SUCCESS 101:
ROAD MAP FOR THE SUCCESSFUL STUDENT

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INTRODUCTION

The College of Engineering at The Pennsylvania State University is committed to increasing the retention of underrepresented students of color. In the fall of 1996, the Minority Engineering Program (MEP) piloted ***Success 101: A Road Map for the Successful Student*** for first year engineering students of color to assist in accomplishing this goal. The purpose of the two-credit course is to help students of color make the transition from high school, to the University structure and to industry or academia. Ultimately the aim of the course is to assist in the enculturation to college life, the College of Engineering and the University by introducing students to successful strategies for learning. Below are five specific purposes that have been identified as priorities for this course:

1) to introduce students to the structure, functions, resources, services and policies of the University;
2) to help students learn the social and problem-solving skills necessary for success. Particular emphasis will be given to developing effective study skills, building a community of support, and developing successful strategies to manage issues related to race and gender;
3) to foster the development of personal skills such as goal setting, as well as stress and time management;
4) to orient students to the engineering educational process; and
5) to encourage professional development. Topics on career options and planning are enhanced by introducing students to a diverse group of successful engineering and business professionals.

The course is offered both Fall and Spring semesters and has a target class size of 30 students. Also, students are encouraged to enroll in ***Introduction to Engineering***, a one-credit course offered by the College of Engineering for first year students. This course focuses on introducing students to the engineering disciplines. Funds provided by the College of Engineering and the Penn State Engineering Coalition of Schools for Excellence in Education and Leadership (ECSEL) cover the cost of instruction for ***Success 101***. Additional expenditures such as field trips, speakers, and supplies are covered by the MEP office.

BACKGROUND

Success 101 is one of many programs offered by MEP in order to increase the recruitment and retention of students of color. Other programs include: the summer bridge program, the academic assistance center, and the peer mentoring program. Since the establishment of MEP in 1985 the total enrollment of African Americans, Latino/Latina Americans, Puerto Ricans, and Native American Indians in engineering has increased an average of 4.3% per academic year[1]. Recruitment coupled with retention programs are essential to the success of each student. The Penn State College of Engineering studies prove that the first two years of the engineering curriculum present the most acute retention obstacles. Since 1989, the average retention rate of students of color in the College of Engineering at Penn State's University Park Campus out performs non-minority students by 1.1% upon completion of the first year of course work. With the onslaught of second year course work the average retention rate of students of color is 13.0%[2] lower than non-minority students. Based on these data the ***Success 101*** course was developed.

NEEDS OF THE ENGINEERING STUDENT

It is believed that engineering educators can better understand the needs of students by answering the following questions:

- What do most engineering students like about engineering?
- How early in the curriculum do students get exposure to the creative and/or fun aspects of engineering?
- What are the perceptions of students of color regarding the engineering profession and the educational process?
- How significant is the role of mentors for some students?
- What are the social and disciplinary factors that ensure academic success? This includes having a support system and good study skills.
- How do students address issues of race and gender that often affect a "chilly" classroom climate, while ensuring academic success and maintaining enthusiasm?

MEETING STUDENT NEEDS THROUGH SUCCESS 101

Landis[3] suggests that an ideal learning environment consists of strong support from peers as well as strong upper-class mentoring. In addition to these, other important factors are necessary for academic success. The student success model shown in figure 1.0 shows the necessary components for the successful student. As the figure illustrates, not only does a well rounded student need to master use of resources, management of time and stress, and effective study; but other skills as well. One key determinant of academic success is the development of skills to manage adversity, particularly those related to cultural differences, race and gender. A key aspect of

managing related problems is the existence of solid mentoring and strong peer support systems. Together, these components are critical to ensure that students develop effective coping mechanisms and continue to perform effectively.

The importance of an appreciation and excitement for the engineering profession is typically underestimated. It is assumed that the contributions of the profession, prestige, and salary are sufficient to sustain interest. Indeed, these aspects are important, but not sufficient to keep students interested. What keeps many students interested is the anticipation of engineering opportunities upon completion of the baccalaureate degree. For students who have exposure to engineering professionals prior to entering college, an appreciation for and the understanding of the profession may already exist. However, for many students this exposure is not a part of their experience. Thus, it is obligatory for the College of Engineering to introduce students to the creative and exciting aspects of the profession; more importantly, the type of decisions that can be made to effect change in society.

Finally, students must understand the policies and procedures of the educational system and make effective use of the resources that are available to them.

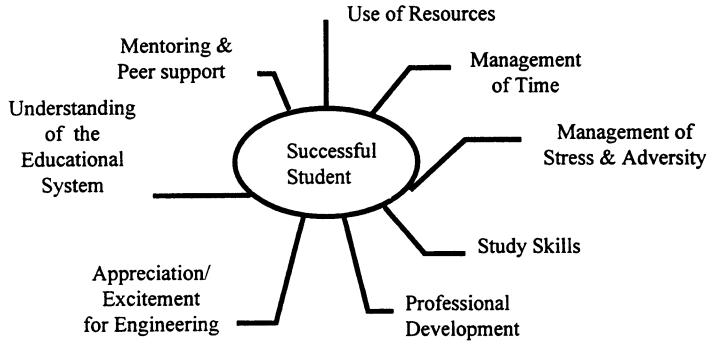

Figure 1.0 - The Student Success Model

In order to meet the needs of the student, it is necessary to introduce new educational approaches. The elements that combine to produce a novel educational experience include a unique class environment, the use of dynamic and diverse engineering professionals from industry and academia, industrial field trips, group projects, presentations, writing exercises, self assessment and candid discussion. Two texts were used to conduct the course: *"Studying Engineering,"* by Raymond B. Landis[4] and *"Becoming a Master Student,"* by Dave B. Ellis[5]. To address the elements of the Student Success Model, five modules were developed.

The class starts with module one, *Orientation to the Engineering Educational System.* Students are introduced to the process of completing the Baccalaureate Degree and important rules and policies are discussed. Commonly made mistakes regarding the scheduling of courses, meeting graduation requirements and the proper usage of resources are reviewed. Effective use of the advising center, the MEP office, and library resources are reviewed by personnel from these offices to increase students' familiarity with the functions and the people that perform them. Other important topics include the organization of the University and the importance of interacting with department faculty.

In the second module of the course, *The Engineering Profession,* students are introduced to the excitement of engineering, the types of job functions, and the impact that people of color have as entrepreneurs and engineers. This is a critical component of the course both in content and in timing. Students are asked to write individually about inventors and entrepreneurs who are people of color, pre-19th century through the modern era. Students are then asked to work in groups to educate their peers about the contributions made and the adversity met by inventors and entrepreneurs. The format used is a formal group presentation. By addressing questions regarding necessary skills and the ability to manage adversity, students are then able to gain an appreciation for the opportunity they have to educate themselves. Given the knowledge that their ancestors have excelled under such difficult and oppressive social conditions, this exercise bolsters feelings of pride in their heritage and builds both self esteem and a community of support.

To better appreciate the engineering profession, students engage in group activities to discuss "bad" designs with possible solutions and current technological breakthroughs. The future work needed in different professions and the possible role that they, as students, can have in solving current problems are also discussed. To enhance this section of the course, a number of speakers from industry and academia are invited to address the opportunities, challenges, and strategies they employ to overcome difficulties. As well, salaries of the different disciplines are discussed and field trips to neighboring industrial companies are provided.

In the third module, *Keys to Success in Engineering Study*, individuals are taught how to become a model student. That is, they are taught how to take notes, study effectively, manage time and plan properly. Essential to this is a self evaluation performed by each student to discover their strengths, weaknesses and personal learning styles. Professional representatives from Student Support Services help students to master the "How To's." Because many of the students take common classes in physics, chemistry, and calculus, lectures on note taking are enhanced by asking students to bring notes to class from a common lecture. Groups discuss and evaluate how effectively lecture material is conveyed through analysis of each student's notes.

Additionally, in order to familiarize students with the academic center, tutors discuss their role and encourage use of their services.

In the fourth module, *Getting an Education: Not Just a Degree,* students are introduced to the importance of addressing non-academic needs. Taking advantages of international travel opportunities and joining the chess club are among the many opportunities students have to learn and grow. Advantages and disadvantages of joining fraternities, sororities and social organizations are discussed. To encourage exploration and promote diversity, students are asked to attend events they typically would not attend and discuss how the experience has enlighten them.

In the last module, *Developing Yourself,* speakers from Counseling and Psychological Services address the importance of building self-esteem, maintaining good health, managing stress and dealing with adversity. Students discuss issues of race and gender and are introduced to successful strategies for coping. Central to these issues is maintaining academic performance in the wake of difficult periods. Students are also provided with opportunities to work on presentation and interviewing skills. The importance of networking and good mentoring are also discussed. To facilitate real world experiences, students have the opportunity to attend leadership conferences and career fairs.

In conclusion, a final class assignment is used to foster community building and solidify learnings from the five modules. A "book of knowledge" was developed to aid in the success of future students. This book required the collective experiences, learnings, insights and tips to enhance the success of the first year student. The activity forces students to think critically about elements of their own success and reminds them of the type of activities they must continue to engage in to achieve academic success.

RESULTS OF COURSE

Our preliminary evaluation of the course has determined that it does meet the needs of the students. Students comment that they highly value the experience geared through the ***Success 101*** course. Specific comments from course evaluations completed by first semester students include:

"It was an informative class."

"The speakers were excellent."

"The best thing about the course was learning how to become a better student and learning about engineering through guest speakers."

"The best thing about the course was meeting other minority engineers."

In order to access the long term impact of the course, a tracking model was developed in collaboration with the Director of the Women in Engineering Program, Barbara Bogue, and the Director of Engineering Instructional Services, Rose Marra. Elements

of the tracking model range from identifying race/gender and role models, to describing current study habits, as well as academic and career goals. Essentially, the tracking model will compare students of color enrolled in the course to students who opted not to pursue enrollment in ***Success 101***. Reasons given by students who chose not to enroll were conflicts with core courses and general disinterest. The tracking model will be administered through graduation to monitor their progress in order to provide viable statistics attesting to the effectiveness of ***Success 101***.

REFERENCES

1. Engineering Workforce Commission, (Fall 1996). Penn State College of Engineering Enrollment Data, David N. Wormley, Dean.

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5. Ellis, David B., (1994), "*Becoming a Master Student,*" 7th edition, College Permission Houghton Mifflin Co., Boston, MA.