

ATTRACTING TODAY'S YOUTH TO CIVIL ENGINEERING

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ABSTRACT: Substantial evidence exists to warn the civil engineering profession of impending shortages in the qualified labor force in the coming decades. ASCE has set ambitious goals for growth in the number of civil engineering students in order to meet the increasing demand. Current recruiting efforts to minimize such shortages include high-school outreach programs and an extensive public-relations program sponsored by ASCE. These programs are described and shown to be necessary measures to halt the recently observed decline in the number of new civil engineers. It is recommended that the programs be supplemented by additional high-school summer camps and by activities in conjunction with a nearby ASCE student chapter. To bolster the ASCE advertising campaign, far-reaching methods of drawing attention to civil engineering projects are advocated. Programs for middle- and grammar-school students are emphasized because of their greater effectiveness and longer-term impact. Support of programs already in effect is encouraged, and a creative approach is recommended for developing new recruiting methods.

INTRODUCTION

All over the nation, there is a rapid growth in the number and scope of civil engineering projects required to rehabilitate our aging infrastructure, build new structures, and clean up the environment. These projects will employ thousands of civil engineers into the 21st century, yet recent studies indicate that young engineers will be in short supply. A review of existing approaches for insuring an adequate supply of civil engineers is provided, and more enduring approaches to the recruitment problem are advanced.

AN IMPENDING SHORTAGE OF CIVIL ENGINEERS

In its *Workforce 2000* study, the U.S. Labor Department predicts that the nation's demographics will shift significantly by the end of the century, with the aging of baby boomers and the trend toward smaller families combining to reduce the number of young workers aged 16–24 by nearly 2,000,000, or 8% of the labor force. The effect on engineering schools will be just as dramatic because there could be a shortfall of up to 560,000 engineers and scientists by 2010 (Rubin 1988).

The anticipated shortage in the work force is exacerbated by the quality of civil engineering students, which, when compared with electrical, mechanical and chemical engineering students, rank lowest in standardized test scores (Muspratt 1986). Muspratt (1984) speculates that a degenerative cycle exists in which attraction of poor students leads to a loss of credibility of the profession, ultimately leading to even fewer students attracted to civil engineering. Gobas (1988) details a number of specific reasons for the recent

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noticeable decline in the stature of the civil engineering profession and introduces a set of 10 commandments of engineering professionalism to combat this material decline in stature.

As the population of college-age youth declines, it will become increasingly important to expand programs that seek to increase the participation of minority populations (Kimmel et al. 1988). In fact, successful precollege and secondary-school programs for increasing the participation of minority students in engineering and science may hold promise for increasing participation of non-minority populations as well. The American Society of Engineering Education found that "precollege education in the U.S. still falls far short of providing the young with the academic qualifications needed in a technology-dependent world."

ASCE RECRUITING GOALS

In response to the increasing demand for civil engineers, ASCE has recently declared recruiting as one of its primary goals. In 1986, the ASCE Board of Directors (*Civil Engineering* 1986) stated its desire to "attract and retain appropriate numbers and quality of students to civil engineering study." Public relations, public involvement, and communications are three of the 11 primary goals of ASCE's most recent strategic plan (Grant 1986). In fact, ASCE ("From Vision" 1985) hopes to prepare a comprehensive membership plan and program to achieve an ASCE membership of 200,000 by the year 2000, which would represent nearly a twofold increase over the current membership.

HIGH-SCHOOL RECRUITING PROGRAMS

The High-School Outreach Program

Many local sections of ASCE sponsor high-school outreach programs (HSOP) to educate teenagers about the civil engineering profession. These programs encourage section members to visit schools and discuss civil engineering in terms of its functions, specialties, educational and occupational options, and growth potential. Speakers are supplied with work materials such as slides, handouts with quizzes, fact sheets, and posters. ASCE national headquarters and the local ASCE sections are excellent sources for these materials.

A More Enduring Approach

Although the existing HSOP is an effective recruiting program, it should be supplemented by programs that further develop the students' interest and understanding of civil engineering. First, more high-school visits by practicing engineers could be arranged so that the students can learn about and possibly schedule visits to local projects, engineering offices, and construction sites. Second, engineering programs could be initiated at summer camps, with an emphasis on projects and field trips for younger children who lack abstract capabilities. Third, an open invitation could be extended to local high schools to take part in university ASCE student chapter/club activities. For example, high-school students could be invited to the ASCE student chapter regional conferences to participate in model bridge-breaking contests, concrete-canoe races, and other activities to encourage interaction among

university and high-school students while simultaneously boosting attendance, which is often low. Such informal participation would also alleviate the students' anxiety in their first year of higher education. Precollege summer programs for high-school students have also been shown to be effective for increasing student access to and interest in careers in science and engineering (Pizzini 1986; Kimmel et al. 1988). Elton and Shoemaker (1988) describe a comprehensive program for recruitment of students into the civil engineering profession employed at Auburn University. Although their program is relatively new, its comprehensive nature almost guarantees its long-term success and enduring value.

Too Little, Too Late?

Such high-school outreach initiatives would produce some results, yet all such programs are limited by their emphasis on the short term. HSOP experiences have indicated that by the time high-school students have reached their junior or senior year, many of them have already chosen career paths. The majority of high-school students have little knowledge about what an engineer does, and thus could not have considered engineering in their career decision. High-school students' awareness of the engineering profession is minimal, especially when compared to the legal and medical professions, which enjoy associations with prestige and personal profit. The primary origins of these associations are the media, teachers, and parents, all of whom overtly and subliminally portray occupations in different lights. Therefore, in order to develop interest in civil engineering at the grassroots level, publicity programs need to be pursued that raise consciousness about the civil engineering profession.

PUBLIC RELATIONS: A MORE FUNDAMENTAL APPROACH

ASCE already sponsors many public-relations and advertising programs, which were developed by the ASCE headquarters public-relations staff. "Civil Engineers Make the Difference, We Build the Quality of Life" is an ad campaign placed in national trade and airline magazines. For over three years, the series has served to illustrate the specialties of civil engineering by capturing the "before" and "after" conditions at a site. For example, photographs of a dry river bed and an irrigated channel are presented side by side, clearly depicting the utility of the civil engineering profession. Other societal benefits illustrated in the posters include crossing waterways via bridges rather than barges, drinking water from a fountain rather than a pump, and cleaner city air. All advertisements offer free copies of a pamphlet covering the subject.

The ASCE public-relations group also employs conventional advertising campaigns. Last year four new ads that emphasized research and development in infrastructure were developed. These ads were placed in both *American City & County* and *City & State* magazines to target administrative and engineering executives in municipalities. The ads in this magazine concern the public/private relationship and stress the very practical point of civil engineers' ability to bring projects in within time and budgetary limits. In addition, advertisements in airline magazines and televised reports of member activities and society programs reach an estimated 10,000,000 readers and 40,000,000 viewers, respectively (Pfrang 1986). Finally, the ASCE pub-

lic-relations group also produces over 450 news releases annually that appear in trade publications, consumer magazines, and newspapers at no charge to ASCE; the estimated value of this free coverage is over \$2,000,000 each year.

All of these efforts have contributed to the status of ASCE as the engineering organization with the best public-relations program, according to a survey conducted by the American Council of Engineering Consultants (*Awareness* 1988). The entire public-relations program deserves the support of engineers on both individual and corporate levels. Funding for the advertising group comes exclusively from the check-off contributions made each year with the membership dues. If ASCE members volunteered more contributions to the public-relations group, advertising campaigns could expand to further demonstrate the challenges that are met by civil engineers every day.

Expanding the Public-Relations Campaign to New Media

New methods could be explored to bolster the existing ASCE advertising campaign. For example, new engineering/construction projects could be submitted to the U.S. Postal Service for consideration as achievements worthy of appearing on a stamp. A series of historical engineering achievements have been depicted in the past and are captured on an ASCE slide presentation called "The Builders of America" (*ASCE Public* 1987). This could be expanded to current projects that capture the high-technology aspects of civil engineering.

Billboards could be posted at public works projects, in keeping with the ongoing "Quality of Life" series. They could show the engineer at work, state the name of the project, and underscore the message that civil engineers build the quality of life. In addition, engineers and managers could take further advantage of free media by inviting reporters to the ground-breaking/switch-throwing ceremony and similar kickoff events. As representatives of the profession, we have the responsibility to "make the public aware of the civil engineers' role in making our communities and nation better places to live" (*ASCE Public* 1987). A full guide to public-relations tools is available from ASCE, offering a "starting point for implementing a public information plan."

INVESTING IN THE FUTURE

The most effective time to motivate and excite students about science, technology, and engineering is during the elementary- and middle-school years (Burnet 1985). For this reason, young children are the target of a new ASCE educational effort. Coloring books have been distributed by the Committee on Minority Programs on a trial basis that display civil engineering around us during a "walk with uncle." The books met with such success that an additional 50,000 copies have been printed and local sections of ASCE have been encouraged to visit schools and explain various facets of our profession to students. A visit to a local elementary school with coloring books and a story about civil engineering can make a strong impression on the youngsters, if only to dispel the myth that the only kind of engineers there are are the ones who drive trains.

A second educational tool for elementary and middle schools is the pro-

gram "Civil Engineering: It Makes the Difference." The program was assembled by Lifetime Learning Systems in cooperation with ASCE, which has provided the program to educators free of charge. The objective of the program is to "inform the students about the impact that civil engineering has on our lives" (Nusim 1986).

SUMMARY

Recent studies indicate an impending crisis in civil engineering due to the lack of an adequate work force in the coming decades (Muspratt 1984, 1986; Gobas 1988; Rubin 1988). This paper has introduced a number of action programs that, in combination with existing programs, could ameliorate the impending work-force shortages:

1. High-school outreach programs could be augmented by visits to ongoing civil works projects, engineering programs at summer camps, and participation in ASCE student-chapter activities and summer programs at colleges and universities.
2. The existing ASCE public-relations campaign could be enhanced by expanding advertising to new media such as postage stamps and billboards and, perhaps most effectively, by actively encouraging the news media to cover significant civil works accomplishments as they occur. The ASCE public information handbook provides guidance for such endeavors.
3. Support could be boosted to aid educational efforts on the elementary- and middle-school levels, allowing ASCE to reach more of the nation's youth at the most opportune time (Burnet 1985).
4. Existing precollege and secondary-school programs for increasing the participation of minorities in engineering and science (Kimmel et al. 1988) could be adapted and extended to include nonminority groups.

There is truly no limit to the programs which could be initiated to recruit more youth into the civil engineering profession. The key is to support the public-relations department and the programs already in place, participate in the local ASCE section's high-school outreach program and use creativity to initiate new efforts such as those described here. Professional pride and civic responsibility, in combination with a cognizance of the benefits of an abundance of quality engineers for future civil engineering projects, can lead us to become active recruiting participants and contribute to ASCE's public-relations work. Even if such programs only provide each company with a few more talented civil engineers, the road to excellence would be a smoother one.

While this paper focusses on action programs initiated by the ASCE, other avenues exist. For example, the U.S. Congress' Office of Technology Assessment ("*Educating Scientist*" 1988) has recently explored federal and state policy options for replenishing the science and engineering work force. Their recommendations focus on three policy options: (1) Recruitment strategies for enlarging the pool of engineering students; (2) retention strategies for keeping students in the pool; and (3) strategies for strengthening federal science and engineering education efforts. They conclude that retaining college and graduate students in science and engineering is the most effective federal

strategy for providing the nation with more engineers and scientists relatively quickly.

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