

# Equal Opportunity in Engineering Education

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## I. INTRODUCTION

In the beginning, engineering was directed toward military applications. The advent of “Civil Engineering” was the first step to put engineering to civilian use. Early engineering activities were physically demanding and only suitable for men. This is not to say that engineering activities were not mentally demanding as they involved calculation and design based on science and mathematics. The discipline, therefore, attracted men with physical stamina and analytical minds. The first restriction eliminated the women who were about half of the population from the workforce, and the second restriction eliminated a large number of disfranchised who were not considered bright enough. As engineers, we should not feel guilty, as this was the norm in most professions in their early days. Over decades, things have changed. Physical strength is not a pre-requisite and mathematics and science are not in the monopoly of a select group. We, therefore, expect to see a fair representation of all in this profession. In this presentation we look at the present status of equal opportunity in engineering education and discuss ways by which such opportunities can be afforded to people who have not enjoyed them in the past.

## II. PRESENT STATISTICS OF ENGINEERS

The present statistics are not encouraging. Women constitute 50.9% of the US Population, but earn 20.3 % of BS, 21.9% of MS and 17.8% of doctorates in engineering and are 17.8% of the engineering faculty. African Americans constitute 25.4% of the population but earn 5.1% of BS, 4.3% of MS, and 3.8% of doctoral degrees and represent 2.35 of the engineering faculty. Hispanic Americans constitute 25% of the population, but earn 5.6% of BS, 4.5% of MS, 3.5% of doctoral degrees, and are 2.35% of the engineering faculty. Native Americans constitute 1.5% of the population and earn about 0.1% of doctoral degrees. Asian Americans, on the other hand, constitute 8.3% of the population but earn 14.2% Bs, 16.8% MS, 14% of doctoral degrees and represent 20.4% of the engineering faculty.

## III. ADVANTAGES OF EXTENDING OPPORTUNITIES TO WOMEN AND MINORITY GROUPS

More women and minorities must be attracted to engineering, because:

- There is great need for engineers and technologists, and all available human resources should be mobilized.
- Engineering is a relatively high paying profession, and attraction of women and minorities promotes social justice and economic well-being.
- Participation of diverse people in engineering fosters multi-culturalism, which brings new perspectives and insights much needed in our global economy.

#### IV. WAYS OF ACHIEVING DIVERSITY

A good percentage of women, although qualified in every way, are not familiar with engineering profession and engineers' functions. They should be introduced through outreach programs such as Engineering Week activities. Engineering programs of interest to women such as chemical, biochemical, and environmental must be established where they do not exist. An attempt should be made to combine engineering with education for large number of women who choose to teach in elementary and high schools.

Some minorities are not familiar with engineering and do not have the necessary mathematics/science background to pursue engineering studies. Many outreach programs are now in place at great cost to government to mobilize this cohort. It is not time to come up with new programs, but to critically evaluate the existing programs to find and follow the most effective ones.

#### V. EXPERIENCE AT THE STATE UNIVERSITY OF NEW YORK AT NEW PALTZ

State University of New York-New Paltz is one of the 10 public colleges chosen by the American Association of State Colleges and Universities (AASCU) as having high graduation rates for Hispanic students. A number of programs have led to this significant success. Educational Opportunity Program (EOP), the Alliance for Minority Education (AMP), the collegiate Science and Technology Entry Program (C-STEP), the Scholar's Mentorship Program (SMP) are some of these programs. All these programs are geared toward building a support system that provides tools the students need to succeed. We have had successful graduates among minorities and women who have good engineering positions or have completed graduate studies.

#### VI. CONCLUSION

Most colleges and universities participate in these national programs as well as their own created programs to provide equitable opportunity. The conference will provide a good opportunity to exchange ideas about the existing programs as well as some novel programs.