Viewpoints

Issues of Accreditation in Higher Education Vol. III

Diversity

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Diversity

Foreword

A diverse workforce is no longer an ideal but a requirement in an increasingly global marketplace. Many professions have made great strides towards this objective, but technical industries are faltering in the pursuit of a representative workforce. These fields show pervasive and critical deficiencies in the employment of many individuals — particularly women, members of some racial and ethnic minority groups, and persons with disabilities — whose perspectives are necessary to compete in today's business environment.

The ABET Industry Advisory Council, often called upon to advise ABET's efforts, offers this report on diversity issues, based on discourses dating from 2003. This assembly of industry leaders has considered the conspicuous lack of diversity in the fields that ABET accredits and the likely implications if such circumstances persist. In addition, this report heralds some of industry's efforts to diversify the current and future technical workforces.

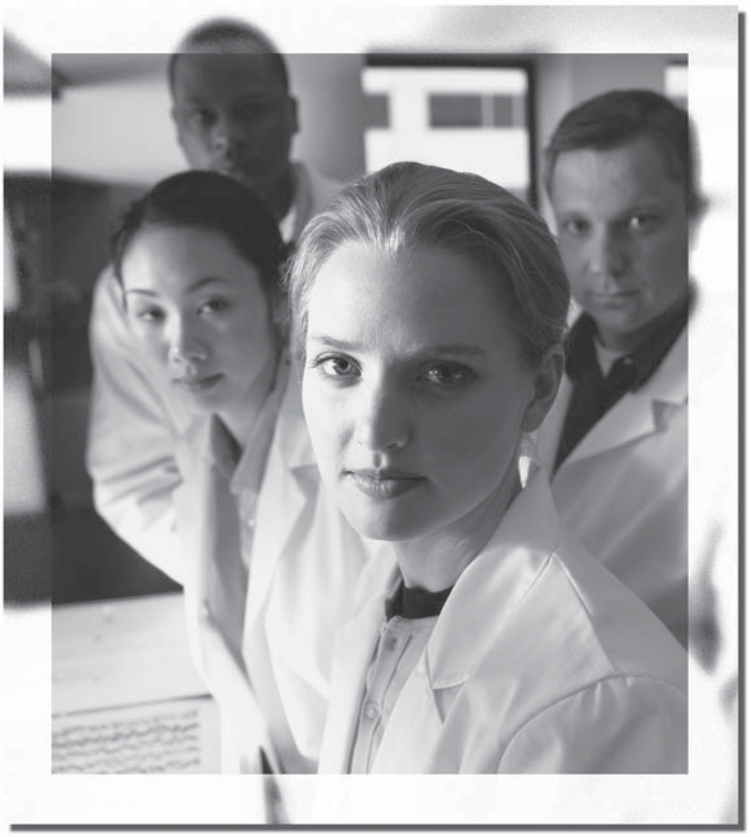
By the Members
of the Industry Advisory
Council of ABET, Inc.

This issuance of *Viewpoints,* the third in ABET's white paper series, is provided to you, our constituents, both for your information and for your response. ABET values your input, so please take time to articulate your comments.

Our sincere appreciation goes to the members of the Industry Advisory Council and, of course, to you for your continued support of ABET.

John D. Lorenz
ABET President, 2003-2004

Diversity in Applied Sciences, Computing, Engineering, and Technology



Introduction

Before the end of the decade, the United States is expected to see almost 2 million new employment opportunities created in the engineering and scientific disciplines. These areas are growing more than four times the rate of all other occupations. Nevertheless, these fields cannot continue to thrive if the greatest pools of talent to fill these positions remain untapped.

> *"Our future depends on unleashing the potential of all our employees, everywhere. And committed leadership is the key to doing that. One of the things our leaders are doing as we work together to continue building our people culture is focusing on diversity. They're doing this because it's the right thing to do and because diverse backgrounds, experiences, and points of view are good for business."*
>
> — Jim Owens, CEO, Caterpillar, Inc.

Diversity is no longer a mere display of altruism or political correctness; it has emerged as a strategic business position. Globalization is making the world more competitive, both economically and intellectually, and technical industries based in the United States must indemnify themselves if they expect to maintain their

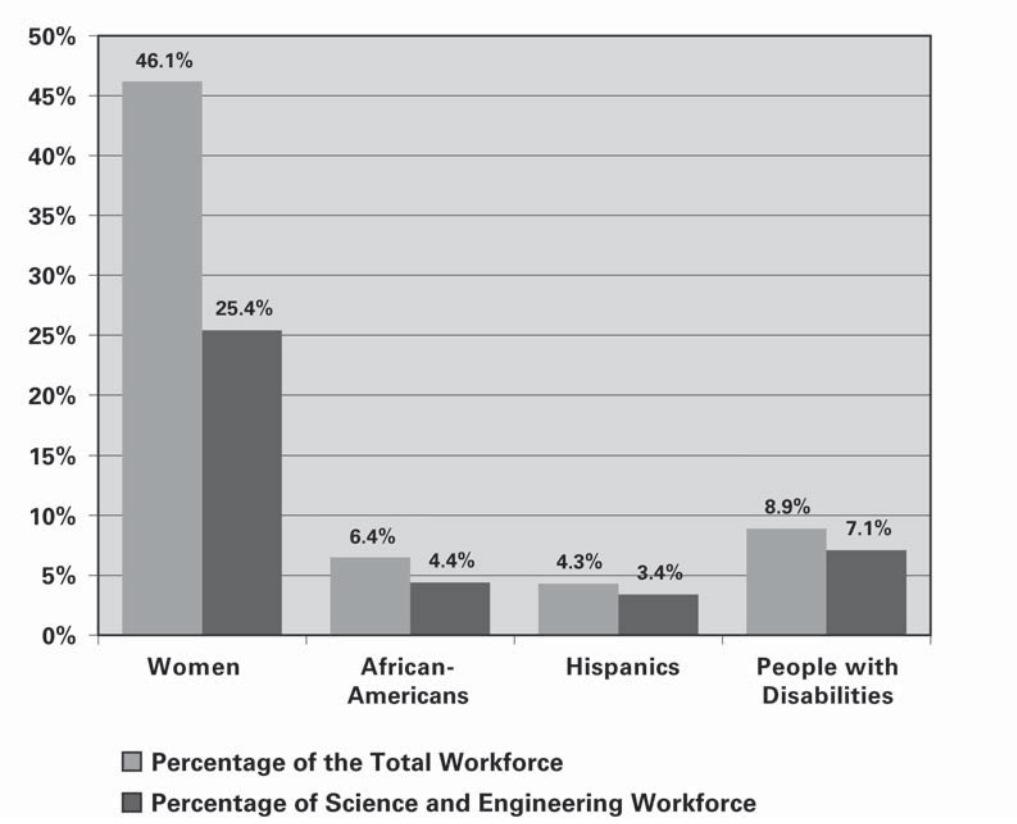
position of superiority. One means to this end is through diversity in their professional capital. Women, underrepresented minorities, and persons with disabilities together comprise two-thirds of the American population; however, the percentages employed in the fields that ABET accredits lingers below — in some cases, far below — those of the national profile, and of the country's workforce in general. It is imperative that technical fields draw from these underrepresented groups if they are to face the future with the same ingenuity and economic strength that has characterized their pasts.

Background

As more women have entered the workforce and the country has become more ethnically diverse, the compositions of many professions have begun to mirror the nation's demographics. However, the faces of the disciplines that ABET accredits — applied science, computing, engineering, and technology — remain practically unchanged. White males constitute seven in 10 professionals employed in engineering and the sciences, a percentage almost double their representation in the general workforce.

On the contrary, many groups are contributing a much lower proportion of their numbers to technological fields than they are to other disciplines. White females

Employed Bachelor's or Higher Degree Recipients by Gender, Race/Ethnicity, and Disability Status in 2000



Data: *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2004*

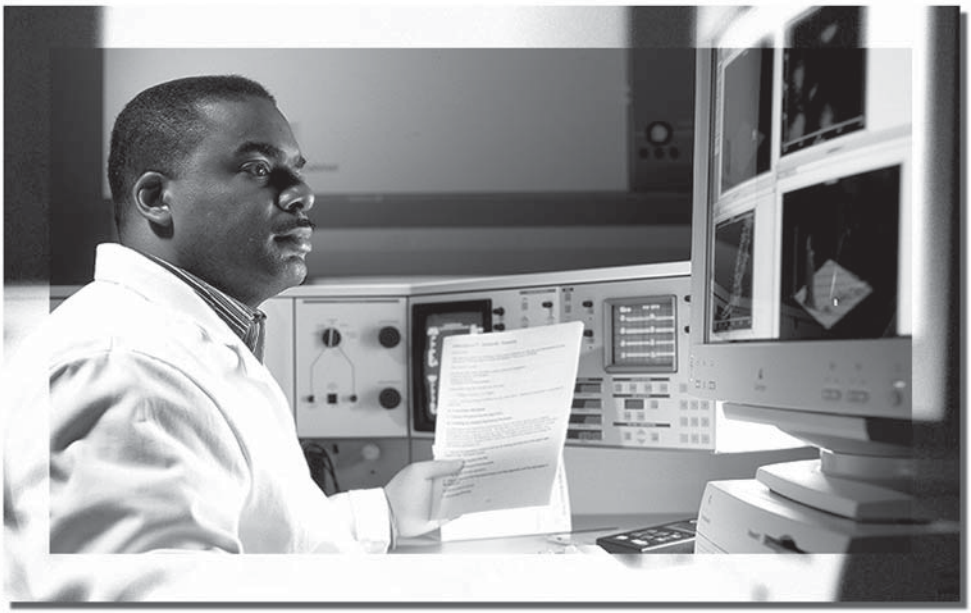
represent more than a third of the American workforce, but they are less than 15 percent of engineers and scientists. Taken together, African-Americans, Hispanics, and persons with disabilities represent nearly 20 percent of degreed labor, yet only 7.7 percent are working in these fields. Let us consider each of these populations on an individual basis:

Women

The numbers of women entering many traditionally male-dominated fields, such as medicine and law, is nearing parity, but the percentage of women entering applied science, computing, engineering, and technology remains disproportionately low. Female students earn just 22 percent of all bachelor's degrees in computer science and engineering. Consequently, women compose only slightly more than one-fifth of the nation's 3.6 million science and engineering employees. The contrast between genders becomes even more apparent when the specific disciplines are examined. For example, there were approximately 1.3 million engineers in the United States in 2000, but only 139,800, less than 11 percent, of these professionals were female. Clearly, there is a huge discrepancy between the number of degreed women entering the workforce and the percentage choosing to pursue technical disciplines.

Underrepresented Minorities

Some ethnic and racial minorities in the United States have excelled in applied science, computing, engineering, and technology. Asian-Americans make up only 6.4 percent of the nation's degreed workforce, yet they constituted 14 percent of employees in technical careers in 2000. That same year, American Indians, Alaskan Natives, and multiracial individuals contributed to the



general workforce and to the fields that ABET accredits in equal percentages. Nevertheless, the African-American and Hispanic populations remained noticeably underrepresented in these disciplines. African-Americans constitute 6.4 percent of the nation's degreed workforce with almost 2.3 million individuals, yet they represent just 4.4 percent of science and engineering professionals. Likewise, Hispanics compose 4.3 percent of all employed degree holders with more than 1.5 million people but are only 3.4 percent of scientists and engineers. These figures show that some members of minority groups are choosing engineering and scientific disciplines, but a disproportionate number are not. They are failing to consider these fields as part of their educational endeavors, and their limited presence in technical professions has become the result.

People with Disabilities

With more than 3 million individuals, people with physical or mental disabilities represented 8.9 percent of the American workforce in 2000. However, only 257,000, or 7.1 percent, of the 3.6 million people working in scientific and engineering fields belonged to this group. In contrast, persons with disabilities constituted 9.1 percent of non-science and engineering professionals, a higher representation than in the general labor force. The disparity between this group's employment in technical fields versus other disciplines is relatively small, but individuals with disabilities are still pursuing careers apart from applied science, computing, engineering, and technology in greater proportions.

Implications

Diversity has emerged as an essential business practice, one that is industry-initiated and productivity-driven. Increased globalization has stimulated an unparalleled production of innovative goods and services that are reaching previously untapped markets around the world. For societies and industries to compete under these new economic conditions, they must maintain the strongest intellectual capital available or otherwise jeopardize their dominance.

Many corporations recognize that no one single group possesses the knowledge necessary to succeed within the current global marketplace and they can no longer rely solely upon their current talent pools to achieve their visions and goals. Therefore, they are aspiring to a more heterogeneous workforce, one that enables their leadership to draw upon the abilities and perspectives of all members within their society. A diverse workforce will understand the new international customer base, help to recognize issues that may become potential problems, and offer a range of creative solutions. These employees and their contributions will serve as one of industry's strongest assets within a changing American culture and upon an ever-evolving global economic stage.

"To me, diversity is a requirement — an imperative of business survival in an era of increasingly tough competition. Why? Because diverse teams make better decisions, and better decisions make us more competitive."

— Former Raytheon CEO Dan Burnham

Fortunately for these disciplines, the nation's demographics are changing rapidly, and the country's workforce will reflect these shifts in the near future. Women in the United States are pursuing college and university degrees in unprecedented numbers. Whereas 51 percent of undergraduates were female in 1978, that ratio had risen to 56 percent in 1996, with nearly 1.5 million more women seeking bachelor's degrees than men. By 2000, 16.5 million women holding at least a bachelor's degree were employed in the United States, representing 46.1 percent of the nation's college-educated workforce. The time is right for the engineering and science fields to make a concerted effort to attract females as students and retain them as professionals.

The United Nations projects that the American population will grow by 40 percent by the year 2050, which will help to fill the anticipated need for more workers in scientific and engineering fields. However, the most significant increases in population will be among racial and ethnic minority groups. During the last decade alone, the African-American population rose by 16 percent, while the Hispanic population

grew by a staggering 58 percent. More significantly, these populations tend to be younger, with 33 percent of African-Americans and 34.4 percent of Hispanics under the age of 18, compared to 22.8 percent of whites. Considering that the number of minorities seeking higher education opportunities is also burgeoning, this fresh pool of talent can provide many of the future's engineers and scientists.

Conversely, the number of white male workers, particularly in the scientific and engineering fields, is dwindling. With the exception of emerging disciplines, such as computer sciences and information technology, the greatest population density for this group is in their 40s and 50s, a cohort that will soon begin to retire en masse. Their employers will be unable to replicate the current workforce's characteristics and must engage women, underrepresented minorities, and people with disabilities to maintain their personnel. Not only will diversity serve as an essential business practice, it will become a vital business strategy as industry replenishes an aging workforce.

ABET Industries Lead the Way

Many corporations have taken an active role in encouraging underrepresented groups to pursue engineering and science opportunities. Some have introduced grassroots initiatives that engage all students in these disciplines from a young age, and many recruit from universities known to have large underrepresented minority student populations. Numerous companies co-sponsor activities with professional societies that represent women or racial and ethnic minority groups, while others have established mentoring and leadership programs for these populations as part of their corporate structure. These are just a few of the actions that companies are taking to ensure a more diverse workforce:

- **The ExxonMobil Corporation** supports several organizations that seek to improve opportunities for women and minorities. It has established partnerships with the Society of Women Engineers (SWE) and the Science, Engineering, Communication, Mathematics Enhancement (SECME) Program. Also, the company provides direct grants and a 3-to-1 matching program to several minority scholarship funds, such as the Hispanic Scholarship Fund and the United Negro College Fund.

  However, one of the company's strong relationships is with the National Action Council for Minorities in Engineering, Inc. (NACME), the nation's largest privately funded source of minority engineering student scholarships. ExxonMobil is one of NACME's founding Partner Institutions and has

become a supporter of the organization's work with the National Coalition of Underrepresented Racial and Ethnic Advocacy Groups in Engineering and Science (NCOURAGES), a new project to advance the participation of African-Americans, Hispanics, and American Indians in science and technology. In 2004, during NACME's 30th anniversary celebration, the organization honored ExxonMobil with its Corporate Leadership Award.

- **Fluor Corporation** invests in a wide range of efforts that support mathematics, science, engineering, and construction opportunities for women and minorities. Its College Relations division has played a key role in the company's diversity strategy for more than 25 years. It places a primary focus on supporting programs that assist in the retention of minority and female engineering students, as well as those that introduce engineering to pre-college students. Some of the many university programs that Fluor supports include: Arizona State University Construction School minority and female outreach efforts; Clemson University's Women in Science and Engineering (WISE) program; Montana State University's Women in Construction program; Purdue University's Women in Engineering and Minority Engineering Programs; Texas A&M University's Females Leading Aggies as Mentors in Engineering (FLAME) program; and the University of Texas at Austin's Equal Opportunity in Engineering (EOE) program and Women in Engineering program.

  In addition, Fluor assists college university career centers with student ambassador and diversity programs. At each institution, funding is provided

to chapters of the Society of Women Engineers (SWE), the National Society of Black Engineers (NSBE), and the Society of Hispanic Professional Engineers (SHPE) to finance student projects and 20 scholarships. Fluor liaisons participate in a mentoring program for SWE and NSBE students and often present industry programs, career days, team-building activities, and employer panel discussions. These individuals also serve as a contact point for students by offering career advice and guidance as they plan their future career paths.

- **Microsoft** works with many organizations that help to increase technology awareness among the country's students. Its youth initiatives include projects with the Technology Access Foundation, which is aimed at underrepresented minority public school students, and with Powerful Voices, the Ms. Foundation for Women, and Ignite, all of which encourage girls' interest in sciences and technology. On the university level, Microsoft has allocated a $15 million software grant to launch the Thurgood Marshall Scholarship Fund Technology Initiative, which will upgrade technology at public historically black colleges and universities. In addition, the company has partnered with the American Association for People with Disabilities to grant paid summer internships to 10 college students with disabilities who have previously demonstrated an interest in IT careers each year.

  Microsoft regularly seeks new hires from women's colleges, historically black colleges and universities, Hispanic-serving institutions, and tribal colleges. Furthermore, the company offers a number of employee resource groups to help these individuals succeed in the workplace, such as Hoppers

(for women), Blacks at Microsoft (BAM), GUIA (for Hispanic employees), NAMER (for Native Americans), Huddle (for hearing-impaired employees), and Visually Impaired Persons at Microsoft (MSVIP). These organizations work to attract, develop, and retain employees, as well as promote a work environment that recognizes and values diversity. In 2003, Microsoft was named one of DiversityInc.com's Top 50 Companies for Diversity and the No. 1 Top Diversity Employer by *The Black Collegian* magazine and Universum Communications.

- **Norfolk Southern** has joined INROADS, a non-profit organization that places extraordinary minority students majoring in civil engineering, electrical engineering, and computer and information sciences with industry internships. In 2004, the Urban League of Hampton Roads recognized the company with its Whitney M. Young Jr. Award, given annually to a company that has made significant progress in diversifying its workforce. That same year, Norfolk Southern established a Women's Network, called WiNS, to offer their female employees informal mentoring and create stronger working relationships with them. Also, the company's recruitment efforts are enhanced through its long-term support programs affiliated with the Society of Women Engineers (SWE), The Cooperating Hampton Roads Organizations for Minorities in Engineering (CHROME), and three historically African-American universities in their area — North Carolina A&T State University, Norfolk State University, and Hampton University.

- The leadership at the **Northrop Grumman Corporation** has shown a great commitment to increasing diversity within its workforce. A member of their Board of Directors, Dr. John Slaughter, heads the National Action Council for Minorities in Engineering (NACME). Northrop Grumman hires summer interns from magnet math and science high schools, provides slots for minority high school students in NASA SHARP (Summer High School Apprenticeship Research Program), and offers ongoing tuition support to students who complete internships with their company through Diversity Engineering

"We have made significant strides in the diversity arena. Notably, 37 percent of new vice presidents appointed companywide during 2004 are women and minorities. At the other end of the equation, among college hires, 57 percent are women and minorities. We are making rapid progress in our journey in diversity and inclusion, and we will increase the intensity of our efforts in 2005 and beyond."

— Northrop Grumman CEO Ron Sugar, December 2004

Scholarship Programs. In addition, the corporation sponsors programs in minority engineering at 32 universities nationwide with banquets, awards, and leadership workshops and works with the Graduate Engineering Minority (GEM) program to send promising engineers to school for M.S. and Ph.D. degrees as an investment in their industries' futures.

- **Raytheon** has been striving to become an employer of choice for a diverse workforce. Its leadership has pledged their commitment to this ideal at the corporation's annual diversity forums, and the company aggressively recruits persons with disabilities, women, and underrepresented minority students at the collegiate level. In addition, its Command, Control, Communications, and Information (C3I) division awards scholarships, holds career workshops, and offers a summer orientation course for minority engineering majors at the University of Massachusetts-Amherst.

  However, Raytheon is also heavily involved in programs to increase the number of minority and female students in math and science. It is a founding member of the American Society of Engineering Education (ASEE) K-12 Engineering Centers and works with Science, Engineering, Communication, Mathematics Enhancement (SECME) on its annual National Student Mousetrap Competition. In 2001, the company founded the Raytheon Engineering Science Academy (RESA) at Tennessee State University, where more than 60 elementary school students learn about computers, mathematics, science, communications, and African-American history during six-week summer sessions. Furthermore, the company commits annual awards to minority-serving institutions across the nation, including $850,000 to Tuskegee University's College of Engineering last year to help recruit and graduate more students in engineering and technology.

ABET Addresses Diversity Issues

ABET has intensified its efforts to address the challenges of diversity, both within the organization itself and within the programs it accredits. ABET cannot impose expectations of change upon accredited programs without also demonstrating its commitment to the same ideals. Therefore, during the past few years, the organization has directed much of its energies into incorporating diversity considerations into all levels of its internal structure. Its Board of Directors adopted a diversity policy, developed by its Diversity Task Group, affirming its commitment to making ABET's ranks more representative of the populations they serve. Recently, the Executive Committees for ABET's four commissions – applied science, computing, engineering,

and technology – scrutinized their slates of new candidates, and several ABET member societies were urged to reconsider and submit qualified alternative nominees that would broaden the commissions' employment and gender diversity. Also, ABET is exploring innovative means to encourage its member societies to diligently recruit and select a more diverse slate of program evaluators, who may rise into the organization's leadership ranks in the future.

In addition to these internal efforts, ABET is focusing on assuring quality and stimulating innovation as it seeks ways to assist institutions and programs answer the diversity challenges that industry has raised. It is clear that several employers have partnered with institutions and student chapters of the professional societies to address this goal. However, ABET must consider other approaches to support the programs it accredits.

Presently, ABET's accreditation criteria do not address the cultivation of a diverse learning environment, and its Board of Directors heard very clearly from its constituents that it should not mandate diversity goals as part of its standards. Technical programs are already experiencing varying degrees of pressure from other sources in this regard, and there is little evidence that additional accreditation requirements would substantially assist them in meeting their diversity goals.

Nevetherless, ABET can use its unique position to create forums that circulate best practices among accredited programs and commend those that define and address their diversity objectives effectively. As one option, ABET is considering an award that would identify, recognize, and encourage programs that employ innovative means to achieve their ideals. Also, the organization is looking for additional ways to acknowledge such endeavors.

ABET may face a long journey, but it is committed to fostering diversity among its volunteers at all levels and among the applied science, computing, engineering, and technology programs that these individuals accredit.

Conclusion

The disciplines that ABET accredits must find innovative means to cultivate and utilize the talents within untapped populations — particularly women, underrepresented minorities, and people with disabilities — on a significantly greater scale if they are to grow, or possibly even survive, well into the future.

ABET Policy on Diversity

ABET is committed to developing and using the talents of all qualified persons who study or work in the applied science, computing, engineering, and technology professions. We respect the human qualities, both similarities and differences, present in the work and study environments of our constituencies as they are affected by our efforts to assure quality and stimulate innovation. The actions of ABET's program evaluators, commissioners, staff, and Board of Directors must demonstrate and confirm respect for each other and the contributions that each of us can make. Our professions benefit from the creativity and constructive improvements best informed and achieved by persons with varied perspectives, experiences, and talents who work toward shared goals.

Differences and similarities among the ABET constituency include, but are not limited to:

age and experience
economic status
education and training
employment history
gender
job level
physical and mental abilities
professional employment
race, nationality, and ethnicity
religion
sexual orientation
ways of learning and communicating

Each ABET staff member and volunteer program evaluator, commissioner, or member of the Board of Directors should observe this policy when conducting ABET activities.

— Approved by the ABET Board of Directors, March 20, 2004

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2004 ABET Annual Meeting Proceedings, "Diversity in the Professions" Session

ABET Strategic Plan, ABET, Inc., November 1, 1997

American Association of Engineering Societies – www.aaes.org

American Management Association – www.amanet.org

Building Engineering and Science Talent (BEST) – www.bestworkforce.org

Diversity Builder's Toolbox: Successful Models in the Chemical Sciences – http://dels.nas.edu/chemdiversity/

Engineering Workforce Commission – www.ewc-online.org

National Science Foundation – www.nsf.gov

- *Land of Plenty: Diversity as America's Competitive Edge in Science, Engineering and Technology,* a report by the Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development (CAWMSET) – www.nsf.gov/od/cawmset/report.htm
- *Science and Engineering Indicators 2000* – ww.nsf.gov/sbe/srs/seind00/start.htm
- *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2004* – www.nsf.gov/sbe/srs/wmpd/pdf/tabh-1.pdf

Society of Women Engineers – www.swe.org

U.S. Census Bureau – www.census.gov

What is ABET?

ABET, Inc., the recognized accreditor for college and university programs in applied science, computing, engineering, and technology, is a federation of 30 professional and technical societies representing these fields. Among the most respected accreditation organizations in the U.S., ABET has provided leadership and quality assurance in higher education for over 70 years. ABET currently accredits some 2,700 programs at over 550 colleges and universities nationwide. More than 1,500 dedicated volunteers participate annually in ABET activities. ABET also provides leadership internationally through agreements such as the Washington Accord (www.washingtonaccord.org), and offers educational credentials evaluation services through ECEI (www.ecei.org) to those educated outside the United States. ABET is recognized by the Council for Higher Education Accreditation.

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