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Dear Department Heads:

I. INTRODUCTION

To be successful in their chosen career, engineering students must master not only the technical information presented to them, but also things that do not necessarily come from books: things like networking, assertiveness, pride in one's work, professionalism, ethics, communication skills, and goal-setting. Some students can make the grade; others can not. Statistics show that a greater relative percentage of minority students, approximately 55% at this University, find that they can not compete in engineering, as compared to the 25% of non-minorities who do not graduate from this College. What causes this substantial difference? During the past semester, I conducted research into the role played by the classroom environment in this issue. Surveys were sent out to three different groups of people. This first group consisted of all engineering student society presidents. Eleven out of approximately 55 were returned. The second group that received surveys included all Department Heads in the College of Engineering and those faculty that were named to the Dean's Student Advisory Committee (DSAC) Outstanding Academic Advisor Lists for 1989 and 1990. Of about 50 that were sent out, 20 were returned to me. The last group surveyed was the minority student alumni. 504 letters were sent out and about 50 were returned. In addition, discussions were held on various occasions. One was at the February Engineering Council President's Lunch. Another was with Dean W. R. Schowalter and present were members of DSAC and Engineering Council executive board. The last discussion was also held with Dean Schowalter at which members of the minority engineering societies were able to voice their opinions.

Due to lack of time, a number of other groups were not surveyed. Further research will need to be conducted and should include a random sampling of all recent alumni from the College, a greater number of students, minority and otherwise, currently enrolled in the University as a whole, teaching assistants and a more diverse group of faculty members. Research should also be done as to whether prejudice on the part of the student against a minority or foreign faculty member results in a lower student performance.

II. CONCLUSIONS

From the questionnaires that were returned, the general conclusion that can be made is that there is a problem, but everyone is unsure of the solution and also, unsure of how much the College of Engineering should do to remedy this situation. The University of Illinois represents a cross-section of American society in which racism exists. Steps can be taken to minimize the effects of racism on the education that one receives from the University of Illinois, but until society is altered, these effects will not be eliminated.

A. Students

Minority student currently enrolled in the College of Engineering reported feeling isolated from other students. One female reported that in a lab section, she was the last student to be picked as a lab partner, making her feel out-of-place. Gender and racial discrimination do occur with regular frequency. Two black students walked into a examination together and sat in close proximity of each other. Upon return of the exam papers, one student noticed that the other student's name had been printed in the corner. When questioned about this, the instructor had stated that he was just making sure that they were not cheating. He obviously had not done this for the remainder of the students. A number of times comments like "Why don't you switch into another major?" had been directed at minority students and females. Some females said that in general that they feel the attitude that it is "unfeminine" to be an engineer. These students also said that they were singled out in classroom situation in ways such as being asked more questions and remarks concerning their attendance while no one else's attendance was being questioned. Instances of flirtation, primarily by teaching assistants, were also noted. Above all, minority students and females want to be placed on an equal footing with the other students. Presently, one of two extremes is encountered. Few faculty seem to relate easily to minorities and females; the reverse is also true. Either the student is given preferential treatment which serves to increase hostility between students or the student encounters condensing attitudes and discrimination which increases hostility between the student and instructor. Lack of communication and preconceived ideas by both groups of students, non-minority and minority, produces the same result, hostility and resentment. No matter what the cause, the end result is that minority students feel out-of-place in the classroom and this may negatively affect their academic performance.

Other voiced student body concerns were that the College as a whole uses "scare tactics." Some are encountered during orientations; others by instructors trying to entice the students

to do better. Class sizes are much too large to be effective. Lastly, academic advisors are not being used as they should for a number of reasons. First, advisors, in general, show a lack of interest in the student and in advising. Second, advisors are usually unavailable to students. Third, a number of advisors do not keep current with classes, requirements, and procedures to be of much use to the student.

B. Faculty Members

Faculty members commented on their observations from years of experience and a quite different perspective. A number felt that it is impossible to draw conclusions as they have had few minority and female students in their classroom. Their view of the matter is that they are providing a constant academic environment, but that student attitudes and backgrounds vary and that this variation is reflected in performance. In general, minority students have insufficient backgrounds to compete in the curriculum. The "U.S. government had conditioned minorities to expect special treatment" in spite of their backgrounds. Some feel that there is "excessive coddling of minorities," "discrimination in favor of the minority student," and overall lower College standard for minorities. This conflicts with the students' desires. In the classroom, there is less participation of minority students. This may be explained by their feelings of isolation, however. Acknowledged by faculty is the lack of role models, peer groups, and support groups for minorities as compared to others. All of this contributed to the conclusion that minority students, in general, have a lower level of performance.

It was noted that on the average, a female student will do better than most in a given classroom situation. In addition, looking at the number of females involved in student societies, one would guess that the ratio of men to women is 1:1, instead of women comprising only 15% of the engineering student body. Faculty members did report that they sometimes feel confused as to how they should treat a female student, as a professional engineer or like a lady.

This confusion may be attributed to faculty members having higher ethical and moral standards than the students they encounter daily. They also are concerned about the fact that the student body "lack the knowledge and ability to go about learning in a mature fashion." Students lack actual work experience. Faculty feel that academic advising in the College is poor. More money is necessary to one, make classes smaller and provide necessary teaching aids and laboratory equipment and two, eliminate some of the many hours that students need to work, time that would be better used studying. The last concern of faculty members is centered around the current tenure system. A majority felt that this limits the formation of student-faculty relations,

that "education and student-faculty relations take a backseat to research." One comment overhead by a faculty member a number of times reflects this attitude, "teaching would be OK if it weren't for the students."

C. Alumni

For the most part, minority student alumni felt as do current students, isolated and lacking in confidence while they were here. They reported a greater number of racial/gender discrimination incidents. Comments such as "You people" were prevalent. They were expected to conform to stereotypes, i.e. blacks are poor thinkers; minorities are gang members; and Hispanic women are promiscuous. A majority mentioned that students need to be better prepared for college and that this preparation should begin, at the latest, in high school. The preparation should include basics in math, physics, and chemistry. A lack of role models did somewhat discourage students. Numerous responses mentioned a "cultural shock," that this University is geared toward white middle-class suburbia, a group to which few minorities belong. One of their largest obstacles was unfamiliarity with opportunities and resources available here at the University and overall unfamiliarity with what being an engineer meant.

III. SOLUTIONS

As they say, "education is the key." A better general education for all incoming students is necessary to put everyone on equal ground. Education of the public, both students and faculty, in cultural diversity would help to eliminate some prejudice that exists. Education of the faculty so that they can minimize feelings of isolation through advising as well as in the classroom. Students need to be educated in the opportunities and resources available at the University of Illinois. Education would yield a better College of Engineering.

Many more solutions were offered than are described below in the following paragraphs. However, due to the complexity of the issue and the fact that the conclusions drawn are from personal experiences, it would be useless to describe them all. Listed below are some of the more viable options that were suggested by a number of people within the sampling group.

A. Students

Students feel that part of the solution lies in mentor programs and expanded tutoring programs. The Minority Engineering Program does currently have limited programs in these areas. Cultural awareness will provide a better basis that may

lead to greater understanding and thus, pride and a measure of assertiveness. Interaction of societies would increase networking and communication skills. Lastly, the use of college students in high school recruitment may attract a more diverse group of students.

B. Faculty Members

Faculty offered solutions covering a wide spectrum. They agreed with the students to use mentors, outstanding seniors and graduates, as role-models. These people will need to be compensated for their efforts, however. They would like to see an alumni booklet, a booklet listing the accomplishments of minority alumni, that would give the students an opportunity to see what they can accomplish. They believe that students, on an individual basis, should be allowed to be enrolled in less than 12 hours per semester, depending upon previous performance and the classes being taken. This would improve retention of knowledge and improve student grade point averages. Require repetition of courses in which students receive a 'D' or lower, not just the repetition of specific classes. Faculty need to be better informed of the importance of teaching and students need to be better informed of the importance of research. This feat may be accomplished by more seminar courses, especially at the undergraduate level, and teaching incentives. Faculty see that they need to reform some of their attitudes. For example, one faculty member found himself in a unique position. He had taught undergraduate courses and had decided that he disliked them. During the course of his research, he became exempt from teaching at the undergraduate level. Over the next few semesters, he made an observation: he was not getting the quality of graduate students as he had previously. He attributed this to not being able to encourage students to pursue graduate degrees and also to the lack of student-faculty interaction. Lastly, younger faculty who are better able to relate to students need to be attracted and retained as professors. Teaching must be promoted as a rewarding career. The suggestions offered by faculty members would help in improving the academic environment of the entire student body. Improvements in the areas listed would help in building the confidence levels of students.

C. Alumni

Many of the suggestions from the alumni could easily be implemented. One involves beginning a college newsletter related to social, and not just technical, issues. This newsletter would provide a more liberal base, cultural awareness that would serve to lessen the feeling of isolation of many students in the classrooms. It would also serve to provide information on ethics, the state of industry, professionalism, etc. Another

suggestion was to begin course sections, similar to those Rhetoric 105 section for engineers only, in others areas, i.e. chemistry and math. Alumni volunteered to be used for recruiting purposes. Another alternative posed was to use to a greater extent the option of visiting faculty members to give the College of Engineering a greater degree of diversity.

IV. RESULTS

Since my research has begun, a number of things have occurred throughout the College of Engineering. Firstly, there has been a general increase of awareness in matters concerning minorities which had yielded a desire for more information. Student societies are more open to interaction, a willingness to participate in intersocietal events. With the new organization of Engineering 100, it is now possible to have presentations on issues such as this. Articles are currently being written for publication in the Technograph, providing information into the existence of minority student organizations, the Association for Minority Students in Engineering (AMSIE), the Society of Women Engineering (SWE), the National Society for Black Engineers (NSBE) and the Society of Hispanic Professional Engineers (SHPE). Seminars will be offered to faculty in which students are to make faculty aware of some of the obstacles faced by students, especially minorities, and then offer suggestions to even further minimize the isolation of students in the classrooms. The Alumni Association of Minority Engineers has committed themselves to helping ease the financial burden of some students through scholarships. Improvements are being made all the time in a variety of areas.

However, improvements can be made in even more areas. Gender discrimination on this campus has decreased over the past few years, especially after increased awareness of the issue. I would expect the same to be true in the area of racial discrimination. To aid in this, some things will need to be done. Students need to be more aware of opportunities and resources. This can be done through pamphlets, seminars, public media, and most importantly through academic advisors. A review of the tenure system may be in order to improve student-faculty relations and increase the number of students, including minorities, that pursue graduate degrees. Faculty need to be encouraged to become society and academic advisors and to involve a greater number of undergraduates in research. This encouragement needs to come from the Department Heads and the administrators in the College of Engineering. Industry should be influenced to provide more cooperative and intern opportunities to students, not only increasing their hands on experience, but also to relieve some of the financial pressures of paying for a

college education. We already have some degree of awareness, now above all, a commitment is needed from all levels, administrators, faculty and staff, students, and industry, if this situation is to improve in time.

The University of Illinois has committed itself to many of the goals the College of Engineering would like to accomplish. Many of the suggestions posed here are currently being implemented in the University of Illinois at Urbana-Champaign Institutional Plan to Improve the Participation and Success of Minority, Female and Disabled Students and Staff. (Please see that document, submitted to the Board of Trustees and the Illinois Board of Higher Education in November 1989, for more information and a better explanation of proposed strategies.) Correlation of activity between the two entities will yield a markedly improved academic environment for students, especially minority students and females, in the College of Engineering. Improvements in the academic environment will give evidence of the fact that racial/gender tensions present today are dissolving between the two groups and that each group is learning to appreciate the attributes and differences of the other.