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THE PENNSYLVANIA STATE UNIVERSITY
COLLEGE OF ENGINEERING

PROGRESS AND STRATEGIC INITIATIVES IN FOSTERING DIVERSITY

CURRENT INITIATIVES, STATISTICS AND TRENDS, AND PROPOSED STRATEGIES FOR ENHANCEMENT OF DIVERSITY AND CLIMATE IN THE COLLEGE

April 8, 2002

EXECUTIVE SUMMARY

The College of Engineering has assessed its progress on the challenges articulated in *A Framework to Foster Diversity at Penn State: 1998-2003.* Specifically, we answered the questions posed by the Vice Provost for Educational Equity by examining the data describing our diversity and processes we have implemented to achieve the goals of the *Framework.* In addition, we have used this opportunity to critically evaluate the observable trends and existing programming, as well as to utilize "outside-the-box" thinking to identify fruitful paths for continued progress. A Task Force, appointed by the Dean with broad representation from the College, conducted extensive benchmarking with other institutions, reviewed departmental strategic plans, and sought input from both internal stakeholders and external advisers to identify the best practices available and applicable to further the College's diversity objectives.

In 1996, having just celebrated its centennial and beginning work on the first five-year strategic plans of its second century, the College developed the following vision:

To have a partnership of faculty, students, staff, alumni, and government and corporate leaders working together to provide the highest quality education and to continue building one of the nation's best engineering institutions. Further, our vision for the College is to create a climate that attracts and supports a diverse group of students, faculty, and staff and in which effective learning, research, and service are accomplished by working together.

In summary, the College has made significant progress on diversity goals consistent with the above vision in areas such as increasing the representation of women on the faculty and narrowing the retention gap between male and female students, while holding its own in other areas, such as maintaining its enrollment of women students at levels comparable to the national means. However, the College has not made substantial progress in attracting underrepresented minority students and faculty. Significant attention is given to fostering a welcoming climate in the College's departments, classrooms and laboratories, and a wide variety of initiatives have been developed to identify, communicate and address diversity issues. Although it is evident from the strategic planning processes currently underway in the departments that diversity has been established and accepted as a core value and vital pursuit in the constituent units of the College, the translation of the College's diversity objectives into measurable outcomes still requires careful articulation and focused efforts. We remain committed to a strategy for achieving these outcomes that involves broad leadership and participation across, among and by all units and stakeholders—working together.

Looking forward, the College has outlined a course of action to build on its progress thus far, and to implement new, creative and aggressive initiatives to address its diversity goals. The recommendations are crafted from models that have proved to be successful elsewhere, approaches suggested by and adapted from our industry partners, good ideas for collaborative approaches developed in the College's departments, and the many contributions of individuals and groups throughout the College. As we strive for an inclusive understanding of diversity, so too is the College committed to diversity as a core value and collective enterprise.

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INTRODUCTION

The College of Engineering's Task Force was charged by the Dean on September 7, 2001, to develop a response to the University's *Framework for Diversity*, and specifically "to identify issues and make recommendations which can improve our ability to build a more diverse and supportive College of Engineering." The thirteen-member Task Force, composed of faculty, administrative staff, and student representatives (see *Appendix A*), set about its assessment of progress and future prospects for diversity through meetings held every two weeks. Working groups were constituted to explore each of the four overlapping dimensions of diversity, including:

- Developing a shared and inclusive understanding of diversity and creating a welcoming campus climate;
- Recruiting and retaining a diverse student body;
- Recruiting and retaining a diverse workforce and College leadership;
- Developing a curriculum and coordinating organizational change to support diversity goals.

These task areas were designed to be aligned with the seven "challenges" outlined in the *Framework to Foster Diversity at Penn State: 1998-2003* and the corresponding seven categories of "questions" posed to all units by the Vice Provost for Educational Equity for assessing progress at this juncture, roughly the midpoint of the planning cycle. The Task Force sought to obtain internal and external input for its deliberations, including meeting with the Vice Provost to carefully examine the purpose and process, holding focused sessions with the College's Academic Council and Advisory Boards, obtaining input from College of Engineering (COE) faculty and others who have participated on University–level commissions, contacting counterparts at the Big Ten "Plus" institutions, reviewing web sites and statistical information from other universities and national data sources, and evaluating selected publications and surveys as well as the recently completed strategic plans from each department to extract useful ideas and best practices. The findings and proposed recommendations from the Task Force were brought to the College's Academic Council, composed of department heads, associate deans and directors of student/academic programs, for further dialogue and input.

From these exploratory efforts by the Task Force along with subsequent analysis and feedback from the Academic Council, a number of themes were developed that will provide an effective guide for continued progress. In retrospect, the College has developed a broad set of initiatives and processes, as well as a solid organizational structure and considerable institutional commitment and investment for its diversity efforts. These activities have been driven in large part by the particular challenges of an engineering community and, while successful, need to be filled in and integrated as a coherent package. The Task Force conducted a comprehensive inventory of the ongoing initiatives, as arrayed in the summary charts prepared for each of the challenges posed in the *Framework*.

The College needs to turn its attention now to broadening participation and seeking creative elements that will undoubtedly stretch the comfort zone, conventional boundaries and mind-set for organizational change and growth. Specific recommendations are highlighted in the report that follows and revolve around the recurring themes of:

(1) Enhancing the communication of core values and diversity initiatives comprehensively and frequently using all available vehicles to keep students, faculty and staff informed and involved.

(2) Interpreting broadly and flexibly the recruitment processes and opportunities for retention and advancement in the College.

(3) Following-up professional development and talent identification with real opportunities for promotion and leadership.

(4) Actively engaging all students in thinking about and re-examining their perspectives of diversity and its linkage to their technical pursuits and studies, particularly through inclusion in the design component and preparation for professional life.

(5) Devising means with which to assess progress, in terms of both measurable inputs (i.e., what we teach) and demonstrated outcomes (what is learned) in addressing the diversity objectives and climate in the College.

CHALLENGE 1

DEVELOPING A SHARED AND INCLUSIVE UNDERSTANDING OF DIVERSITY

PROGRESS AND CURRENT STATUS

1. *How does your college define or describe diversity? How is this understanding demonstrated in areas of emphasis within your college?*

   In the historical context of engineering as a profession and place in higher education, diversity has traditionally been defined in terms of access and retention. The College of Engineering (COE) at Penn State, like its peer schools in the Committee on Institutional Cooperation (CIC) and nation, has concentrated its diversity-related initiatives – and hence the focus of its internal and outward articulation of diversity goals – on the importance of developing all available talent to meet the needs of the Commonwealth and nation for a healthy technical workforce.

   In its strategic plan for 1997-2002, the College states its objectives regarding diversity, consistent with its vision statement, namely:

   "With respect to diversity, to be among the top 10 engineering programs at major research universities. This goal requires that we effectively be among the top three of the Big Ten universities in recruiting and retaining, through graduation, women and minority undergraduate and graduate students. We similarly need to recruit and develop women and minority faculty and staff to achieve senior positions within the College."

   Operationally, the College articulates its commitment to develop an inclusive and diverse community through its stated initiative to "increase recruiting activities to create a more diverse student body, faculty and staff in the College; and increase retention of women and minority students to equal majority retention levels." The progress, led by the long-standing and effective Minority Engineering Program (MEP) and Women in Engineering Program (WEP) as shown by the data presented later in this and subsequent sections, describes a steady, positive trend toward this goal. As a result, the success in enhancing the representation of women on the faculty has been considerable. With regard to minority faculty and student enrollments, we face a continuing challenge to move up from the mid to lower ranks of the Big Ten and other peer engineering programs.

   Central to its 1996 diversity planning has been an emphasis on climate and the education of students in, and for, a pluralistic society from both a national and global perspective. The College's initiative to "increase the diversity component within the engineering curriculum and continue to develop faculty and staff awareness of climate issues" has been strongly reflected in, and linked to, the educational objectives adopted in its strategic planning, as embodied by its commitment to the goal of producing "World-Class Engineers," who are aware of the world, sensitive to cultural differences, adept in working in diverse and multidisciplinary teams, and possessing the broad knowledge of historical perspectives, professional behaviors and interpersonal skills needed for success in an increasingly competitive and global workplace. The "World-Class Engineer (WCE)" vision and attendant educational outcomes, originating with the external advisory board of the Leonhard Center for the Enhancement of Engineering Education, has become the cornerstone for curriculum development and improved teaching and learning in the College. Widely recognized and embraced by students, faculty and staff, the WCE framework has provided an effective vehicle through which the College projects and promotes its mission, both internally and

outwardly. The document has been disseminated throughout the College, featured prominently in planning activities, and highlighted as our overarching mission in student recruitment and external stakeholder (industry partner and professional and alumni advisory board) presentations.

2. *How has your college distributed and discussed information to students about the University's diversity initiatives?*

The University's diversity initiatives are communicated to students by word and active encouragement to participate in opportunities that provide exposure to diverse cultures and peoples. The advising system and new-student orientation program both emphasize the importance of preparing to live and work in a diverse society. Students are advised through the College's *Guide to Undergraduate Programs* and sessions with the Advising Center staff on their options for satisfying the Intercultural and International Competence requirement of the General Education curriculum and how it is intertwined with their technical studies. The orientation for incoming students, organized and facilitated by upper-division students who function as peer mentors, provides a context for student-to-student exploration of the campus community. The First-Year Seminar program in the College furnishes another avenue for dialogue on diversity. While the specific content for the seminars is flexible and instructor-determined, as appropriate to the format and topical focus of each seminar, discussion and reflection on issues of diversity and workplace practices is specifically encouraged.

The *Engineering E-Newsletter*, a weekly electronic communication to all engineering students, as well as all of the faculty and staff at all campus locations, also serves as a conduit of information for students. For instance, each semester students are reminded about the sexual harassment policy and directed to the College's web site for definitions, examples of what constitutes harassment and persons who they can go to for counsel or to report incidents.

To minority students, as well as majority students, faculty and staff, the investment and commitment to diversity is visible in the College in the Minority Engineering and Women in Engineering programs' many activities. As the support structures for three of the largest and most active student groups in the College, the National Society of Black Engineers (NSBE), the Society of Hispanic Professional Engineers (SHPE), and the Society of Women Engineers (SWE), the programming sponsored by the MEP and WEP figure prominently in the *Engineering E-News* announcements and notices. The co-location of these College-wide student groups with the Engineering Undergraduate and Graduate Councils, Envisioneers, Tau Beta Pi Honor Society, and several other student organizations in the newly created Student Activities Center has fostered even more collaborative projects and activities among the groups than had been optimistically anticipated.

All graduate teaching assistants and students employed in the capacity as graders attend sessions on diversity led by the College's Director of Engineering Instructional Services. Either through ENGR 588, a mandatory teaching seminar course for TA's, or specially scheduled workshops held each semester, the topics are presented that include an overview of instructor expectations and responsibilities, appropriate instructor/student interactions, different learning styles and motivations, and sensitivity to the rich and differing perspectives manifested in and by a diverse student population.

Prospective minority and women students receive information about the MEP and WEP programs during visits to the campus while still in high school, usually delivered by MEP and WEP staff at meetings scheduled as part of the visit day's itinerary. An opportunity to spend some time with current minority and/or women students is also provided during the visits. Once admitted to the University, the MEP and WEP directors follow-up the congratulatory "offer" letter from the associate dean with letters of welcome of their own, inviting the students to participate fully in the programs offered through their offices.

3. *How has your college distributed and discussed information to faculty and staff about the University's diversity initiatives?*

Faculty and staff receive information on University and College diversity initiatives largely through the offices of the department heads. The agendas of the monthly Executive Committee and Academic Council meetings include visits from the Vice Provost for Educational Equity, the Affirmative Action Office, the COE or University Office of Human Resources (OHR), and others who can speak to current or updated policies and practices. "Round table" discussions to share successful (or unsuccessful) approaches are held regularly on diversity-related challenges, such as new faculty or graduate student recruiting, for which the department is the most active "agent" and key stakeholder in the outcome. The College distributes informational materials to all faculty and staff, such as formal statements or documents about the University's definition of, and objectives for, diversity and published policies on equal opportunity and affirmative action.

A major project to provide input and feedback to faculty on student viewpoints is the frank and compelling video program, "In Their Own Words." Developed by the COE's Leonhard Center, EIS and WEP under the National Science Foundation grant to the Engineering Coalition of Schools for Excellence and Leadership (ECSEL), the first-hand accounts of students' experiences and interactions with faculty in and out of class, and the workshop developed around them have been taken to the Executive Committee, department faculty meetings and even other coalition schools and international engineering education conferences.

4. *What is the role of the multicultural coordinator?*

The multicultural coordinator, or Director of the Minority Engineering Program, addresses broad goals and a range of activities under the collective vision of "Building a community, one student at a time." In practice, the MEP collaborates with the administrative offices and departments in the College, as well as representing the COE in interacting with the other multicultural coordinators and central administration, in furthering the College's diversity objectives. Included in the central mission of the MEP is undergraduate student recruitment and retention, in partnership with the Offices of Undergraduate Studies and Student Services and, increasingly, as opportunities are identified at Campus Colleges; recruitment and retention of graduate students, by providing assistance to the academic departments and Office of Graduate Studies and Research; and coordination of career services and industrial relations on behalf of the students and interests of the College. Beyond these expressed roles, the MEP collaborates with the OHR and participates with the College's Academic Council in supporting minority faculty hiring, orientation and advancement.

Additional staff in the MEP office include a full-time associate director responsible for program development and coordination and a full-time staff assistant responsible for office coordination. Due to the MEP's clear intersection with the WEP where minority women are concerned, the two programs work closely together on a number of initiatives, such as the "Faculty of the Future" program, a funded project to recruit underrepresented students into academic careers supported by the GE Fund. Developed with a parallel structure (see *Appendix B*), the WEP is administered by a full-time director, associate director for program coordination and staff support. The MEP and WEP offices are co-located in the Office for Student Services, along with the Cooperative Education and Career Services Program and Engineering Advising Center. All four activities obtained occupancy of the newly created office suite and student reception area in 1995 to promote a highly visible, integrated and frequented central facility for addressing students' academic and other needs. Both the MEP and WEP receive input, feedback and counsel from active external advisory boards that report to the Dean and are composed of industry, alumni and university representatives. The Boards review ongoing activities and make recommendations at meetings held each semester. Periodically, the meetings are scheduled to coincide so

that the two Boards can share information and identify common goals and opportunities. The College's Office of Human Resources provides support for faculty and staff recruiting and hiring, including training sessions for search committees. The office provides counsel during searches and follows up all appointments to ensure that a diverse pool of applicants was generated and considered in the searches.

5. *Does your college have a diversity committee? What is its role?*

The COE has a standing Climate Committee, chaired by the Dean and consisting of a rotating membership of faculty, staff and students. Meeting several times each year, the Committee advises the Dean and College as a whole on diversity-related matters, including recruiting challenges, retention measures, communication of diversity expectations and goals, and climate issues. Last year, for instance, following up the earlier development and dissemination of a harassment brochure, the Committee had extensive discussions on a comprehensive sexual harassment education effort in the College. Some of the initiatives that emanated from that discussion are summarized in a later section. The Committee has been replaced this year by the Task Force efforts in developing this report, but will resume operation during the spring semester.

The College also maintains a network of sexual harassment contacts to ensure the presence of a knowledgeable and non-threatening peer or colleague to approach in virtually any department or unit. Periodic workshops are provided to new members of the network or to provide a refresher for continuing volunteers.

SUMMARY AND TRENDS

SUMMARY CHART 1:
Understanding Diversity

Action	Lead	Focus/Impact
Setting strategic goals	College	COE Community
World-Class Engineer initiative	College, Leonhard Center	preparation of undergraduates for the workforce/workplace
Expansion of the MEP and WEP	Dean	new associate directors for program coordination
Climate Committee	Dean	COE community
Web pages on sexual harassment	Climate Committee, OHR	COE Community
Engineering *E-Newsletter*	Student Services	communicating core values, policies, opportunities
ENGR 588	Instructional Services	TA and grader training in diversity
"In Their Own Words" video and workshop	WEP, Leonhard Center, EIS	faculty in the COE, Big Ten "Plus" and other institutions

From the above, it can be concluded that substantial effort and some progress has been made to advance the articulation, communication and adoption of diversity statements and initiatives. As noted, at the urging of the COE Climate Committee, the wording of the College's sexual harassment policy and procedures for addressing incidents have been made more accessible to students, staff and faculty. An entry for "Climate Issues" appears on menus in the first "layer" under the College's home page, reached on a single click from *Faculty/Staff Services* and *Student Information* "buttons."

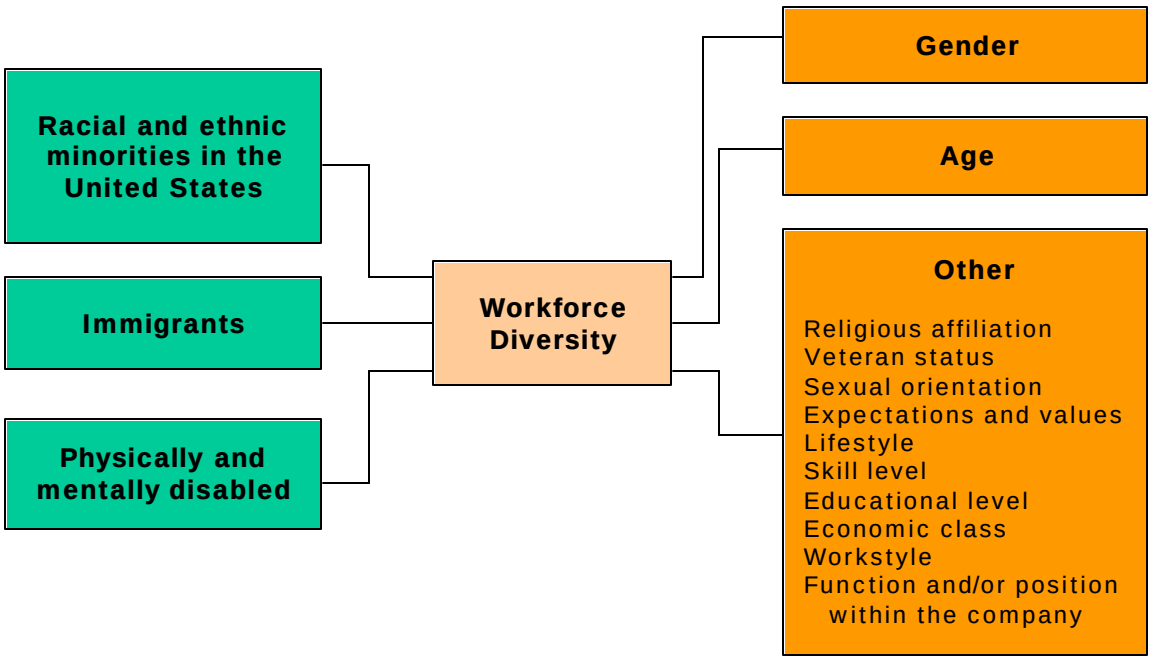
Important to addressing diversity in an engineering setting is ensuring that all stakeholders share a common and consistent definition of diversity – including, for the purposes of recruitment and retention programs, the people who are underrepresented in the disciplinary community. Thus, where students and faculty are concerned, statistical reports generally focus on women, African/Black American, Hispanic/Latino American and American Indian/Alaskan Native populations, while in the ranks of staff, Asian Americans are also a minority. The COE thus adheres to the conventions for reporting shared by peer engineering schools and national commissions (e.g., the American Society for Engineering Education and Engineering Workforce Commission) and should make comparisons and availability analyses according to the geographical regions and disciplines, particular to the position and employment classification or enrollment category being addressed.

Other issues of diversity are not specifically minority-related as, for instance, the climate for international students. In some graduate engineering programs, international students in fact represent a majority of degree candidates, yet they may still suffer from stereotypical perceptions or prejudicial attitudes towards their cultures, customs or traditions.

In the view of the Task Force members authoring this report, the narrow focus conventionally used to define diversity in the engineering community may be somewhat myopic. While it focuses attention on the ethnic, racial and gender discrepancies and challenges particular to the applied science and engineering disciplines, it presents the risk of overlooking the diversity issue and educational opportunities confronting and significant to all members of the population, including other protected groups, such as the physically challenged, and those of the majority. The College tries to be vigilant in identifying instances where access for the disabled is difficult or inconvenient and to correct these through the Engineering Facilities Coordinator and University ADA compliance officers. Some of the College's older facilities and buildings, such as Hammond and Reber, continue to be problematic and present an impediment to effectively removing obstacles encountered by disabled or handicapped students, visitors and employees.

PROPOSED ACTIONS AND RECOMMENDATIONS

The Task Force offers for consideration, the following diagram as a model for our educational environment and endeavors in curriculum development, learning and research. While this model is adapted to the workforce, it applies equally well to the student body and other constituent groups in the College.



Taken from Management: Competing in the New Era. Thomas S. Bateman and Scott A. Snell. McGraw-Hill Companies, Inc. New York: 2002.

Anecdotal evidence from students, at least, would indicate that effort must be made to develop a more inclusive approach that embraces all forms of, and contributions to, diversity. In the sections that follow, and particularly those dealing with the curriculum, some new proposals are presented to help foster that inclusiveness as a core value of the College. A good start would be to improve dissemination. In much the same way as the College has brought its Sexual Harassment Policy to the attention of stakeholders, so should the broader framework for diversity be accessible and frequently publicized through all available and appropriate forums.

Recommended Actions:

- Foster an environment where everyone feels as though they can have a unique contribution to offer and differences to be celebrated, and in which effective learning, research and service are accomplished together.

- Show an appreciation for all individual differences and the value they bring to the creative enterprise; to the pursuit of knowledge, sustainable use of resources and betterment of the human condition.

- Keep the College's core, diversity-related values in the forefront and students, faculty and staff systematically informed, via *E-News*, First-Year Seminars and other available mechanisms of events on campus and other opportunities relating to diversity.

Assessment Measures:

Finally, it will be important to redouble our efforts towards achieving the third strategic initiative of our diversity plan: to "identify meaningful assessment indicators for measuring diversity within the College." We choose to interpret this as not just tracking the enrollment statistics or degrees awarded to underrepresented groups, but also monitoring the degree to which diversity is understood and internalized. For instance, the extent to which attempts to communicate diversity objectives to students through the First-Year Seminars program are successful is not clear, nor do we yet have an understanding of what will best encourage the inclusion of diversity within the scope of more of the seminars. Assessment instruments for the First-Year Seminar program, mainly in the form of end-of-semester student evaluations requesting "self-reporting" on topical coverage and engagement in various activities, should be used to evaluate whether seminars include dialogue on diversity. Investigation of what kinds of activities have been attempted, and informational and supporting instructional materials or workshops that will facilitate broader adoption of these elements by seminar instructors is needed. The exploratory seminar, ENGR 100S – "Introduction to Engineering," for instance, includes an exercise on personal values and goals setting into which discussion on diversity could be easily incorporated. An existing task group on the First-Year Experience in engineering would be the ideal forum for formulating an appropriate strategy for First-Year Seminar initiatives. Web-based survey instruments have also been developed to solicit feedback from graduating seniors and alumni and represent ideal vehicles for evaluating the exposure and perceptions of diversity held by recent graduates. The early evidence is promising. Respondents to the recent graduating-senior exit survey report significantly higher preparation in understanding global and societal issues (with 410 ranking their educational experience in this area as nearly 3.5 on a five-point scale) than alumni from the 1997 and 1998 classes of graduates (369 respondents who ranked their experiences as 2.5 on a five-point scale). As described later, the best assessment evaluates the outcome, not the input. A critical test will be if students, at least for their capstone design experiences in the senior year, can articulate their own core values for diversity as they relate to technical design criteria and practices.

CHALLENGE 2

CREATING A WELCOMING CAMPUS CLIMATE

PROGRESS AND CURRENT STATUS

1. *How does your college and department leadership demonstrate visible support for diversity?*

The Dean and department heads demonstrate support for diversity through their direct interactions with faculty, staff and students, active participation with the Minority Engineering and Women in Engineering Advisory Boards, explicit inclusion of diversity in strategic planning and discussions with their Industrial and Professional Advisory Committees (IPAC), guidance of graduate admissions and faculty search processes, and familiarity with resources and procedures that can further the interests of diversity. The Chemical Engineering Department, for example, emphasizes its mission to inculcate students with "the highest sense for ethics, diversity, and social responsibility." Further, the department's core values focus on fostering the kind of climate that is crucial to achieving its educational mission, namely that:

- *Respect for our students is paramount.*
- *Mutual respect for each other and our efforts in scholarship, pedagogy and service is essential.*
- *Collegiality, civility, and cooperation are hallmarks of a successful and well-integrated faculty.*
- *Pedagogy and scholarship are two sides of the same coin and are reinforcing and integrated activities.*

The Industrial and Manufacturing Engineering Department emphasizes its expectations on the part of faculty and students through "contracts" developed by the faculty and by the students themselves. These documents describe the responsibilities of each party to the other and pledge engagement in practices and behaviors that will enhance mutual respect and achievement of teaching and learning goals.

Both the MEP and WEP include the objective of promoting an equitable and productive learning environment in the College. The COE Climate Committee, with representation from the departments, is expressly charged with monitoring the College's climate, recommending actions or practices that can improve inter-group relations (faculty/staff, student/faculty, etc.), and promoting an awareness and appropriate means for addressing incidents of harassment, and improve communication.

Perhaps the most visible way to create a nurturing and supportive climate is by rewarding and recognizing achievement. A good example is the College's Peer Review of Exceptional Performance (PREP) program, piloted this past year, wherein staff employees who have been in their current positions for at least two years and who have received outstanding performance evaluations can be nominated for two promotions within grade. Visible support is also evident by encouraging personnel to take advantage of opportunities for professional development, as many departments have noted in their strategic plans. For students, recognition of academic merit and achievement can be equally important in reinforcing their sense of belonging and accomplishment. So, for instance, departments are provided with information on students eligible for scholarships, separate lists of women and minority students in the major are prepared to ensure that they will attract attention and consideration, rather than simply including these candidates in the longer list of men. Students are recognized publicly for their joining the "Circle of Academic Excellence" in a ceremony held each semester during the meeting of the Minority Advisory Committee. The choice of alumnae as commencement speakers for two of the last three years is still another example how the College can and did display its pride in the successful careers of talented women graduates.

2. *How does your college identify climate issues?*

The COE Climate Committee was formed to provide broad input on climate issues, and several departments have established their own, unit-level climate committees. College-wide Climate Surveys aimed specifically towards assessing issues of diversity were conducted in 1989 and 1995-96. The surveys asked respondents about the incidence of insensitive or disparaging remarks, experiences in which discrimination was shown or witnessed and to whom it was addressed, and current or proposed activities to improve the climate. Discussion is ongoing in the Climate Committee on the possible design and implementation of another survey. Climate issues affecting students will generally come to the department heads, directors or staff of the MEP and WEP, the Assistant Dean for Student Services and members of the advising staff. The Engineering Undergraduate Student Advisory Committee (EUSAC) is convened once a month for the purpose of providing counsel to the Associate Dean for Undergraduate Studies on students' issues or concerns, including and predominantly those that directly affect their experiences in the College's classrooms, labs and departmental facilities and their satisfaction with the quality of teaching, support services and interactions in the departments. Participation is open to any and all students, but specific representatives are identified from EUC, SWE, NSBE, SHPE, Tau Beta Pi, the Envisioneers and Engineering Leadership Development Unlimited, students who began their studies at a Campus College, representatives from each class year – first though senior, and students who participated in the Schreyer Honors College and Co-op Education.

At the unit level, providing the right environment and opportunity for comment is the best mode for issue identification. The following comes from the recently submitted strategic plan from the Pennsylvania Transportation Institute, a COE research center:

> *The climate for achievement and teamwork goes beyond mere professional interaction on work issues to a caring and compassion for each other as individuals, including extraordinary acts of support and generosity in times of personal crisis. The director meets regularly with the staff by activity subgroups to maintain communication on a personal level, and in this same spirit, every director's and supervisor's door is always open to exchange ideas and receive questions or concerns.*

3. *How does your college respond to climate issues?*

When climate issues emerge that are common to many departments, they are put on the Executive Committee agenda for round-table discussion. Similarly, results of climate surveys are distributed for discussion at the meetings. Sharing of information and useful ideas may be supplemented by inviting resident experts from the College or University community to shed light on approaches that may be taken. Issues raised by the COE Climate Committee are directed by the Dean to the responsible units or personnel for action. Issues raised by students or groups of students are likewise taken to responsible parties for consideration. Feedback on the disposition of the issue is to be provided in a timely manner.

Individual concerns or instances of interpersonal conflict that come to the attention of any office or employee of the college are referred to the appropriate head, director or supervisor. In such cases, closing the loop is the paramount responsibility for all parties involved. The referring party is to establish that the head, director or supervisor has been approached by the original complainant, or in the absence of a direct interaction or account, has otherwise investigated the complaint. The local authority is also to provide feedback to the concerned party, as appropriate and ethical, on what actions were or will be taken to provide for intervention or remedy. This person should also provide guidance consistent with his or her knowledge and capability and offer referrals to other offices, personnel or resources as needed.

4. *What college-wide and individualized approaches have you developed to enhance overall climate and individuals' satisfaction with the environment?*

Most departments note that they hold welcome receptions for new faculty, staff and students, and both the MEP and WEP invite new and continuing students to a welcome-back mixer to meet faculty and members of the administration. Informal social events that bring together the members of student chapters of professional societies and the department faculty and staff are also a common practice. An annual Multicultural Day organized by NSBE, SHPE, the Caribbean Student Organization, and others is held during Black History Month for students, faculty and staff in the College that includes food and recipes from around the world. The Department of Mechanical and Nuclear Engineering has established a welcoming committee and enlists the help of retirees in organizing the initiative. It is expected that a department escort will introduce newcomers to key support personnel around the College.

New engineering faculty at all campus locations are invited to an orientation, organized by EIS and the Leonhard Center, that has as its major purpose the provision of information to make a strong start and become acquainted with procedures and helpful resources for both teaching and research. For example, faculty receive and discuss information on procedures for addressing students' different learning needs, such as extended time or alternative accommodations or formats for test-taking, and how to make arrangements in a way that avoids the students being or feeling singled-out or stigmatized.

The Department of Computer Science and Engineering intends to review all departmental publications for both text and images containing overt and subtle messages that might discourage women and minorities from applying. The department also proposes to broaden its institutional culture to accept a range of personal choices in balancing work and life. Most departments cite the importance of creating a peer community for women and minority students, providing appropriate role models, and standardizing the methods used for delivering information so association with a particular, informal social network is not required to receive it.

5. *On a scale of 1 to 10 how do you rate the climate for diversity in your college at present?*

The Task Force rates the climate for diversity at 6 or 7, an estimate founded on the somewhat dated results for the COE derived from the 1996 Faculty and Staff Survey developed and administered through the Penn State Continuous Quality Improvement Center, as well as the Department/Program Climate Survey administered within the COE in roughly the same time period. These data reflected employees' satisfaction with the College, with 60% of the 236 respondents rating the COE as an *above average* to *one of the best* places to work and indicated that there is a sense of mutual respect and propensity to help one another and work well together. Similar attitudes prevailed for the communication of University values and the degree to which employee suggestions are valued by the College leadership. In an earlier COE survey of seniors and graduate students, 85 to 90% of the women and minority students among the 675 respondents reported never or rarely having witnessed or received inequitable treatment, as did 82% of the international student respondents.

Other surveys in which the College has participated (such as the recent Women's Experience in College Engineering Project, conducted for 53 participating schools by the Goodman Research Foundation) measure the relative influence of faculty, advisers and other students in providing encouragement to pursue engineering and the relevance of courses to them as compared to students of the opposite gender or having other characteristics. In the cited project, women in the Penn State COE were more likely to experience encouragement than peers in the aggregate of other schools. The study also compared

"stayers" who persist in engineering with the "leavers" who move to other programs and disciplines of study.

Accepting the notion that the individual experience can be important qualitative input, as valid as group means and not to be relegated to the status of simply "anecdotal," the College possesses a variety of focus groups from which to gain broad feedback. In addition, these forms of input do not suffer the risks of overlooking minority views as do aggregate survey results and serve well in elucidating issues that are difficult to quantify. This said, recent experience would suggest that the morale and climate for diversity does not seem to have eroded over the past several years, and in many cases the sensitization to diversity goals and issues has increased.

SUMMARY AND TRENDS

SUMMARY CHART 2:
Campus Climate

Action	Lead	Focus/Impact
Advisory board input and dialogue on diversity	College, Departments	adds partners' voices to College commitment
Student focus groups	College, MEP, WEP	solicits students' involvement
Peer Review of Exceptional Performance (PREP)	Dean, OHR	rewards achievement in line with core College values, goals
College climate surveys	Climate Committee	informs leadership on climate issues, perspectives of students, faculty, staff
Student/faculty/staff orientations, welcome receptions, mixers, award programs	Departments, MEP, WEP	community-building
Sexual harassment counselor network	College	incident intervention
Student Activities Center	College	promotes student group interaction and collaboration
Multicultural Day	MEP	sharing of cultures, community-building

The College has mechanisms in place for the support and identification of climate and diversity issues and responsible parties to turn to for implementation or action. This infrastructure has been reinforced and augmented as a result of the College's strategy for fostering diversity. However, the timeline for intervention or solution to problems or issues that arise is prolonged and can allow discontent and unhappiness to fester. An example is the long-standing concern over the grading and up-grading processes for staff employees. High performing staff were effectively forced to "move out" in order to "move up" on account of the absence of promotion opportunities within their current unit, leading to transient staffing patterns, inter-unit competition, and position-hopping of valuable and productive staff within the College and

to other units. While the pilot PREP program described above has proved thus far to be a creative and effective intervention, it was a long time coming and the delay came with a considerable cost in terms of morale—both of supervisors and their staff. While this example is not specifically a diversity-related climate matter, it illustrates the need for more rapid intervention and change agents.

Contributing to the rich diversity, but serving as a potential target of insensitivity, is the large international community in the College. With almost 1200 international students (742 at the graduate level, 241 undergraduates, and 204 undertaking practical training) the COE is the academic home of more than 30% of all international students enrolled at the University. Engagement of international students as Teaching Assistants further raises the potential, even when they are provided with careful orientation, training and supervision, that the TA's will encounter some adverse reactions from students under their charge.

There is evidence from various student focus groups that "majority" students often feel left out of programming developed for underrepresented groups in the College. It is not altogether surprising that this perspective should be voiced at feedback sessions and other forums given the high visibility of the College's diversity initiatives. To address these concerns, the College has strived to stress gender-balanced (rather than gender-exclusive) offerings, represent support services as open to and benefiting all students, stimulate collaborative activities among student organizations, and recognize the contributions and volunteer service/outreach by individuals and student groups in furthering the welfare of the student body, the College and the larger community.

PROPOSED ACTIONS AND RECOMMENDATIONS

An effort to evaluate the climate in the College more systematically and comprehensively is perhaps overdue and discussions on the design and strategy for an empirical study should be resumed by the Climate Committee. It has been over five years since input with emphasis on diversity has been solicited from a wide cross-section of students, faculty and staff.

Although it is often observed, perhaps unfairly, that academia moves at a glacial pace, the democratic and committee-centered organization and leadership structure tends to slow down the change processes. An easily accessible information source that catalogues new initiatives or projects to address climate and diversity issues would go a long way toward informing personnel on actions being taken and who is responsible for them. In many cases, it is not that things don't happen or get done, but instead, is the uncertainty over *what* is happening or *when* that breeds a sense of isolation and disconnection.

Commentary from majority and even some non-majority students on their perceived exclusion from certain curricular offerings and activities, while it cannot be characterized as "backlash," is recurrent enough to warrant attention. It can have a number unfortunate consequences, not the least of which, is to put the supposed "privileged" group on the defensive.

Recommended Actions:

- Develop and implement a new, College-wide survey within the next year to support diversity planning efforts.

- Create a web site to list ongoing climate-related initiatives and projects along with the identity of the responsible parties and projected time lines for implementation.

- Reinforce core values in the departments by developing student and faculty "pledges" or "contracts" along the lines of those developed in the Industrial and Manufacturing Engineering Department.

- Fully engage students by seeking out ways, such as the First-Year Seminars, to stimulate and nurture mentor relationships between students and faculty and to integrate students into the research culture of the department – about which faculty are particularly passionate – as early as possible.

- Draw attention to the benefits accrued to all students through programs developed by the MEP and WEP and continue to nurture collaboration and participation among the constituent student groups.

Assessment Measures:

In considering the design of a new climate survey instrument, consideration should be given to assuring that the results are actionable. Queries should be posed that will help identify what initiatives and activities have contributed to an improved climate and where further effort is needed.

CHALLENGE 3

RECRUITING AND RETAINING A DIVERSE STUDENT BODY

PROGRESS AND CURRENT STATUS

1. *Does your college contribute to locating and recruiting undergraduate students from underrepresented groups? If so, how?*

Recruitment is a key activity of the College and is subject to continuous re-engineering and refinement. It is a whole-College activity in which everyone is expected to contribute – the dean's office, student services personnel, faculty in the departments, current students and alumni. Much of the recruitment effort in recent years has been focused on achieving a diverse student body, particularly by attracting students from underrepresented groups. Gifts to "encourage diversity" and "help recruit and retain the talented engineering students that today's employers are seeking" is also a key goal of the College's fundraising campaign as presented in the *Dean's Report on Philanthropy*.

The focus of recruiting has been to develop and implement a process that not only involves outreach to primary, middle and early high school aged children, but then to tap into the "flow" in the pipeline towards science and engineering. That larger pool then serves as a foundation for a concerted effort to ultimately enroll the "prospects" at Penn State. The recruitment strategy has been designed and re-designed to constitute contacts, events, communications and incentives tuned to each stage in the recruitment cycle, from prospects' initial college exploration, to the application stage, to "offered admission," to the decision to go "paid-accept." We see this much like nurturing a relationship from just an acquaintance through engagement and marriage, with the recognition that the work on the student/college relationship has only just started at that juncture—when the student enrolls.

Primary and middle school education programs are aimed at increasing the awareness of girls and minority students of opportunities in engineering and encouraging the preparation necessary for success. Specifically, the issues are:

- The low number of girls and minority students who remain in the types of classes that are necessary to enter and succeed in engineering undergraduate programs;
- External environment conditions that work against attracting girls into a career that is non-traditional for women or in which there are comparatively few role models of the same minority group as the student; and
- Introducing girls and minority students to engineering as a possible profession and keeping that prospect alive.

Accordingly, the WEP has initiated several activities that focus on the pre-college pipeline by incorporating hands-on, interactive activities and featuring undergraduate women as dynamic role models. Approximately 350 girls were involved during the past year with 130 graduate and undergraduate women student mentors. Activities include:

- Girl Scout Saturdays - Workshops for girls of varying ages that focus on different aspects of engineering.
- Girlz in Engineering Camp - A week-long day camp for girls within the local vicinity.

- VEC-Tour - A camp that introduces girls who are juniors and seniors in high school who have the right prerequisites for engineering but who are not necessarily identifying engineering as a possible major.
- PSU4YOU - A listserv for prospective women students moderated by current undergraduate women that talks about academic and campus life.
- TechGirlz - A newsletter directed at late elementary girls, written and edited by undergraduate women.
- GEE (Girls Exploring Engineering) - A website directed at introducing girls to engineering through activities attractive to late elementary and middle school girls.

Pre-college programs are also offered through the MEP in the summer and throughout the year to provide minority students exposure to engineering and Penn State. These include:

- BEST (Business, Engineering, Science and Technology) – An interdisciplinary program involving 24 minority students over a four-week period.
- VIEW (Visit in Engineering Week) - A program consisting of three sessions accommodating a total of 72 corporate–sponsored participants involving a three-day session for 9th and 10th graders and a two session program for 11th graders;
- A weekend visit organized by SHPE for 25-40 high school students bused from the Philadelphia area.

Pre-applicant events in the College that typically attract 1000 prospects each year have been fine tuned based on the feedback from previous years' participants. One of the key ingredients is to provide opportunities for prospects to interact with students, meet faculty and see the learning laboratories they will spend time in from the first year on. The long-standing Engineering Open House and Scholars Day have been reformulated to include visits to the First-Year design labs where current students display and explain their projects. In the department tours, similar connections are made to the capstone design activities of recent and current seniors. The changes made to the format of this and other events have been specifically crafted to present a welcoming and responsive atmosphere for underrepresented students.

Visits by groups or individual high school students and their parents are encouraged and currently total over 200 per year. All the staff serving Undergraduate Studies are trained in handling the requests and developing the itineraries for these visits (which are mailed to the families in advance), including time with an engineering departmental and/or MEP or WEP "envoy" (student escort), attending a class, touring facilities, and meeting with faculty and a member of the advising staff. The MEP regularly participates in the group visits arranged for high school students by recruiting centers in Philadelphia, Harrisburg and Pittsburgh.

A newer event designed for students in "offer" status is specifically focused on women, minority and Schreyer Honors College prospects. Spend An Engineering Day features student panels, hosted stayovers with current students, and sessions on Co-op Education and Student Services that highlight the engineering experience and sense of community. Representatives from all academic departments participate in the event and the MEP provides bus transportation for students who need it to attend. Also at this stage, students receive congratulatory letters from the Associate Dean, follow-up letters from the MEP and WEP directors and information on scholarships, financial aid and special housing options for engineering students. An active recruiting committee composed of volunteers from the Penn State Engineering (alumni) Society (PSES) make over 300 telephone calls to students in their home areas and both the MEP and WEP organize phone-a-thons in which current students reach out to a similar number of prospects. A weekend workshop is held every February by the Associate Dean to update these volunteers on new programs, activities and emphases in the College.

The College entered into a new, proactive relationship and collaboration with the Office of Undergraduate Admissions this past year to address recruitment goals. Traditionally, the College has had little involvement with the largely centralized process during the early phases of the admissions cycle. The thrust of the cooperative effort is to become invested earlier in the identification and contact with students considering engineering.

Finally, the scholarship program has been redesigned so as to allocate a much greater proportion of the resources for the purpose of recruiting incoming students. A program to match department awards and early identification of eligible candidates has resulted in a significant increase in offers to women and minority students. The proportion of the admissions "pool" offered scholarships has increased ten-fold since 1995-1996 and the number of newly enrolled first-year students receiving scholarships has increased eight-fold. The average award amount has increased by 60% to about $3,800. The College has also collaborated with the University Office of Student Aid to offer several more than its annual allotment of Bunton-Waller fellowships by agreeing to fully fund the excess yield (any students who enroll in the College beyond the allotted number).

2. *How has your college contributed to locating and recruiting graduate students from underrepresented groups?*

For recruiting underrepresented graduate students, the College relies on both programs that encompass the entire college (i.e., the WEP and MEP) and individual department efforts. Each year, the Associate Dean for Graduate Studies meets with the MEP and WEP directors to review a strategy for recruiting and allocate funds to support these activities. The MEP director makes recruiting trips to attend graduate fairs, such as those held at the national SHPE and NSBE conferences or state- or regionally-organized events, and selected schools such as Grambling University.

Individual departments have established unit-specific working relationships with the WEP and MEP and several departments have initiated separate efforts to recruit underrepresented minorities. For example, Architectural Engineering has developed partnership programs with two schools: Tennessee State and North Carolina Agriculture and Technology (NC A&T). These partnership programs have been moderately successful, leading to the enrollment of a graduate student every one to two years. The Acoustics Program has committed to sending a representative of the program to the recruiting fairs of at least one institution whose majority population is drawn from the underrepresented groups.

The Women in Engineering Program is developing the GE Faculty for the Future website, an interactive database that will allow underrepresented students who are interested in undergraduate research, graduate research, postdoctoral, or faculty positions to post resumes where faculty at 40 GE Fund schools can access them. The website will also feature a position bulletin board and career development tips. The website is currently being beta tested. Also sponsored through the GE-funded Faculty for the Future program are undergraduate research projects that are coordinated through the Center for Undergraduate Research Opportunities (CURO). The WEP began sponsorship of undergraduate research in 2000-2001. Thus far, 18 students have been supported in a variety of departments. These students are supported by a combination of funding from OSGR matched by Fluor, UTC and the GE Fund. The MEP collaborates through CURO with the University-level Summer Research Opportunities Program (SROP), to encourage undergraduate students from Penn State and other colleges to enter graduate studies by engaging them in summer research opportunities.

The WEP organizes the Penn State Graduate School Information Weekend for students who are juniors in College, with an emphasis on attracting women and students of color. This year Mechanical and Nuclear Engineering, Chemical Engineering, Civil and Environmental Engineering, and Engineering

Science and Mechanics participated. In its second year, the program served 43 students from universities and colleges ranging from the University of Michigan to Princeton University to Grove City College. An on-campus graduate school orientation for undergraduates from Simmons College, a women's college in Boston, is planned for Spring 2001. This activity is a pilot for other such connections with women undergraduates at other institutions.

As with undergraduate recruiting, where scholarships are an important ingredient, so is the extension of support to graduate students an essential part of the equation. The WEP works with the College's Office for Graduate Studies and Research (OGSR) and departments to identify outstanding women and ethnic candidates for first year Graduate School Minority Fellowships and other "top-up" fellowships administered by the OGSR. Two new students were recruited this year through the added incentive represented by the former of these fellowship funding sources.

3. *What strategies have you implemented to retain undergraduate students from underrepresented* groups?

A wide range of programs are offered through the MEP and WEP to provide for intervention, a safety net and specialized services for underrepresented students. Departments and faculty are cognizant of these activities and, since the numbers in the individual programs are small, will generally refer students to the centralized services. There is a growing recognition in the departments, however, of the importance of being proactive in providing a welcoming intradepartmental environment.

MINORITY ENGINEERING PROGRAM

PRE First-Year Engineering & Science Program (PREF)

The Pre-First-Year Engineering Program (PREF) is a six-week summer-bridge experience designed for first-year students who have been accepted in the College of Engineering. Corporate sponsorship and other grant funding (such as from EOPC) provide sponsorship for the program at capacity of 24 students. The program provides a review for introductory courses in physics, chemistry and math to ensure the success of academically promising students as well as those for whom academic performance is directly associated with the continuance of scholarship funding (Bunton-Waller Fellows).

Community-Building Activities

A picnic reception is held in September where students have an opportunity to personally meet the director over great food and music in Foundry Park. The event was attended this year by 175 of the 260 ethnic students enrolled at University Park. Many of them voiced their concerns or apprehensions which MEP has tried to address throughout the year.

The Peer Mentoring Program matches first-year students with upper-division students for the fall semester.

Success 101 Seminar

This entry in the First-Year Seminar program is taught in the fall semester and, for the first time, also in the Spring 2001. Comprised of survival skills and exploration of the engineering majors, the seminar has also been augmented with a field trip. As a "cluster" course for minority undergraduates, it offers an opportunity to become acquainted and enter into dialogue with the MEP director, as well as providing support for negotiating the first year in engineering.

Academic Excellence Center

Renovation- Many students voiced their concern that the AEC was in need of maintenance and upgrading. Plans to paint, carpet, retile the ceiling, and create a more space-efficient layout are included in the renovation project developed this past summer. Also included will be additional learning tools that students suggested for acquisition. The Center will be more conducive to learning and more flexible in its accommodation of single students or groups.

Supplemental Instruction (SI) Tutors- Included in this upgrade is the addition of Supplemental Instruction Tutors who will assist students in engineering courses. Five tutors were added in Spring 2001 to assist with pre-calculus, calculus 1, statics, physics and introductory computer programming.

The E.A.T.T. Card (Educational Assistance Through Tutoring) – In order to motivate students to use the AEC, a new incentive program was developed last year. Students observed that, having excelled in high school, they may have difficulty adjusting to the more challenging academic environment and expectations in college and "find" the EAC too late. This program implements a student-generated idea to reward students with meal points, which are in short supply around mid-semester, for attending tutoring sessions.

Book Scholarship Funding

Merck has agreed to provide $10,000 towards a book scholarship fund that will be used as an incentive for students to improve their academic performance. Awards will be based on the positive change in a student's GPA to assist those who fall between 2.0 and 3.0. Advertised this fall under the inaugural program, students will receive $50 at the end of the semester for each 0.1 increment of increase in their GPA over the previous term.

Resume Workshop and Resume Book

Students are scheduled to visit the computer laboratory to revise or create a resume for the corporate resume book. About 100 resumes are compiled for the book furnished to industry recruiters, and students are rewarded with a very well-attended repast at Damon's Ribs.

Student Interaction and Organizations

The MEP director meets with Bunton-Waller Fellows, attends NSBE and SHPE meetings and travels to both organizations' national conferences.

WOMEN IN ENGINEERING PROGRAM

The Women in Engineering Program Orientation (WEPO), is the College's primary retention program for undergraduate women. WEPO is a three-day intensive introduction to engineering at the UP campus that emphasizes ownership of the physical space, community building and mentoring. All students participate in mentor teams led by two upper-division mentors and yearlong programming. WEPO has grown from 27 participants in 1996 to 117 in 2001. Participation by women of color runs between 6-8 percent higher than the percentage of women of color in the overall engineering student population. WEPO has proven retention value with WEPO women being retained at a much higher rate than non-participants.

Other key retention activities are:

- Facilitated Study Groups - WEP recruits upper-division students to lead study groups in most of the first and second year courses required for engineering majors;
- WESAC (Women Engineering Students at the Commonwealth) - This activity includes a CWC listserv, SWE chapters at three campuses, and a planned orientation for change of assignment students in Spring 2001;

- L-WEPPSU - This listserv reaches 800+ women and delivers information about scholarship opportunities, jobs and internships, current events, etc.;
- WEP Scholarship Program;
- Undergraduate research for upper level women (see above);
- SWE, the Society of Women Engineers, one of the largest and most active student groups in the college; and
- Phi Sigma Rho, a national engineering sorority initiated at Penn State in Fall 2001.

The scholarship program also plays an important role in retention. The College has simplified the process by eliminating an unneeded award application process and developed, instead, a sophisticated software program to match any and all eligible candidates with the criteria for various scholarship funds. With the help of the Grand Destiny Campaign, the growth in the College's scholarship endowment has significantly enhanced the impact of the program despite the relatively constant corporate support available annually in the Engineering Minority fund. During the period from AY 1995-1996 to AY 2001-2002, the number of awards to minority students has increased from 30 to about 100, and the total value of the awards has doubled to about $200,000 per year. Despite the refocusing and growth of the program, and an increase in the average award across all recipients from $1,370 to $1,824, increases in the tuition, fees, room and board and books expenses over the seven-year period have reduced the average value from 13.5% to 11.5% of the PA-resident cost of attendance.

4. *What strategies have you implemented to retain graduate students from underrepresented groups?*

The primary retention strategy for graduate students is aiding the departments to provide a peer community and integrate students into the research culture and professional associations. The MEP offers funding to students to attend conferences to present their work and sponsors attendees at the Graduate Achievement Conference.

The WEP also offers monthly Grad/Faculty Networking lunches that in 2000-2001 attracted a total of more than two hundred graduate and faculty women and provided informal mentoring experiences for graduate women as well as junior faculty women. An on-line networking directory provides and encourages connections among graduate women and career development seminars are offered for students destined for both academia and industry.

The MEP and WEP also provide support and advocacy on behalf of minority and women students with the departmental graduate admissions committees, the COE Office for Graduate Studies and Research, the Center for Minority Graduate Opportunities, and the Director of Graduate Fellowships and Awards in the Graduate School.

5. *What recruitment and retention strategies have been most successful?*

The most effective strategies address issues that we know contribute to attrition among underrepresented groups, namely: lack of attachment to the major or to the engineering community; lack of essential information and particularly "insider" information such as which classes are best to take, where to access practice tests or solved homework examples, how to best operate in the system; and, the tendency to internalize failure or poor classroom performance.

Strategies that address theses issues are actively implemented through collaborative efforts of Undergraduate Student Services, including the Advising Center, MEP and WEP. They include community building and networking; increased information flow to all students, and development of classes and programs that provide access to key knowledge and skills. Programs like WEPO clearly work but they will work best only if we can continue to make progress in creating an environment where prospective women students can interact with other women students and women faculty and prospective minority students can interact with other students and faculty of color populating our classrooms, hallways, offices, and laboratories.

SUMMARY AND TRENDS

SUMMARY CHART 3:
Student Recruiting and Retention

Action	Lead	Focus/Impact
Inclusion of diversity in fundraising priorities	Dean	scholarship/program support for diversity
K-12 outreach/pre-college programs: *Girl Scout Saturdays* *Girlz in Engineering Camp* *Vec-Tour summer program* *PSU4YOU listserv* *TechGirlz newsletter* *Girls Exploring Engineering Newsletter* *BEST summer program* *VIEW summer program* *bus visits*	WEP, MEP	expand interest in engineering among primary, middle and high school students
Recruiting events: *Spend A Summer Day* *Scholars Days* *Engineering Open House* *Spend an Engineering Day* *High school visits program*	Undergraduate Studies, Student Services, Departments	expand applicant pool, focus on talented women and minority prospects, involve faculty and current students
Recruiting contacts: *offer letters* *phone-a-thons*	Undergraduate Studies, Student Services, Departments	personalized contacts from Penn State personnel, students, alumni
Annual retention study	Undergraduate Studies	track and compare retention of majority and underrepresented groups

Action	Lead	Focus/Impact
Academic support: *PREF "Bridge" program*	MEP	preparation and math/science review for entering students
Peer mentoring and tutoring *Facilitated study groups* *Academic Assistance Center* *Success 101 and hands-on seminars* *Book scholarships* *Gender-balanced and "cluster" classes* *Undergraduate research*	WEP, MEP	exposure to survival skills, provision of networking opportunities, and encouragement to use academic assistance services
WEPO	WEP	intensive orientation for incoming women undergraduates
Graduate student recruitment and Retention: *Grad fairs/information weekend* *"Partner" institutions* *Faculty involvement/ networking* *"Faculty of the Future" program and website* *Summer research opportunities* *Fellowship support* *Support for attending conferences* *Grad/Faculty networking lunches* *Career development seminars*	WEP, MEP, Departments, OGSR	spread recruiting responsibility, present Penn State as welcoming place, introduce students to professional community and research culture

The key challenge in recruiting efforts is to deploy available resources, in terms of personnel and funding, to address the multiple objectives so as to have the maximum impact. For instance, the College wants to make a contribution to enhancing the interest levels and preparation of women and minority students in engineering at an early age, while recognizing that these efforts do not necessarily translate directly into an increase in the prospect pool for engineering at Penn State. Decisions must also be made in where resources are allocated during the two-or-more year "admission" cycle, from the pre-applicant stage through eventual enrollment of new first-year students. The College has devoted substantial time and effort to devising strategies for tracking and assessment to help make these critical decisions. At the same time, flexibility needs to be maintained to take advantage of opportunities as they arise and to offer a suite of programs for students with differing needs and circumstances.

The College has made extensive and judicious use of technology to inform these complex processes. Every unit now has the resident capability among its staff to mine the data and other information that can illuminate the issues and trends. The data that follow provide an illustration of how the College can begin to evaluate and assess the impact of its programming.

As shown in the Table 1 below, the College has expanded enrollment of women both in numbers and proportion. The number of undergraduate women students has increased by almost 20% over the last seven years and the percentage of women enrolled in the College has increased by over 10% during that period. The College ranks sixth among the nation's engineering schools in the number of degrees awarded to women.

Minority enrollments, while still relatively small in number, have also increased by 25% in terms of relative proportion. Graduate enrollment of women has grown, while minority enrollments at the graduate level have fluctuated up and down in recent years. These data can be depicted in terms of the various underrepresented groups and the enrollment at University Park and the campus colleges, as shown in Tables 2 and 3. (Note that Asian Americans are not, by convention, included in the reporting of underrepresented students in engineering.) Degrees awarded data follow similar trends and show the increasing impact of international students at the graduate level, Table 4.

TABLE 1:
College of Engineering Enrollments
University Park - Full and Part Time Students

Year	Total Enrollment		Women				Underrepresented Minority			
	UG	Grad	UG	%	Grad	%	UG	%	Grad	%
1994/95	5,143	1,334	896	17.4%	181	13.6%	189	3.7%	43	3.2%
1995/96	5,272	1,346	932	17.7%	188	14.0%	210	4.0%	49	3.6%
1996/97	5,163	1,089	968	18.7%	211	19.4%	208	4.0%	51	4.7%
1997/98	5,249	1,331	976	18.6%	216	16.2%	227	4.3%	42	3.2%
1998/99	5,405	1,273	1,014	18.8%	231	18.1%	251	4.6%	42	3.3%
1999/00	5,467	1,310	1,036	19.0%	228	17.4%	248	4.5%	43	3.3%
2000/01	**5,530**	**1,350**	**1,071**	**19.4%**	**243**	**18.0%**	**260**	**4.7%**	**40**	**3.0%**

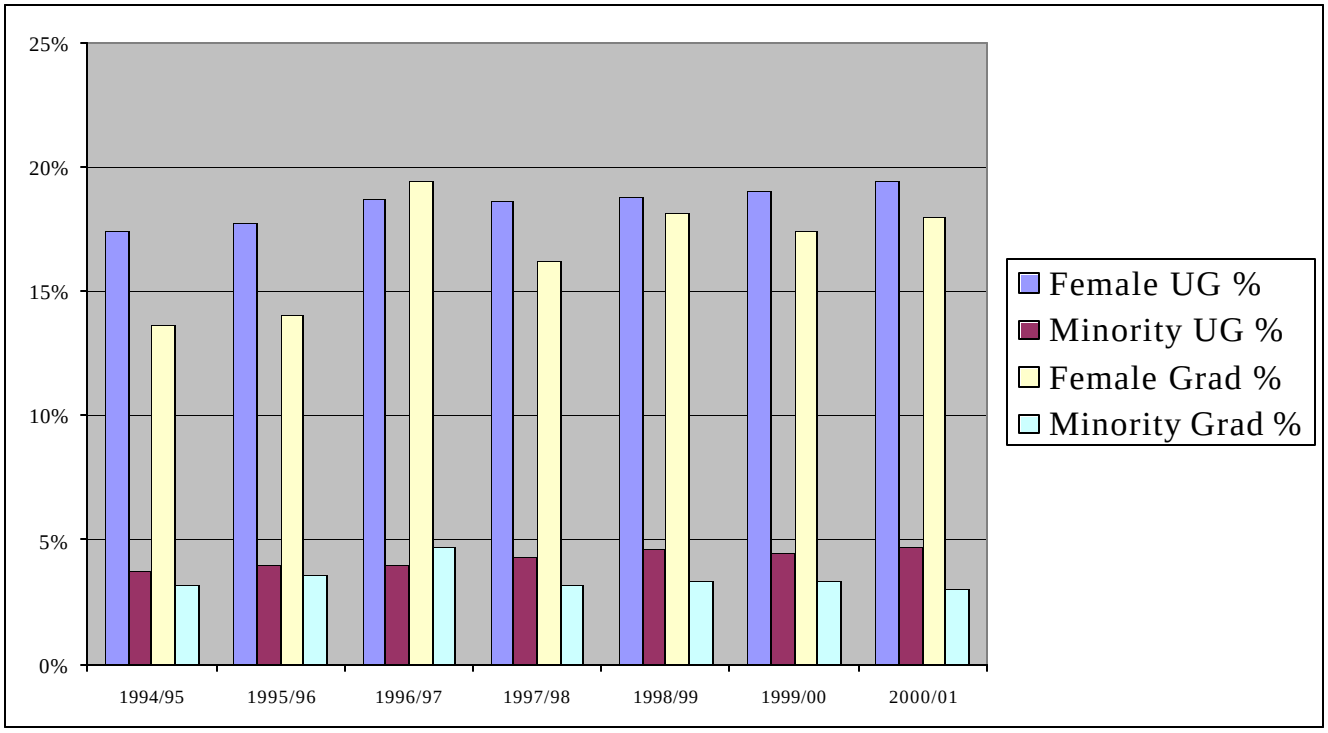


TABLE 2:
College of Engineering
Undergraduate Enrollment by Gender, 1997-2000

	University Park Campus				All Locations*			
	Fall 1997		Fall 2000		Fall 1997		Fall 2000	
Gender	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Female	19%	989	19%	1,079	16%	1,322	16%	1,363
Male	81%	4,287	81%	4,486	84%	7,029	84%	7,130
TOTAL	**100%**	**5,276**	**100%**	**5,565**	**100%**	**8,351**	**100%**	**8,493**

Undergraduate Enrollment by Ethnicity, 1997-2000

	University Park Campus				All Locations*			
	Fall 1997		Fall 2000		Fall 1997		Fall 2000	
Ethnicity	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Asian American	7%	354	7%	376	6%	473	6%	536
African American	2%	113	2%	130	2%	195	3%	241
Hispanic	2%	111	2%	126	2%	151	2%	166
Native American	<1%	4	<1%	5	<1%	10	<1%	5
Subtotal	11%	582	11%	637	10%	829	11%	948
International	2%	100	3%	159	1%	111	2%	189
White	87%	4,594	86%	4,769	89%	7,411	87%	7,356
TOTAL	**100%**	**5,276**	**100%**	**5,565**	**100%**	**8,351**	**100%**	**8,493**

**Includes baccalaureate and associate degrees.*

NOTE: Percentages may not sum to 100 due to rounding.

Source: Office of the Vice Provost for Educational Equity

TABLE 3:
College of Engineering
Graduate Enrollment by Gender, 1997-2000

	University Park Campus				All Locations			
	Fall 1997		Fall 2000		Fall 1997		Fall 2000	
Gender	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Female	15%	166	18%	209	15%	218	18%	229
Male	85%	969	82%	969	85%	1,203	82%	1,037
TOTAL	**100%**	**1,135**	**100%**	**1,178**	**100%**	**1,421**	**100%**	**1,266**

Graduate Enrollment by Ethnicity, 1997-2000

	University Park Campus				All Locations			
	Fall 1997		Fall 2000		Fall 1997		Fall 2000	
Ethnicity	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Asian American	5%	56	3%	35	7%	96	4%	47
African American	2%	18	2%	20	2%	28	2%	23
Hispanic	1%	15	1%	8	1%	18	1%	8
Native American	0%	0	<1%	1	<1%	1	<1%	2
Subtotal	8%	89	5%	64	10%	143	6%	80
International	50%	567	62%	730	40%	571	58%	731
White	42%	479	33%	384	50%	707	36%	455
TOTAL	**100%**	**1,135**	**100%**	**1,178**	**100%**	**1,421**	**100%**	**1,266**

**Percentages may not sum to 100 due to rounding.*

Source: Office of the Vice Provost for Educational Equity

TABLE 4:
College of Engineering
Degrees Conferred by Gender, 1997-2000

	Undergraduate				Graduate			
	Spring 1998		Spring 2001		Spring 1998		Spring 2001	
Gender	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Female	16%	180	18%	236	15%	70	20%	98
Male	84%	949	82%	1,088	85%	402	80%	396
TOTAL	**100%**	**1,129**	**100%**	**1,324**	**100%**	**472**	**100%**	**494**

Degrees Conferred by Ethnicity, 1997-2000

	Undergraduate				Graduate			
	Spring 1998		Spring 2001		Spring 1998		Spring 2001	
Ethnicity	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Asian American	6%	66	6%	82	7%	32	5%	25
African American	1%	13	1%	16	2%	11	2%	8
Hispanic	2%	23	2%	20	1%	7	1%	4
Native American	0%	0	0%	0	<1%	1	0%	0
Subtotal	9%	102	9%	118	11%	51	7%	37
International	2%	18	2%	24	36%	172	48%	237
White	89%	1,009	89%	1,182	53%	249	45%	220
TOTAL	**100%**	**1,129**	**100%**	**1,324**	**100%**	**472**	**100%**	**494**

**Percentages may not sum to 100 due to rounding.*

Source: Office of the Vice Provost for Educational Equity

Table 5 illustrates the variation in enrollments in the various majors. Two of the largest departments in the College enroll the lowest proportions of women, while disciplines such as chemical and industrial engineering traditionally attract larger female enrollments. Electrical engineering typically enrolls a significant fraction of the minority undergraduates in the College. Somewhat different patterns are evident for the graduate enrollments, wherein women are well represented in computer science and engineering compared to other majors, and in contrast to their lower numbers at the undergraduate level.

It should be noted that, although the minority representation in graduate programs is only about 3% of all students, when domestic (U.S. citizen) graduate enrollment is used as the baseline, the minority representation is approximately 8%. Putting the enrollment into a national perspective, it can be seen in Table 6 that, for institutions ranked in the top 25, Penn State is in the mid-range in terms of enrollment of women, and at the lower end of the scale in minority enrollments. The data underscore the importance of looking at the disciplinary detail as well as the aggregate comparisons. When viewed in the context of the various majors, considerable variation is evident. The absence of bioengineering, which traditionally draws women majors, tends to depress Penn State's position among peer institutions at the undergraduate level, but the same program at the graduate level enhances its relative position. (A new undergraduate major in Bioengineering has only been introduced this fall.) The data over a somewhat longer time span also show the challenges from a longitudinal viewpoint. As depicted in Figure 1, the steady growth in women enrollments during the early- to mid-90's has tended towards a plateau in the last several years, reflecting a national trend.

TABLE 5:
College of Engineering
Undergraduate Enrollment by Major, Fall 2000

	Male		Female		African American		Hispanic		Native American	
Undergraduate Program	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Aerospace	135	82.8%	28	17.2%	5	3.1%	1	0.6%	0	0
Agricultural	20	62.5%	12	37.5%	0	0.0%	1	3.1%	0	0
Architectural	205	71.4%	82	28.6%	4	1.4%	3	1.0%	0	0
Chemical	270	65.7%	141	34.3%	9	2.2%	8	1.9%	0	0
Civil	327	79.8%	83	20.2%	4	1.0%	6	1.5%	0	0
Comp Sci & Engr	471	86.7%	72	13.3%	5	0.9%	2	0.4%	0	0
Electrical Engr	585	91.2%	57	8.8%	33	5.1%	17	2.6%	1	0.2%
ENGR/ENGRAE	1,535	79.3%	401	20.7%	58	3.0%	68	3.5%	4	0.2%
Engineering Science	58	86.6%	9	13.4%	0	0.0%	0	0.0%	0	0
Industrial	245	68.2%	114	31.8%	7	1.9%	10	2.8%	0	0
Mechanical	583	90.1%	64	9.9%	5	0.8%	8	1.2%	0	0
Nuclear	25	75.8%	8	24.2%	0	0.0%	1	3.0%	0	0
TOTAL	**4,459**	**80.6%**	**1,071**	**19.4%**	**130**	**2.4%**	**125**	**2.3%**	**5**	**0.1%**

Graduate Enrollment by Major, Fall 2000

	Male		Female		African American		Hispanic		Native American	
Graduate Program	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Acoustics	44	80.0%	11	20.0%	2	3.6%	1	1.8%	0	0.0%
Aerospace	63	91.3%	6	8.7%	1	1.4%	1	1.4%	0	0.0%
Agricultural	31	79.5%	8	20.5%	3	7.7%	0	0.0%	0	0.0%
Architectural	25	83.3%	5	16.7%	0	0.0%	0	0.0%	0	0.0%
Bioengineering	25	80.6%	6	19.4%	1	3.2%	1	3.2%	0	0.0%
Chemical	43	76.8%	13	23.2%	1	1.8%	3	5.4%	0	0.0%
Civil & Env Engr	108	77.7%	31	22.3%	1	0.7%	0	0.0%	0	0.0%
Comp Sci & Engr	126	71.6%	50	28.4%	0	0.0%	1	0.6%	0	0.0%
Electrical Engr	204	85.4%	35	14.6%	3	1.3%	0	0.0%	0	0.0%
Engr Sci & Mech	71	82.6%	15	17.4%	1	1.2%	0	0.0%	1	1.2%
Industrial	99	86.1%	16	13.9%	7	6.1%	3	2.6%	0	0.0%
Materials	53	80.3%	13	19.7%	2	3.0%	1	1.5%	0	0.0%
Mechanical	159	87.4%	23	12.6%	2	1.1%	0	0.0%	0	0.0%
Nuclear	32	84.2%	6	15.8%	1	3.0%	0	0.0%	0	0.0%
QMM	24	82.8%	5	17.2%	2	6.9%	0	0.0%	1	3.4%
TOTAL	**1,063**	**78.7%**	**232**	**17.2%**	**25**	**1.9%**	**10**	**0.8%**	**2**	**0.2%**

Source: College of Engineering Warehouse

TABLE 6:
DIVERSITY IN THE TOP RANKED ENGINEERING COLLEGES
According to the April 9, 2001, U.S. News & World Report

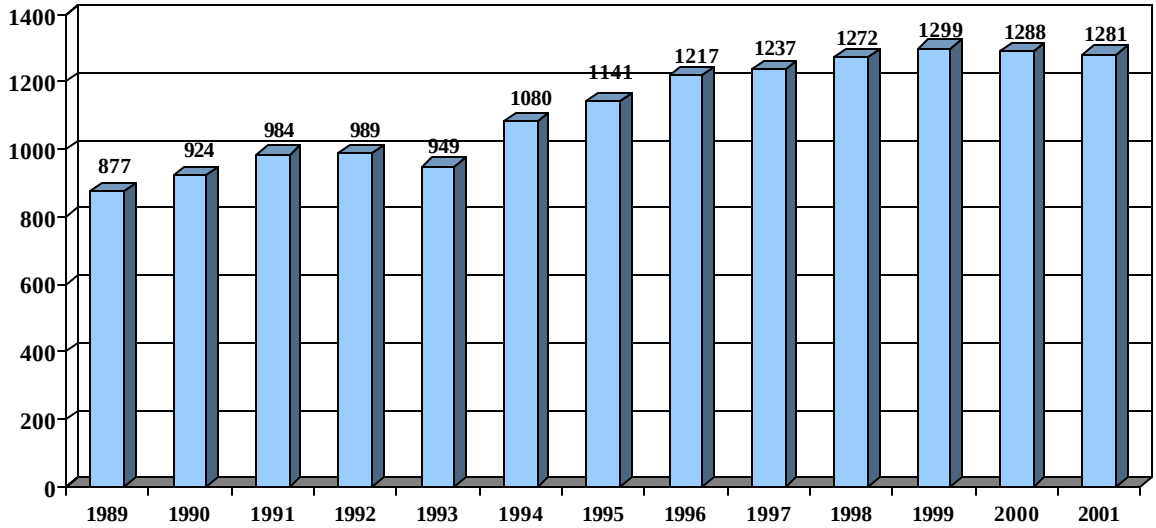
University	ENROLLMENT, Fall 2000									
	Undergraduate Students					Graduate Students				
	T#	F#	M#	F%	M%	T#	F#	M#	F%	M%
1. M.I.T.	1,985	673	373	33.9%	18.8%	2,609	574	123	22.0%	4.7%
2. Stanford	1,332	346	253	26.0%	19.0%	3,069	649	150	21.1%	4.9%
3. California-Berkeley	3,208	793	199	24.7%	6.2%	1,511	308	87	20.4%	5.8%
4. Michigan - Ann Arbor	4,828	1,315	562	27.2%	11.6%	2,143	403	94	18.8%	4.4%
5. Georgia Tech	7,719	1,659	1,007	21.5%	13.0%	2,502	508	212	20.3%	8.5%
6. Illinois	5,302	935	400	17.6%	7.5%	2,086	341	58	16.3%	2.8%
7. Cal. Tech.	515	153	49	29.7%	9.5%	511	83	16	16.2%	3.1%
8. Carnegie Mellon	1,362	309	137	22.7%	10.1%	653	115	14	17.6%	2.1%
9. Cornell	2,971	655	180	22.0%	6.1%	1,100	224	61	20.4%	5.5%
10. Texas - Austin	4,838	1,037	852	21.4%	17.6%	1,822	342	66	18.8%	3.6%
11. Texas A&M	6,593	1,392	859	21.1%	13.0%	2,043	370	61	18.1%	3.0%
Southern Cal.	1,791	426	281	23.8%	15.7%	2,469	407	78	16.5%	3.2%
13. Purdue	6,507	1,223	228	18.8%	3.5%	1,899	293	76	15.4%	4.0%
14. Penn State	**5,530**	**1,071**	**260**	**19.4%**	**4.7%**	**1,350**	**243**	**40**	**18.0%**	**3.0%**
Wisconsin	3,619	707	111	19.5%	3.1%	1,218	209	39	17.2%	3.2%
16. California-San Diego	2,646	606	320	22.9%	12.1%	508	75	36	14.8%	7.1%
17. Princeton	765	210	98	27.5%	12.8%	474	105	12	22.2%	2.5%
18. Northwestern	1,419	436	147	30.7%	10.4%	925	215	47	23.2%	5.1%
Maryland	2,987	637	507	21.3%	17.0%	1,448	270	98	18.6%	6.8%
20. Minnesota	3,304	620	111	18.8%	3.4%	1,171	228	21	19.5%	1.8%
21. Harvard	424	96	34	22.6%	8.0%	192	53	3	27.6%	1.6%
22. U.C.L.A.	2,768	581	244	21.0%	8.8%	1,079	173	39	16.0%	3.6%
California-Santa Barbara	1,579	223	158	14.1%	10.0%	558	110	9	19.7%	1.6%
24. Ohio State	5,328	900	425	16.9%	8.0%	1,177	199	21	16.9%	1.8%
25. Rensselaer Tech.	2,682	586	266	21.8%	9.9%	1,161	220	70	18.9%	6.0%
Virginia Tech.	6,052	936	392	15.5%	6.5%	1,730	312	81	18.0%	4.7%

University	DEGREES CONFERRED 1999-2000									
	Undergraduate Students					Graduate Students				
	T#	F#	M#	F%	M%	T#	F#	M#	F%	M%
1. M.I.T.	715	246	116	34.4%	16.2%	1,007	204	35	20.3%	3.5%
2. Stanford	352	100	44	28.4%	12.5%	1,231	229	49	18.6%	4.0%
3. California-Berkeley	899	201	45	22.4%	5.0%	517	86	28	16.6%	5.4%
4. Michigan - Ann Arbor	1,106	320	104	28.9%	9.4%	747	99	26	13.3%	3.5%
5. Georgia Tech	1,243	319	180	25.7%	14.5%	776	126	53	16.2%	6.8%
6. Illinois	1,136	207	57	18.2%	5.0%	694	104	18	15.0%	2.6%
7. Cal. Tech.	111	24	4	21.6%	3.6%	146	13	3	8.9%	2.1%
8. Carnegie Mellon	337	84	31	24.9%	9.2%	344	38	11	11.0%	3.2%
9. Cornell	681	170	54	25.0%	7.9%	364	56	21	15.4%	5.8%
10. Texas - Austin	791	177	117	22.4%	14.8%	538	76	14	14.1%	2.6%
11. Texas A&M	1,105	257	150	23.3%	13.6%	508	72	18	14.2%	3.5%
Southern Cal.	359	74	52	20.6%	14.5%	895	148	20	16.5%	2.2%
13. Purdue	1,074	249	62	23.2%	5.8%	563	71	24	12.6%	4.3%
14. Penn State	**1,197**	**200**	**54**	**16.7%**	**4.5%**	**524**	**97**	**19**	**18.5%**	**3.6%**
Wisconsin	596	130	14	21.8%	2.3%	332	40	11	12.0%	3.3%
16. California-San Diego	560	137	50	24.5%	8.9%	174	20	7	11.5%	4.0%
17. Princeton	172	49	15	28.5%	8.7%	134	1	1	0.7%	0.7%
18. Northwestern	346	100	23	28.9%	6.6%	367	67	18	18.3%	4.9%
Maryland	442	93	62	21.0%	14.0%	401	70	32	17.5%	8.0%
20. Minnesota	647	129	22	19.9%	3.4%	301	49	2	16.3%	0.7%
21. Harvard	102	20	5	19.6%	4.9%	51	6	1	11.8%	2.0%
22. U.C.L.A.	387	101	31	26.1%	8.0%	309	42	10	13.6%	3.2%
California-Santa Barbara	174	24	23	13.8%	13.2%	160	21	1	13.1%	0.6%
24. Ohio State	1,076	88	30	8.2%	2.8%	404	61	7	15.1%	1.7%
25. Rensselaer Tech.	547	124	32	22.7%	5.9%	355	62	15	17.5%	4.2%
Virginia Tech.	892	157	31	17.6%	3.5%	458	72	18	15.7%	3.9%

T = Total **M = Underrepresented Minority*** **F = Female**

Source: Engineering & Technology Degrees, 2000, Engineering Workforce Commission of the American Association of Engineering Socities, Inc.
**Underrepresented Minority includes: African American, Hispanic, and American Indian.*

FIGURE 1:
College of Engineering
Women's Undergraduate Enrollment Trend
(All Locations)



Turning to retention, the College compiles an annual study that tracks cohorts of students who entered the College in the summer and fall of a given year. The study, began in 1989, does not count students who enter with advanced standing or transfer into the College. The focus of retention efforts has been on reducing attrition during the first two years of engineering study, and particularly the departure of students at the end of the second year when students decide whether to enter an engineering major or change to another college. Our definition of retention, therefore, is based on persistence in engineering at Penn State and not on eventual completion of a degree program anywhere in the University. During the past decade, the two-year retention of male students has remained fairly steady, fluctuating between 63% and 69% (Figure 2). During the same period, the retention percentages for women have climbed from a low of 47% in 1990 to a high of 66% in 1997. The retention differential between men and women is consistently and considerably lower than the 20% gap reported in a May 1998 report developed through the U.S. Department of Education and the National Institute of Science and Education (*Women and Men on the Engineering* Path). The retention figures for minority students have risen comparably from 35% in 1990 to 61% in 1997, although with significant year-to-year variations (Figure 3). We believe that substantial reform of the first year to emphasize a user-friendly engineering curriculum and early, hands-on problem solving has been a major factor in the persistence of underrepresented groups. The introduction of small classes and creative, team-based design projects in the first year provide more connection to, and foster students' interest in, engineering as they develop foundation knowledge in mathematics and science, countering what otherwise would be a "drift" of students toward disciplines outside of engineering. Despite narrowing the retention gaps between underrepresented and majority populations of students, the College considers that women and minority students who make it to Penn State to study engineering have surmounted considerable hurdles and should, as veteran survivors, be retained at higher levels. It is the goal of the College to achieve, at minimum, equal persistence rates for all students.

FIGURE 2:
College of Engineering
Retention of Women and Men Engineering
Students After Second Year at UP, 1990-98

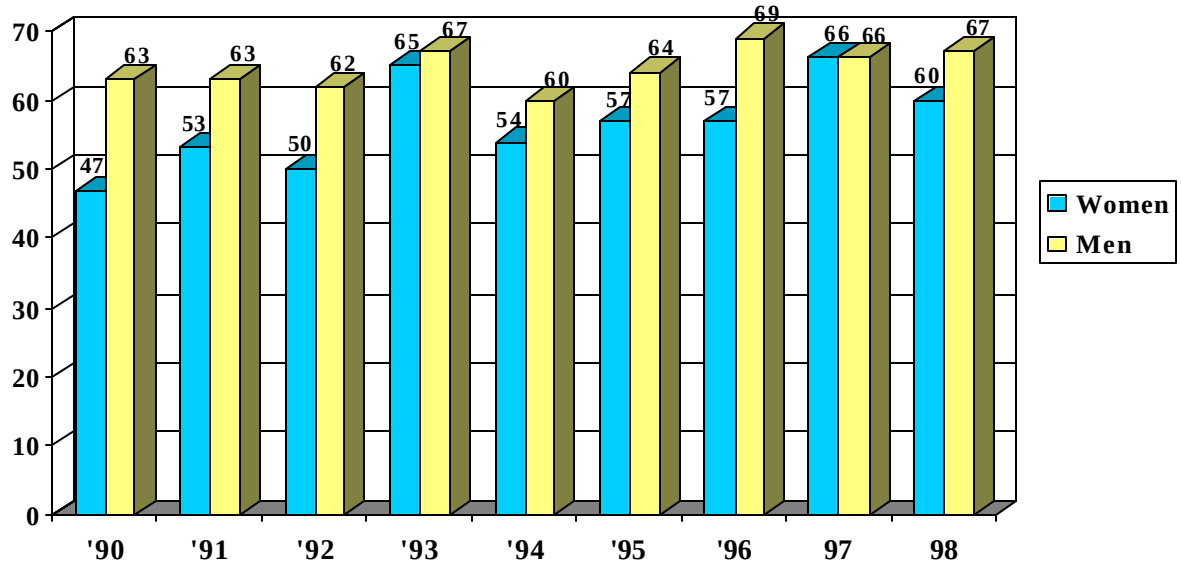
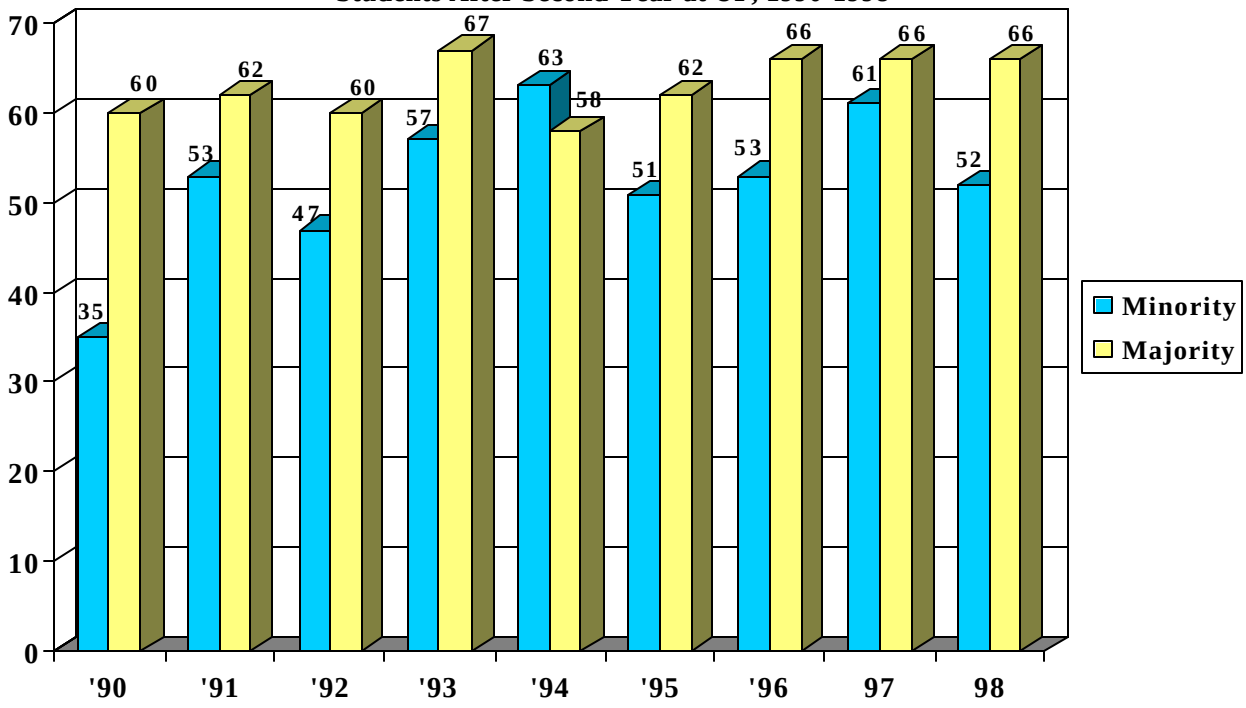


FIGURE 3:
College of Engineering
Retention of Minority and Majority Engineering
Students After Second Year at UP, 1990-1998



Also of concern is the higher attrition, across-the-board, for students who begin their engineering studies at campus colleges. The retention in engineering for all students who start at non-UP locations is 25% lower by the end of the second year and this gap is consistent for men, women and minority students. The same trend is exhibited for retention of students who start in engineering and persist to graduation at Penn State in any major. The six-year graduation rates for minority students in the 1994 cohort starting at UP are 82% and 84% for minority and majority students, respectively, compared to 66% and 72% for minority and majority students beginning at all locations. The four-year graduation rates are 38% and 49%, respectively, for students beginning at UP (28% and 38% for students beginning at all locations) indicating that a larger proportion of minority students need extra time to earn their degrees.

The College does not systematically track the retention of graduate students, either majority or minority, or of the significant population of international students pursuing advanced degrees. For a number of reasons, including the changes in registration status as students move from coursework to the research stage and then to thesis preparation, it is not a trivial task to get reliable graduate retention data.

PROPOSED ACTIONS AND RECOMMENDATIONS

An under-exploited tool in recruiting at all levels is the development of partner relationships among schools and educators. In the pre-college domain, this means developing relationships with key schools and teachers, particularly at the secondary level but even at the primary and middle school level where pipeline interests are concerned. Current interest in science, math, engineering, and technology education, as reflected in recent federal and state policy initiatives, should encourage existing collaboration among science, education (teacher preparation and science pedagogy) and engineering programs and provide funding opportunities for K-12 outreach. The establishment of a teacher advisory boards for the WEP and MEP, a Penn State Day visit for high school math and science teachers, targeting urban schools with diverse populations and magnet or other schools specializing in math, science or technology, are possible options. Working with teachers has the advantage that many generations of students can be influenced with the same outlay of resources as might be expended in outreach to a single cohort of pre-college students. It would also help expand attendance at recruiting events that occur early in the admission cycle, before students make their first contact with Penn State, by creating a more direct link to interested students.

Graduate recruitment will also depend on creating and nurturing linkages – between faculty and their colleagues at other institutions – and with women's colleges, HBCU's and HHCU's. Students enrolled in our own undergraduate programs should be courted into advanced studies more effectively and faculty need to be more invested in making contact with recruits, inviting them to visit and offering assistantship support to work on their research projects. An incentive system for faculty might be considered. Current students may also be engaged as ambassadors to the schools where they did their undergraduate study and to host students from those institutions at Penn State graduate school fairs. The latter is particularly important to communicating Penn State and State College as welcoming places to study and live, respectively. It will also be important to exercise flexibility in terms of the scope of academic or research experience applicants might bring, so as to be inclusive of students who come from applied science or other fields that are not aligned with traditional engineering stems. A better understanding is also needed on the admissions process at the graduate level – that is, the application, offer of admission, and enrollment/yield stages. In 2000, for example, 320 of 383 U.S. citizen applicants were offered admission, or 83%. Of those offered admission, 138 or 43%, accepted the offers. Of the 82 minority applicants, 43 (52%) were offered admission and 12 (28%) of these students enrolled in the COE.

The COE set the goal in its original plan to be among the top three of the Big Ten universities in recruiting and retaining—through graduation—women and minority undergraduate and graduate students. The College has been urged by its external advisory boards to also set quantitative objectives that will be aggressive and realistic and help to generate and sustain substantive efforts. The MEP has proposed to increase graduate enrollments by 0.5% of the population per year to grow the representation of minority students from 3% to 6% over six years. This would require just 7 additional students in the first year. Electrical engineering has advanced the goal of increasing its undergraduate and graduate enrollments from underrepresented groups by 1% per year for each of the next five years. The demographics of the Commonwealth offer another relevant objective – 10% African American, 3.2% Hispanic/Latino and 0.1% American Indian (U.S. Census Bureau Census 2001). These add up to a representation that is not far from the top schools (13-19%). In terms of women, the leading institutions have achieved percentages of 30%.

Improvements in retention will depend largely on expansion of already successful programs to provide effective orientation and bridging programs, as well as strong incentives and support to encourage academic engagement and achievement. The preliminary retention data collected for the Women in Engineering Program Orientation shows the powerful influence of this kind of community-building and skills-development initiative. As shown in the data for the 1997 and 1998 cohorts, the impact of the program appears to persist for the participants through subsequent years of study, as manifested by retention rates that exceed those for all women and men (Figures 4 and 5).

FIGURE 4:
WEPO '97 Preliminary Retention Data

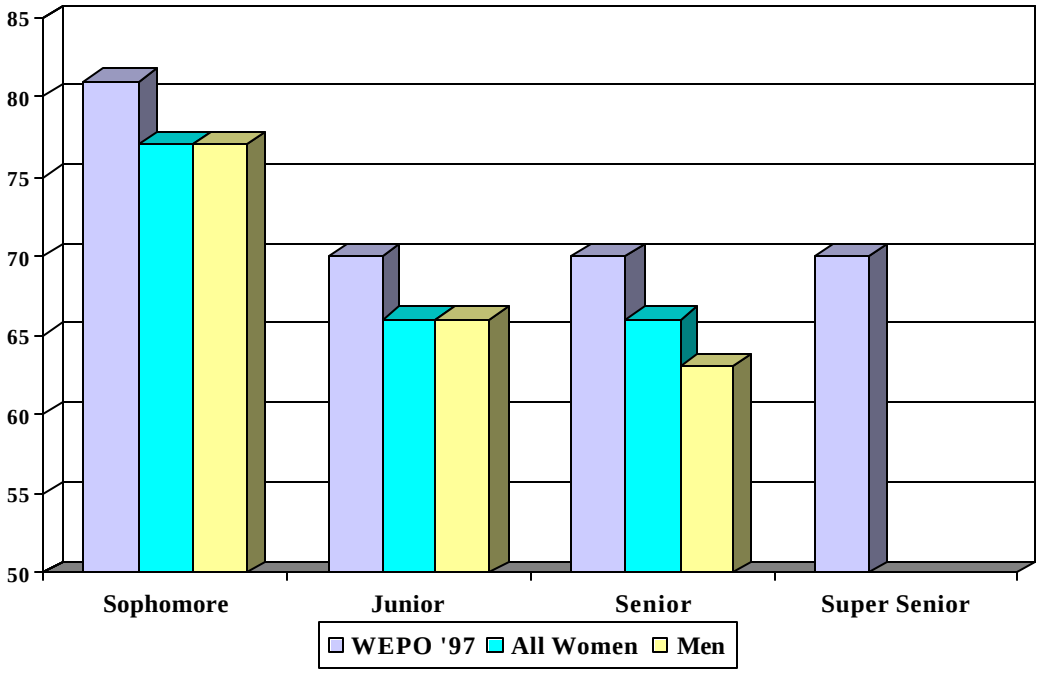
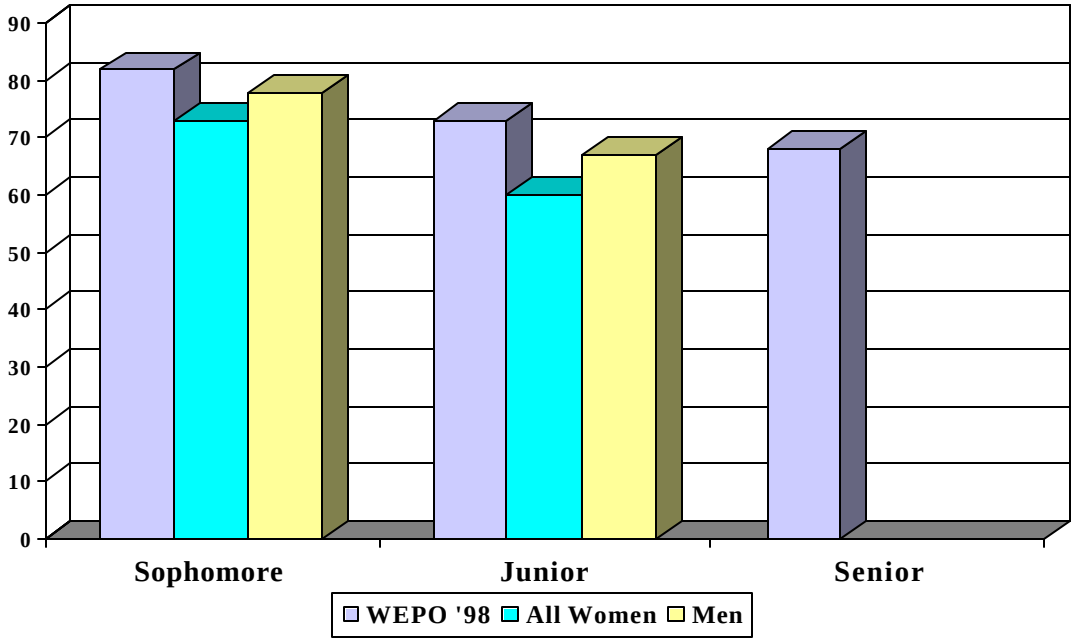


FIGURE 5:
WEPO '98 Preliminary
Retention Data



Recommended Actions:

- Tie existing programs together as appropriate to comprise a comprehensive suite of initiatives without unnecessary redundancy.
- Continue to identify prospective students early, particularly those who have the skills and talent for engineering but who have not identified engineering as a possible career, and create efficiencies by working with target schools, and math and science teachers.
- Develop a system for identifying and disseminating best practices for graduate recruitment, including aggressive networking, casting the Penn State community in its most favorable light, and involving current students as ambassadors.
- Increase efforts to identify new connections and collaborations with key colleges for recruitment purposes, with an emphasis on identifying women's colleges and HBCU's and HHCU's.
- Increase awareness of faculty on issues and challenges faced by underrepresented students.
- Solicit and achieve more buy-in from departments in active recruiting, providing appropriate incentives.

- Continue to expand the financial support for underrepresented students and concentrate undergraduate recruitment on PA-residents for whom providing a significant contribution to the cost of attendance is a more attainable proposition.

Assessment Measures:

The recent advances in data mining have provided information never before obtainable with which to track, analyze and evaluate the causes and effects of various programs and processes. Diligence should be exercised in exploiting these capabilities to their fullest extent in helping to understand, refine, expand or discard current practices and processes.

The College currently solicits feedback from students who decline scholarship offers on their college plans, most of whom identify other top-choice schools and/or larger scholarship and financial aid packages as their reasons for not enrolling at Penn State. The Office of Undergraduate Studies is also developing a survey to be administered early in new student's first semester to learn more about what attracted them to Penn State, which programs they attended, what contacts were influential, and what they would have liked that was not available or provided. More systematic exit interviews are also needed for students who leave the College as well as tracking of where they go.

Through its participation in ECSEL, the College of Engineering has developed a well-conceived algorithm for longitudinal tracking of undergraduate student retention. Several other Big Ten "Plus" institutions use essentially similar approaches, but the associate deans' group is currently discussing standardizing the system so consistent comparisons can be made across all the schools and best practices identified and shared.

To reach its strategic goal of being among the top three Big Ten universities in recruiting and graduating women and minority B.S., M.S., and Ph.D. candidates, the College should set aggressive, measurable and realistic enrollment objectives. Increasing the enrollment of women and minority undergraduates by 0.5% per year would result, over six years, in representations of 22.4% and 7.7%, respectively. This would mean recruiting an additional 28 women and incoming minority students the first year, or about 40 first-year students assuming a two-thirds retention rate. Similarly, a 0.5% per year increase in graduate enrollments would double the representation of minority advanced degree candidates to 6.0% over six years (or almost 15% of domestic grad student enrollments) and women enrollments would rise to 21%, each involving attracting 7 to 10 new students in the first year.

CHALLENGE 4

RECRUITING AND RETAINING A DIVERSE WORKFORCE

PROGRESS AND CURRENT STATUS

1. *How has your college actively engaged in locating and recruiting faculty and staff from underrepresented groups?*

   For faculty, the College uses professional networks that include professional societies and societies, peers at other institutions, and national advertising. National listservs and organizations that serve underrepresented groups in engineering are also available for this purpose but have not been widely used. Open searches and early identification of potential candidates are also successful methods. It should be noted that in engineering the numbers of Ph.D. women represent 15.8% and minority Ph.D. graduates represent 3.2% of the total number of Ph.D. graduates nationally, making recruitment in this area challenging. Further, since many of the new faculty lines are available through inter-college consortia established by the University, departments must structure proposed joint positions more narrowly and inflexibly in these research thrust areas, which in turn, statistically stacks the deck against the hiring of qualified women or minority candidates in those positions.

   Recruitment for staff positions is restricted by University policies and the requirement of initial internal advertisements.

   The College has attempted to provide accommodations for faculty and staff with disabilities. These include, for instance, access to technician time and other support for employees with motor or visual impairments.

2. *What recruitment strategies have been most successful?*

   Open searches and early and continuing cultivation of prospective faculty members have been the most successful in yielding new candidates.

   The Department of Mechanical and Nuclear Engineering, which has one of the highest percentages of women tenure track faculty compared to other mechanical engineering programs in the country, has instituted searches that are open, i.e., broadly defined positions that are constantly advertised. Since many positions are very narrowly defined, the actual number of underrepresented minorities or women who qualify is consequently very low and so the possibility of having them come into such a position is almost statistically not possible. An open search can have a dual impact for the department: 1) it allows the identification and courting of qualified minorities and women who may not fit into existing niches; and, 2) it allows the hiring of any highly qualified candidate who becomes available and may not fit into existing niches.

   The Departments of Aerospace Engineering, Architectural Engineering and Civil and Environmental Engineering have all been successful in increasing the numbers of tenure track women faculty members by identifying qualified prospective candidates either in graduate school or in other institutions and maintaining contact until they are ready to look for a position.

   A University strategy from which the College has benefited is the dual career hire which has allowed the College to aggressively recruit talented couples to tenure track faculty positions. The President's Opportunity fund has also been helpful in providing matching resources for hiring candidates from underrepresented groups when the funding of a full faculty line is not available.

At the staff level informal networking, posting staff positions to key listservs and distributing announcements among colleagues are employed at the higher staff grades. Use of University policies and procedures are followed at all levels.

3. *What retention strategies have you implemented in your college to retain members of underrepresented groups?*

For faculty, the College has a proven track record in bringing underrepresented faculty members to tenure. A major factor here is quality hires, followed-up by regular reviews, required and consistent feedback from department heads, and adequate start-up packages to assist in the establishment of a research program. The College also offers a New Faculty Workshop each year and a series of seminars on instructional and teaching issues throughout the year; both are available to all faculty members and incorporate diversity and gender issues. The Women in Engineering Program offers monthly Faculty/Graduate Networking seminar lunches designed to provide informal mentoring experiences for both entry-level faculty women and graduate students. These are well attended and popular. More than two hundred graduate and faculty women participated with a core of 40-50 women attending most sessions. Twenty-eight (out of 44) faculty women or 70 percent of the female faculty population participated and 53 percent of the female graduate population participated. The College full professor women also provide important leadership and encouragement for their younger counterparts and have offered, in conjunction with WEP, promotion workshops for associate level professors. The College also organizes periodic lunches for faculty women.

At the staff level, the College of Engineering implemented a pilot program for staff employees: Peer Review of Exceptional Performance (PREP). PREP is designed to recognize, reward, and retain exceptional staff employees within the College. PREP provides every staff employee the potential for two promotions within grade and is open to all standing or fixed-term staff employees at all grade levels within the exempt and non-exempt staff categories. Since the program was recently implemented, it is too early to tell if the program is successful in staff retention but further monitoring of the pilot program will continue in order to provide feedback to the University's Human Resource Office. If successful, it is conceivable the program can be implemented University-wide.

The College of Engineering also offers an Administrative Fellows Program to support the College's commitment to provide career development opportunities for engineering staff members. The program is intended to give staff first-hand experience in the management issues and decisions that are important to the future of the College and University. Fellows have the opportunity to broaden their perspective and experience in higher education administration. Although completion of an Engineering Administrative Fellowship does not guarantee promotion to a higher-level position within the College or the University, it is intended that persons who complete the program will have strengthened their ability to achieve their career goals. Since the program's implementation in 1991, 21 people have participated in the program of which 18 were women and 1 minority. Sixteen former fellows have been promoted to higher graded positions.

All faculty and staff are encouraged to participate in the numerous leadership and management programs offered by the Human Resource Development Center: The Penn State Leader, Mastering SuperVision, Penn State Leadership Academy, and Penn State Management Institute. Thirty-five faculty, staff and department/unit heads have completed these programs since 1998. The College is currently soliciting nominations from departments for the newly developed certificate program, Office Professional Excellence. The College also encourages faculty and staff to apply for the University Administrative Fellowships. Dr. Jean Pytel, Assistant Dean for Undergraduate Education, spent the 2000-2001 academic year as the University Administrative Fellow in the Provost's Office.

4. What retention strategies have been most successful?

The most effective strategy is to ensure that new faculty members, particularly women and minorities, are included in the life of the College, have good and constant supervision and advice, receive informal mentoring by senior faculty, and are provided opportunities to join research teams and funding opportunities. The WEP Grad/Faculty lunches and the College-organized lunches for faculty women do provide mentoring and networking opportunities. While the College initiated a teaching mentor program for new faculty members and responses from the new faculty were positive, this activity is no longer available. In fact, only the annual evaluations and the regular two-, four-, and six-year promotion and tenure reviews can be considered to be fully institutionalized.

SUMMARY AND TRENDS

SUMMARY CHART 4:
Faculty/Staff Recruitment and Retention

Action	Lead	Focus/Impact
Proactive use of professional networks, societies, peers, listservs	Departments	early identification of new Ph.D's and faculty candidates in industry
"Open" and "continuous" searches	Departments	broaden search process and diversity of potential candidate pool
Workshops for search committees	OHR	strategies for insuring a diverse candidate pool
Identification of best practices	Academic Council	sharing of successful strategies
Monitoring of performance indicators	College	tracking of progress in minority/women hiring
"Dual-career" hiring and President's Opportunity fund	College, Departments	eases hiring constraints
New Faculty Workshop	EIS, Leonhard Center	orientation and support for new faculty
Faculty/Grad Networking lunches	WEP, MEP	networking
Participation in HRDC Leadership/Management programs	College	development and retention of talented workforce
Peer Review of Exceptional Performance	College	recognizes and rewards performance, improving retention and reducing job transience

The number of women on the College of Engineering faculty continues to increase while the number of underrepresented minority faculty has plateaued at 11 faculty members (Table 7). Female faculty have continued to steadily increase since 1985 from 3 faculty women to 33 in 2001, or 11.6%. This is the highest percentage of female faculty among engineering colleges ranked among the Top 25 in the April 9, 2001, *U.S. News & World Report* (Table 8). The statistics on female faculty members are from a national survey initiated by the Engineering Deans Council. The average percent of female faculty in these institutions is 8.39% and the median percentage of female faculty is 8.51%. Penn State ranks seventh in the percentage of minority faculty. The average percentage of minority faculty is 3.49% and the median percentage is 3.34%.

It is noted that, in terms of the "availability analysis" of women and minority candidate pools (taken from the latest University Affirmative Action Plan), the COE has faired well. The percentages of women and minority tenure track and tenured faculty, as well as the non-tenure track faculty, are nearly equal to or exceed the national availability. Seven of the eleven departments exceed the minority availability figures and six of the eleven exceed the availability of women in the respective fields. However, the comparisons for minority availability include Asian Americans who are not usually in the aggregate numbers for underrepresented groups in engineering. The COE does not do nearly as well when Asian American faculty are not counted.

The small numbers of women and other underrepresented faculty is a national phenomenon and reflects the relatively low numbers of underrepresented populations entering and completing Ph.D. programs. Once they have received their doctorates, moreover, the competition with industry for these highly qualified individuals is quite fierce. The greater success in attracting women faculty is a result of a larger actual number of qualified candidates and a focused effort by department heads to identify and track candidates. Recruiting faculty of color to Penn State poses a different set of recruiting challenges: numbers of underrepresented minority candidates in engineering are very low nationwide (e.g., only 1.6% or 96 African Americans obtained a Ph.D. in engineering disciplines offered in the College of Engineering as reported in the ASEE Degrees Conferred, 2000) and it can be a hard sell attracting them to a majority white, rural area. While it may be more difficult to recruit faculty of color, it should not be a rationale for failing to set and achieve goals in this area.

TABLE 7:
College of Engineering Faculty at University Park
Includes all Tenured/Tenure-Track and Multi-Year Fixed Term Faculty

Year	Women		African American		Hispanic		Native American	Total Under-represented		TOTAL FACULTY AT UP
	Total	%	Total	%	Total	%		Total	%	
1985	3	1.6%	1	0.5%	1	0.50%	0	2	1.0%	193
1986	4	1.9%	1	0.5%	1	0.50%	0	2	0.9%	216
1987	5	2.3%	2	0.9%	2	0.90%	0	4	1.8%	220
1988	6	2.6%	2	0.9%	2	0.90%	0	4	1.7%	234
1989	9	3.6%	4	1.6%	4	1.60%	0	8	3.2%	248
1990	13	5.1%	4	1.6%	5	2.00%	0	9	3.5%	255
1991	16	6.2%	4	1.5%	7	2.70%	0	11	4.2%	260
1992	17	6.6%	4	1.6%	8	3.10%	0	12	4.7%	257
1993	18	7.0%	4	1.5%	7	2.70%	0	11	4.2%	259
1994	20	7.4%	5	1.9%	5	1.90%	0	10	3.7%	267
1995	21	7.8%	5	1.9%	6	2.20%	0	11	4.1%	268
1996	22	8.4%	3	1.2%	6	2.30%	0	9	3.4%	261
1997	23	8.6%	3	1.1%	6	2.30%	0	9	3.4%	267
1998	24	8.9%	4	1.5%	7	2.60%	0	11	4.1%	270
1999	28	10.1%	4	1.1%	7	2.50%	0	11	4.0%	277
2000	33	11.7%	3	1.1%	8	2.80%	0	11	3.9%	281
2001	33	11.6%	3	1.1%	8	2.80%	0	11	3.9%	284

TABLE 8:
Faculty Diversity in Top Ranked Engineering Schools

Top Ranked Universities	Total Faculty	% Female Faculty	% Minority Faculty	Number of Female/ Minority Chairs/Prof.	Number of Female/ Minority Dean/Dept. Heads
MIT	341	9.4%	3.5%		
Stanford	208	8.2%	5.3%		
Berkeley	215	7.0%	3.7%	4	1
Michigan	268	11.2%	4.5%		
Georgia Tech	392	10.7%	4.6%	8	1
Illinois	389	6.4%	3.3%	1	1
CIT	287	10.5%	1.1%		
Carnegie Mellon	122	9.0%	3.3%	1	2
Cornell	167	9.0%	3.0%		
Texas – Austin	236	8.5%	6.8%	5	1
Texas A & M	284	6.3%	5.6%	4	1
USC	148	2.0%	2.0%		
Purdue	274	7.7%	2.6%		1
Penn State	**281**	**11.7%**	**3.9%**		**1**
Wisconsin	175	8.6%	5.7%		
Northwestern	153	10.5%	2.6%	1	1
Minnesota	188	8.5%	2.1%		
UCLA	136	6.6%	.7%		
Ohio State	247	7.7%	2.0%		2

Table 9 shows that in addition to increasing the numbers of entry-level women faculty, the representation of women in the higher ranks is also increasing. The College has been very successful in tenuring and promoting women faculty as they become eligible for advancement.

TABLE 9:

College of Engineering Faculty at University Park
By Rank

1997 Faculty By Rank	Total Faculty at UP					African American		Hispanic		Native American	
	T#	F#	M#	F%	M%	#	%	#	%	#	%
Assistant Professor	47	9	3	19.1%	6.4%	0	0.0%	3	6.4%		
Associate Professor	75	11	4	14.7%	5.3%	2	2.7%	2	2.7%		
Full Professor	145	4	2	2.8%	1.4%	1	0.7%	1	0.7%		
Total All Faculty	267	24	9	9.0%	3.4%	3	1.1%	6	2.2%		

2001 Faculty By Rank	Total Faculty at UP					African American		Hispanic		Native American	
	T#	F#	M#	F%	M%	#	%	#	%	#	%
Assistant Professor	46	13	0	28.3%	0.0%	0	0.0%	0	0.0%		
Associate Professor	86	14	2	16.3%	2.3%	1	1.2%	4	4.7%		
Full Professor	152	6	6	3.9%	3.9%	2	1.3%	4	2.6%		
Total All Faculty	284	33	8	11.6%	2.8%	3	1.1%	8	2.8%		

T = Total ***F = Female*** ***M = Minority***

At the staff level, men are underrepresented at 37.6 percent overall. However, if you look at grade levels, women are underrepresented at the higher grades and are more underrepresented as the grades get higher with 49.2 percent at Grades 20-22; 10.3 percent at Grades 23-26; and 0 percent at Grades 27-28. Minorities are severely underrepresented in College staff positions and, in fact, are represented only in Grades 20-22 at 4.6 percent. For Tech Service the numbers are worse: only 6.4 percent are women and none are minority. These correspond to the availability data for comparable EEO-6 categories (i.e., 77% for women in secretarial/clerical tracks, dropping to 14% for women in professional non-faculty roles). Minority availability in the EEO-6 categories 04-07 (clerical, technical, service) vary from 1% to 11%, all higher than their actual representation in comparable positions in the COE.

TABLE 10:
COLLEGE OF ENGINEERING STAFF STANDING AND FIXED-TERM

Staff Exempt and Non-Exempt		**Female**		**Male**		**Minority***	
Grade Levels:	Total	Number	%	Number	%	Number	%
Grades 14-16	90	85	94.4%	5	5.6%	0	0
Grades 17-19	77	50	64.9%	27	35.1%	0	0
Grades 20-22	65	32	49.2%	33	50.8%	3	4.6%
Grades 23-26	39	4	10.3%	35	89.7%	0	0
Grades 27-28	3	0	0.0%	3	100.0%	0	0
Total Staff	**274**	**171**	**62.4%**	**103**	**37.6%**	**3**	**1.1%**
Tech Service	**47**	**3**	**6.4%**	**44**	**93.6%**	**0**	**0**

**Minority includes: Asian American, African American, Hispanic, and American Indian*

PROPOSED ACTIONS AND RECOMMENDATIONS

To improve the outcome of faculty and other searches, conventional or traditional practices may need to be unlearned and others sharpened. University resources and procedural guides are useful but practices tuned to the recruiting environment in engineering are crucial to success.

Once a talented and diverse personnel makeup is achieved, we can't afford to lose it. Appropriate advancement opportunities must follow development activities so that talent is not underutilized, actively courted and vulnerable to being attracted away by others.

The pool for recruiting staff should be both internal and external so that populations from areas like Harrisburg, Lock Haven, Williamsport, Pittsburgh and Philadelphia can be tapped.

Recommended Actions:

Improvement of Search Committee Procedures

- The College should require some level of training for all search committees on the topic of diversity as outlined in University policy. As part of the training, a guidebook should be written that can be distributed to all search chairs and committee members and posted on the college website that includes outlets for advertising to reach underrepresented or nontraditional populations, objectives of the college diversity plan, and effective methods for running a search. The guidebook should be regularly updated with "best practices" and new resources available to search committees.

- A training team should be set up that includes volunteers from the faculty and appropriate administrators. Members of this team can then be trained and meet with search committees throughout the college. The participation of faculty as peers will help to institutionalize diversity values.

- Qualified minority and women candidates, especially new Ph.D.'s and those in industry, should be proactively identified, recruited and hired. The fact that there are low actual numbers of viable candidates should not diminish the effort. Penn State and the College of Engineering have much to offer and these attributes should be identified and melded into a "marketing strategy" that casts the community and opportunities here in their best light.

- Open searches should be encouraged and advertisements for faculty positions should be as broad as possible to increase the potential pool of applicants. In addition, advertisements and the on-site interviews should be expanded to provide information about the Penn State location (low cost of living, low crime rate, quality public schools, wide variety of outdoor recreational activities, active religious communities, etc.). The ads should also provide information on the assistance available for spousal employment support. During interviews, the tendency to be unintentionally critical or apologetic regarding the community (i.e., as isolated or lacking cultural outlets) needs to be avoided, even in jest, recognizing that many of us have, in fact, found the community and region to be a very pleasant place to live and work.

Retention:

- The College should provide career development workshops for faculty members (on promotion, management, leadership, and other ingredients for advancement) and take steps to ensure that underrepresented faculty members are not requested to serve on a disproportionate number of committees. (Current practices of directing requests to participate on committees through the department heads help prevent over-commitment of women faculty should be reinforced.)

- All staff should be permitted and encouraged to participate in professional development activities. To achieve this, the Dean would have to require that all faculty members and administrators make it possible for their staff to participate in some minimal number of these activities per year.

- A College orientation manual could be developed to acclimate new faculty and staff to the College's resources available and to reaffirm the College's diversity vision and mission.

Staff Recruiting

- Expand locus of recruiting to include urban areas and to cast opportunities and the local environment in their best light; advertisements should sell Happy Valley as a great and affordable place to live.
- Provide reimbursements for moving expenses for underrepresented candidates who will have to relocate.
- Offer orientation sessions for all new staff members.
- Develop packets of information for minority candidates for all positions that detail availability of goods, services and social institutions available in the area.

Assessment Measures:

Goals should be set by the individual departments to guide their recruiting efforts and with which to assess progress in the context of their respective fields. Careful record-keeping on how candidates for successful hires were identified and the make-up of faculty candidate pools will help to inform improved practices and demonstrate whether approaches such as "open" searches result in high probabilities for minority and women hires. Similarly, monitoring the retention and advancement of the staff in departments and the College of Engineering will be essential to measuring the impact of new programs, such as the PREP initiative.

CHALLENGE 5

DEVELOPING A CURRICULUM THAT SUPPORTS THE GOALS OF OUR NEW GENERAL EDUCATION PLAN

PROGRESS AND CURRENT STATUS

1. *What initiatives has your college taken in supporting multicultural curriculum efforts?*

   Although the College is not a major player in delivering the General Education curriculum, courses are offered through the Science, Technology and Society program that have been approved as meeting the Intercultural and International Competence requirement. These include a course sequence on women in science and engineering and treatments of a variety of global issues, such as the food supply and conflict resolution, from technology and policy perspectives.

   The First-Year Seminar program has offered fruitful territory for addressing the different learning styles, needs and characteristics of new students entering the College. From *Success 101*, a "survival course" developed by the MEP, to the *Toy FUNdamentals* class, developed by the WEP and featuring an introduction to hands-on design of children's toys, the seminar offerings acquaint students with various skills and practices that will be crucial to their success as engineering students.

   Other curricular developments have included "cluster" courses in first-year engineering design, math and physics and a math "orientation" course that meets the General Education speech communications requirement by engaging students in explaining and interpreting mathematical concepts in layperson terminology. A common element of these courses is the control exercised in the registration process, such that the enrollment can be balanced or students clustered together to combat the sense of isolation felt by women or students of color. Facilitated study groups are organized with upper-division students as the "facilitators" to support these efforts.

2. *What research and teaching in your college has advanced the University's diversity agenda?*

   The COE offers substantial opportunity to students to work one-on-one with faculty as research interns or on other independent or group projects. Financial support for wages and supplies is provided annually for students participating in the *Women in Science and Engineering Research* program organized by the Space Grant College, and the WEP and MEP sponsor undergraduate research placements under the GE-funded *Faculty of the Future* program and Center for Undergraduate Research Opportunities (CURO), which also attracts students from other institutions during the summer.

3. *How is diversity integrated into the curriculum of your college?*

   Earlier discussions have highlighted some of the efforts to integrate diversity into the curriculum through First-Year Seminars and other mechanisms. In conjunction with the World-Class Engineer initiatives, the Dean has appointed a task group on Global, Societal, Ethical and Professional Aspects of Engineering to recommend and implement programs that will broaden students' understanding of these elements in their education, careers and professional lives. Ways to integrate these topics into the engineering curriculum, improve the perceived coherence and interrelationship of the general education and technical components of the curriculum and development of attractive co-curricular offerings – such as an invited

speaker series – are under consideration by the task group. A good example of curricular integration is the Alliance for Design project, wherein students in ED&G 100 work with teams in a partner French institution on collaborative design projects. The team with the most successful design solution travels to France for an escorted industry tour and their French counterparts are invited to visit the United States.

SUMMARY AND TRENDS

SUMMARY CHART 5:
Curriculum Development

Action	Lead	Focus/Impact
First-Year Seminars featuring gender-balanced and/or clustered enrollments	MEP, WEP, Departments	introduce key survival skills, hands-on/design activities, computer software, machining, welding and carpentry skills needed in project courses
Cluster courses in math, physics, engineering design	MEP, WEP	community-building; facilitated study groups in core/foundation classes
Math orientation/engineering communications course	WEP	translation/communication of math principles and modeling in applied engineering terms
Undergraduate research	MEP, WEP, Space Grant College	interaction with faculty; introduction to active research and facilities
EPICS	EE, Learning Factory	involvement of students in community-oriented design projects
Intercultural and international course offerings	STS	opportunities for students to explore cultural diversity and global issues
Alliance for Design	ED&G (Alcoa sponsorship)	collaborative, international design teams share differing perspectives and approaches via internet conferencing

Direct exposure to diversity issues in the curriculum occurs for engineering students mainly through the General Education courses delivered, in large part, by other colleges. In those forums that serve as the "think tank" for curricular innovation and change, such as the Faculty Advisory Board for the Leonhard Center, it is acknowledged that diversity and workforce/workplace education needs to be incorporated throughout the curriculum so that students see the connection to their technical studies and career pursuits. This is more easily said than done. Investigation of the Internet sites and correspondence with counterparts in the Big Ten "Plus" schools failed to turn up new or unique approaches taken by other institutions. Penn State is generally recognized as a leader in curricular assessment and reform and is arguably as far along the learning curve as any of its peers in promoting diversity awareness.

The current and pilot offerings developed by the MEP and WEP have gained national attention for their creativity, thoughtful pedagogy (designed with the help of collaborators trained in education) and expansive reach. Good approaches need to be devised or imported, however, to facilitate integration of diversity into the curriculum for all students. An illustration of how this can be accomplished is the new Engineering Projects in Community Service (EPICS) program. EPICS is a partnership, organized through Electrical Engineering with local community organizations, to engage engineering students in design activities that addresses needs of the particular agencies. Coordinated with the multi-disciplinary senior design program in the College of Engineering's Learning Factory, student teams have worked this fall on seven different projects sponsored by Easter Seals, Strawberry Fields, the Special Olympics, and the Beacon Camp. The engineering problems included a mobility support device for children with physical limitations, a portable lift to aid the access and egress from swimming pools, and software for interactive, computer-based training for agency employees.

To obtain creative ideas and models for adaptation to the curriculum, the Task Force met with external advisory board members familiar with current practices in industry. The consensus gleaned from this dialogue is that diversity—as a core value—has to be everyone's business and that support of diversity represents an enrichment of the professional experience and of a work-life balance for all populations.

PROPOSED ACTIONS AND RECOMMENDATIONS

A variety of good ideas emerged from the Advisory Board sessions. A compelling vehicle for discussion of diversity is to emphasize the role it plays in the employee evaluation processes graduates will ultimately encounter in the workplace. Industry representatives note that annual evaluations, especially for supervisors, typically place significant weight on the unit's performance in regard to the company's diversity initiatives and supervisors accountable for these efforts. Translating this practice to the classroom can take the form of establishing similar goals and performance standards for design teams and their projects. Most majors, for instance, include a pre-capstone design project course or seminar in the junior year to prepare students for senior design activities. Involving the class in agreeing upon core values and design criteria informed by cultural, socioeconomic or other differences of potential clients or customers, as well as global codes and standards is a exercise that would meet with less resistance than in more conventional, content-rich, technical courses. Familiarization of students with appropriate modes for providing constructive feedback is also important to their professional development. The administration of teaching evaluations (SRTE's) in virtually every class represent an ideal opportunity to discuss how students' comments regarding the quality of a course or the teaching can be expressed in a formative way, as opposed to alluding inappropriately (and hurtfully) to instructor characteristics such as gender, national origin, physical appearance, or manner of speaking.

The Task Force members recognize that curricular approaches such as those that follow do not conform to the educational experiences of current faculty, nor are faculty likely to be adept at, or comfortable with the prospect of adopting them. A significant challenge, nevertheless, requires thinking and solutions that may be "outside-the-box."

Recommended Actions:

- Encourage integration of diversity issues, especially as they relate to professional practice and career development, into the engineering curriculum at every opportunity, from the First-Year Seminars and design experiences, to pre-co-op workshops, through the junior-level pre-capstone and senior design courses.

- Be cognizant of differences in learning styles, skill and confidence levels and certainty of the major choice (or even the decision to study engineering) held by different groups of students when devising or explaining class activities and assignments. This should include provisions to ensure that students with disabilities have the same opportunity for learning as students without disabilities, especially as the learning formats become more active.

- Insure that the advising system is proficient in helping students make course selections and utilize electives that will promote curricular coherency in their general education and major courses.

- Take advantage of opportunities to engage students actively in defining and agreeing on shared core values that will guide and enhance subsequent team-project and design efforts; establish an award program for senior projects that exhibit consideration of and sensitivity to cultural differences, preferred at the end-of-semester *Design Showcase* organized by The Learning Factory.

- Invite industrial representatives into the classroom and take advantage of the perspectives gained by co-op students in communicating the corporate processes for instilling commitment to and rewarding diversity.

- Offer faculty and TA workshops on the incorporation of non-intimidating approaches, such as role-playing, into the classroom experience to illustrate circumstances or dilemmas that call for policies and standards regarding ethics, diversity, flexible work arrangements and sexual harassment.

Assessment Measures:

Efforts have already been initiated in conjunction with preparation for the accreditation review next fall to assess how engineering undergraduates are meeting the Intercultural and International Competence requirement of General Education, as well as requirements in the humanities, social and behavioral sciences. These and other exposure students receive to diversity, professional, workplace and workforce issues through First-Year Seminars, design experiences and their studies in the majors should be measured and assessed. The recently developed web-based senior exit survey and the long-standing surveys of alumni provide excellent instruments for tracking progress. In the Spring 2001 pool of graduating seniors, for instance, the 410 respondents rated their preparation in "societal aspects" at an average of 3.5 on a five-point scale, as compared to the average rating of 2.5 assigned by the 369 respondents to the most recent alumni survey of graduates in the 1997 and 1998 class years.

CHALLENGE 6

DIVERSIFYING UNIVERSITY LEADERSHIP AND MANAGEMENT

PROGRESS AND CURRENT STATUS

1. *How has your college assisted faculty and staff from underrepresented groups in developing leadership and management skills?*

   The College has encouraged faculty and staff members to acquire leadership skills through participation in various professional development programs offered at the College and University levels. Although faculty are cautioned against too much volunteer service early in their careers, they will generally be advanced for faculty governance or administrative committee roles as time and due prudence permit. These activities are important to expanding the locus of experience from department to College and University levels, and thus, to be seen as viable candidates for academic leadership director positions.

   This year, the Academic Council, an expanded group composed of the Executive Committee and directors of key programs (such as the MEP, WEP, Student Services, and Graduate Studies) was created "to advance the College's efforts in continuing to build a strong and supportive academic climate for a diverse group of students, staff and faculty."

   At the staff level, the College offers the Engineering Administrative Fellows Program, initiated in 1991. The program's goal remains to provide staff members with an opportunity to serve fellowships with higher-level staff members in different areas of the College. Since the program's inception, 21 people have participated in the program of which 18 were women and 1 minority. Sixteen former fellows have been promoted to higher graded positions.

SUMMARY AND TRENDS

SUMMARY CHART 6:
Diversifying Leadership

Action	Lead	Focus/Impact
Participation in College/University leadership programs	College, Departments	development of leadership potential at all faculty and staff levels
Creation of Academic Council	Dean	expansion of Executive Committee to include directors of key academic support programs
Administrative Fellows Program	College	familiarization with different areas of the college according to participants' interests

The College has enjoyed moderate to good success in developing talent from within, allowing the promotion of staff into increasing responsible roles in the College. Not so successful have been attempts to hire or effect the advancement of faculty into department head or other key academic leadership positions. This is an area that has been explored in conjunction with industry advisory groups for practices that can be imported from the non-academic sector. Good suggestions include the establishment of a developmental program on "Managing your own career," and providing evaluation and feedback more regularly and frequently during the first year. Further, it is important to provide information about informal processes—such as how leadership potential is identified—to make these processes explicit rather than implicit.

PROPOSED ACTIONS AND RECOMMENDATIONS

The recommendations for diversifying leadership in the College naturally revolve around **continuously developing** people towards leadership and exploiting available opportunities to make **immediate changes** that will add diverse perspectives in key decision-making.

Recommended Actions:

Developing the leaders

- The ways in which to develop broader knowledge of college and university infrastructures and functions should be outlined and encouraged among faculty interested in leadership roles. Approaches to balancing these developmental activities with successful advancement through the faculty ranks need to be articulated.

- Faculty aspirations towards leadership and upper administration roles should be clear of impediments and disincentives.

Diversifying the perspective

- Expanding the Executive Committee to include several additional appointees can diversify the leadership of this college and provide valuable experience and insights for College deliberation and decision-making that are not currently available to the Committee. These appointments can be rotating so that the committee does not become too large. Potential members for the expanded Committee could include heads of administrative units other than departments, such as institutes, research centers or distinguished or chaired professors.

  These appointments would not only serve as a way to introduce diversity into the committee, but would also provide retention and career development opportunities for other faculty. The creation of the Academic Council is a step in the right direction but stops short of inclusion in College decision-making.

- When searching for department heads or attempting to fill other leadership positions, invite applicants to submit a document that discusses their diversity and professional leadership philosophy.

Assessment Measures:

Comparison and benchmarking should be initiated with peer institutions on ways to recognize and develop leaders from within and to identify potential talent for leaders who could be recruited from outside. Department heads should review annual self-reports of activities for evidence that developmental opportunities have been made available and accessed. Participation should be tracked for the purpose of insuring that opportunities for professional development and advancement are available and uniformly encouraged in all units.

CHALLENGE 7

COORDINATING ORGANIZATIONAL CHANGE TO SUPPORT OUR DIVERSITY GOALS

PROGRESS AND CURRENT STATUS

1. *What organizational realignments, systems of accountability, resource mobilization and allocation strategies, long-term planning strategies, etc. have your college implemented to ensure the realization of the University's diversity goals?*

The College has made substantial investments and devoted broad-based attention and resources to further its diversity initiatives. Since the early 1980's, the College has recognized the need for special programming and dedicated personnel to take the lead in addressing the under-representation of women and minorities in the engineering field. These efforts have been expanded in the 1990's in concert with greater involvement and collaboration on the part of the academic departments.

In their earlier days, the MEP and WEP concentrated primarily on offering summer and other pre-college programs and providing academic support for current students. Aided by external funding from ECSEL and the aggressive, carefully crafted strategies of the MEP and WEP directors, the programs have been expanded to ensure outreach to—and contribution from—the departments, faculty and staff in the areas of recruiting, curricular reform, community-building, and mentoring activities with currently enrolled students.

The impact of the financial investment in these areas has been significant, spurring increased attention to development opportunities and corporate partnership and successful acquisition of grants and contracts for general or directed programming. The College Relations Office, Office for Undergraduate Studies and new Office for Student Services (comprised of the WEP, MEP, Advising Center, and Cooperative Education Program), have developed into a successful, collaborative team, cooperating on proposals for external support. These funds support both our programs and provide approximately $150,000 for undergraduate scholarships and graduate fellowships for women and minority students. The remaining two-thirds go towards recruitment and academic support/networking development and delivery, faculty workshops and other diversity initiatives. Grants have been attracted from corporations, foundations and agencies, mostly on a competitive basis. Key sponsors include the GE Fund, Corning, the National Science Foundation, Alcoa, GEM, W.E.P.A.N., Texaco, Fluor, Dow Chemical, Hemler/Burns/Roe Enterprises, DuPont, Eastman Kodak, GM, GTE, Lockheed-Martin, Mobil, NACME, Armstrong, and others. The external support has permitted new program development as well as the institutionalization of programs initiated with seed funding from University sources, such as the EOPC, Center for Learning and Teaching, Office of Undergraduate Education, Summer Sessions, and others. The active roles played by the Leonhard Center, Engineering Instructional Services and involvement of graduate assistants and other personnel from the Colleges of Education and Science, have been instrumental in developing sound pedagogical foundations and formative assessment methodologies with which to create, evaluate and improve the programs.

SUMMARY CHART 7:
Coordinating Organizational Change

Action	Lead	Focus/Impact
Increased staff support for the WEP, MEP, diversity programming	College	enhanced ability to design, fund and implement new programs and to provide ongoing administrative support
Office of Student Services	College	co-location of the WEP, MEP, Co-op Education, and Advising Center to enhance collaboration and provide one-stop student support *(A recent expansion provided additional office space for grad and part-time assistance and a resource center for students.)*
Student Activities Center	College	office suite, kitchen and student conference room for 8 student organizations including SWE, NSBE and SHPE, to promote collaboration and College community *(located on first floor of Hammond for easy student access)*
Academic Assistance Center; Kunkle Activities Center	MEP, Advising Center	planned and completed renovations, respectively; equipment upgrades and expanded hours for study, team meetings, tutoring, and other academic activities
Center for Engineering Design and Entrepreneurship	College, ED&G, The Learning Factory	new facilities for first-year student design, seminars and extra-curricular projects

The original College support for the MEP and WEP included directors for each program and a shared staff assistant. As the activity and reach of the programs has increased, so has the need for additional staff. An additional staff assistant position was filled in 1997, a shared program coordinator position was created in 1999 initially with assistance from the President's Opportunity Fund, and this role was recently expanded to full-time associate director/program coordinator positions for both programs beginning this academic year. The new positions have been made possible largely as a result of the leverage associated with external funding for specific programs and unrestricted gifts.

Contributions from College resources and capital improvement fund allocations (including its general and State Equipment grant and tuition surcharge distributions) have significantly enhanced the physical facilities available for academic and support services. These include the creation and later expansion of the Office for Student Services, the development of the year-old Student Activities Center, recent renovation of

and associated expanded access to the Kunkle Activities Center, and a renovation of the MEP Academic Assistance Center slated for this year. All of these improvements were designed around the theme of providing a more welcoming, community-oriented and collaborative environment for academic support services and personnel and for student teams and organizations. Just opened this year was a major expansion of the facilities available for holding hands-on first-year seminars, conducting student-centered and led design projects and competitions, accommodating team-based learning activities, and facilitating walk-in access to learning technology. The commitment of State grant and tuition surcharge funds to the Center for Engineering Design and Entrepreneurship has significantly improved the access available for summer programs, student organizations, workshops and other activities/groups to appropriate spaces and instrumentation. The Center includes flexible meeting/class rooms, wireless instructional technology and computer labs, a computer design studio, a model shop with fabrication/assembly equipment, and a testing/analysis laboratory. It has already served to showcase the College's emphasis on active, professionally-focused, learn-by-doing curricular experiences during recruiting events this fall.

PROPOSED ACTIONS AND RECOMMENDATIONS

Although the College and its Minority and Women in Engineering Programs have been successful in increasing their efforts in diversity through external leveraging, the increased staff support devoted to these initiatives continues to be funded on a fixed-term ("soft" or temporary) basis. This means that available funds must primarily support program delivery and administration, and constrains the level of effort that can be applied to existing program assessment, research on emerging strategies and new proposal/program development.

Recommended Actions:

- Continue to seek avenues to convert existing fixed-term support position to a permanently funded position;
- Work with the College development staff to identify Academic Excellence endowment resources to institutionalize programs currently reliant on annual income sources, grants and gifts;
- Continue to expand departmental and faculty involvement and participation through appropriate incentive and recognition mechanisms.

Assessment Measures:

Continue to build clear assessment plans and procedures into proposed programs and to define measurable indicators that can be used to evaluate the effectiveness (or need to sunset) existing or future programs. Work with the College of Education and other partners to provide research opportunities for graduate students that will be of mutual benefit to them and to the College of Engineering in terms of experimentation with new, creative pedagogy and formative assessment methodologies.

APPENDIX A

TASK FORCE MEMBERSHIP:

Richard Benson, Head, Department of Mechanical and Nuclear Engineering

Kim Barron, Undergraduate Student, Department of Industrial and Manufacturing Engineering

Barbara Bogue, Director, Women in Engineering Program

Karen Brooks, Program Manager, Acoustics Program

Lynn Carpenter, Associate Professor, Department of Electrical Engineering

Kristin Fichthorn, Professor, Department of Chemical Engineering

Alan Finnecy, Manager, Human Resources, College of Engineering

Amy Freeman, Director, Minority Engineering Program

Kenya Goins, Grad Student, Department of Civil and Environmental Engineering

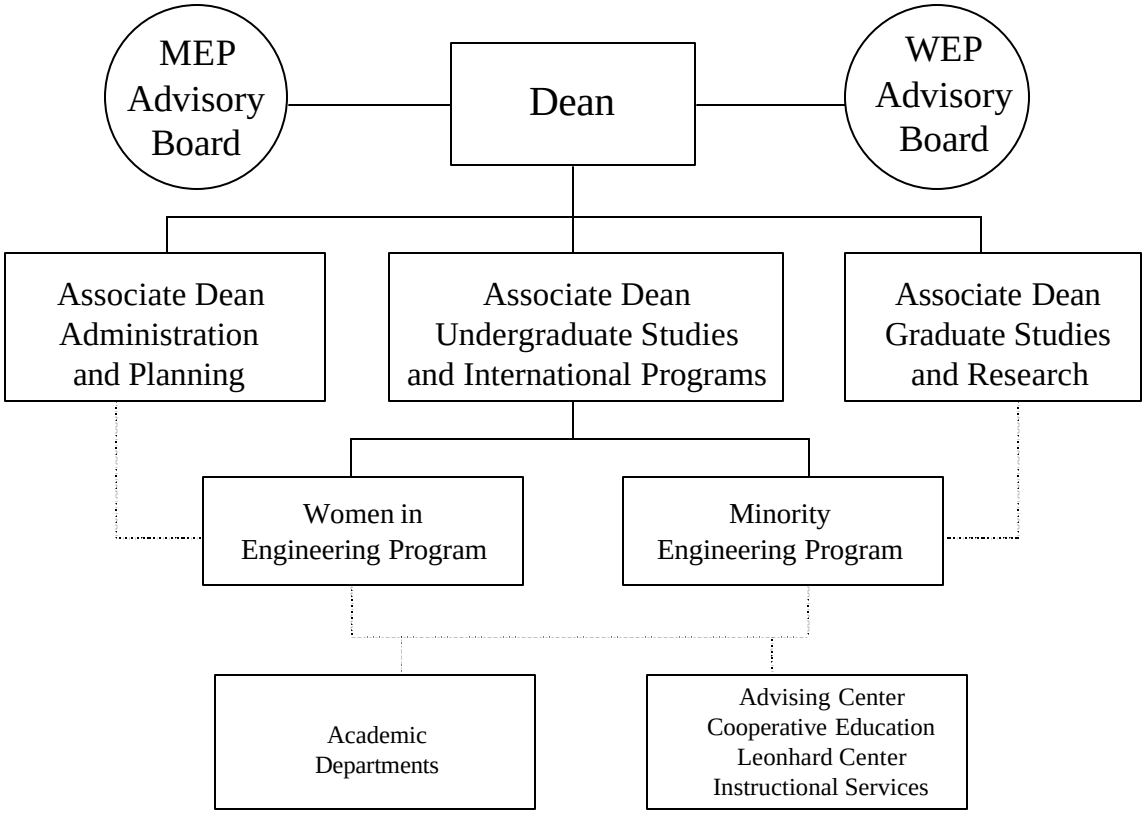
Peggy Johnson, Associate Professor, Civil and Environmental Engineering

Robert Pangborn (Chair), Associate Dean for Undergraduate Studies

Kim Ripka, Administrative Assistant, Department of Mechanical and Nuclear Engineering

Jose Ventura, Professor, Department of Industrial and Manufacturing Engineering

APPENDIX B



STAFF POSITIONS IN EACH OF THE MEP AND WEP PROGRAMS:

Director

Associate Director/Program Coordinator
(shared position created in 1999; expanded to full-time positions for each program in 2002)

Staff Assistant/Office Coordinator
(shared position created in 1994; expanded to full-time positions for each program in 1997)

Graduate Assistants

Undergraduate Assistants/Work Study students/Tutors/Facilitators