they constitute nearly one-fifth and earn over half of the bachelor's degrees awarded in science and engineering. The numbers in doctoral programs and on our faculties, however, have stagnated. The report found no biological basis for this difference but summarized a substantial body of literature that points to unintended biases and structural barriers. I will supplement the U.S. data in the report with international data.

My talk will focus on strategies for change. Women face barriers to hiring and promotion in research universities in many fields of science and engineering. Eliminating gender bias in universities requires immediate, overarching reform and decisive action by university administrators, professional societies, and government agencies.

### 2. REFERENCES

- [1] National Academy Press, 2004, *The Engineer of 2020: Visions of Engineering in the New Century*. <http://www.nap.edu/openbook.php?isbn=0309091624>
- [2] National Academy Press, 2005, *Educating the Engineer of 2020: Adapting Engineering Education to the New Century*. <http://www.nap.edu/openbook.php?isbn=0309096499>
- [3] National Academy Press, 2007, *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*. [http://books.nap.edu/catalog.php?record\\_id=11741#toc](http://books.nap.edu/catalog.php?record_id=11741#toc)