Capturing Young MINDS with MITE – A Pre-College Residential Program Generating Results

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Abstract
The Minority Introduction to Engineering (MITE) program at The University of Texas at Austin (UT Austin) is a five-day summer residential program designed to spark students' interest in engineering as an exciting career choice. MITE offers 100 high school juniors and seniors the opportunity to discover engineering through hands-on experience and interaction with engineering students, faculty, staff, and practicing engineers. While residing on the UT campus, MITE participants attend interactive workshops that highlight: engineering disciplines; the college admissions process; and financial aid/scholarships. In addition, student teams participate in a week long design competition where they are required to design, build, and test a working model to meet given specifications within a budget. MITE provides high school students with an understanding of the personal commitment required to obtain a degree in engineering.

Hosted by the Equal Opportunity in Engineering (EOE) Program for more than 25 years, MITE serves as our most effective recruitment program. Seventy percent of MITE participants, eligible for college enrollment in Fall 2004, applied for admission to UT Austin. This paper provides an overview of the MITE Program and captures lessons learned over the years. In addition, it describes how data from Recruitment Plus, a university wide student recruitment database, is used to evaluate and demonstrate the effectiveness of MITE. Program coordinators also use this data to direct their continued efforts to enhance and evolve the MITE program.

The EOE Program at UT Austin was established in 1970 for the recruitment, retention, and academic development of Hispanic, African American, and Native American students interested in pursuing careers in engineering. EOE supports students historically underrepresented in engineering and strives to increase the number of minority engineering graduates from UT Austin through comprehensive support programs that address outreach and recruitment, academic enrichment, leadership, and professional development.

As a result of EOE and programs such as MITE, the minority student enrollment for the College of Engineering has increased substantially over the past 34 years, from 94 in 1971, to 890 in Fall 2004, which represents 17.6 percent of the total undergraduate enrollment[1]. Our vision is to create a student body at UT Austin's College of Engineering that reflects the demographics of the college age population within the state of Texas, 43 percent ethnic minorities.

Introduction

The Minority Introduction to Engineering (MITE) program was created at The University of Texas at Austin (UT Austin) in 1980 to spark high school students' interest in engineering as an exciting career choice. MITE was initiated to address the following challenges: (1) lack of

African American, Hispanic, and Native American students pursuing undergraduate degrees in engineering; (2) large percentage of African American, Hispanic, and Native American students with limited exposure to the field of engineering; (3) large percentage of African American, Hispanic, and Native American engineering students with limited knowledge about career opportunities in engineering. Nearly 2,500 students have participated in the MITE Program since its creation. The MITE Program provides students with the opportunity to discover engineering through hands-on experience and interaction with engineering students, faculty, staff, and practicing engineers. In addition, MITE participants learn about: the UT admissions process; financial aid; and the availability of housing and scholarships.

The goals and objectives for the MITE Program include the following: (1) increase student knowledge about engineering so they can make informed decisions when selecting a major area of study on university admission applications; (2) increase the number of African American, Hispanic, and Native American students that apply to and enroll in the College of Engineering at UT Austin; (3) actively recruit African American, Hispanic, and Native American students that are academically prepared to compete and be successful in the College of Engineering at UT Austin.

Over the past 25 years, nearly 2,500 MITE participants have gained a greater appreciation for engineering and an understanding of the different engineering disciplines offered at UT Austin. MITE has enabled EOE to increase the number of African American, Hispanic, and Native American students that apply to and enroll in the College of Engineering at UT. Seventy percent of MITE participants, eligible for college enrollment in Fall 2004, applied for admission to UT Austin.

Program Overview

The Minority Introduction to Engineering (MITE) program is a five-day summer residential program at UT Austin designed to spark students' interest in engineering as an exciting career choice. MITE offers 100 high school juniors and seniors the opportunity to discover engineering through hands-on experience and interaction with engineering students, faculty, staff, and practicing engineers. MITE provides high school students with an understanding of the personal commitment required to obtain a degree in engineering. MITE participants live in university dormitories and are chaperoned by UT Austin engineering students who serve as MITE counselors.

MITE is open to students with a strong interest in engineering, science or math. There is no fee to attend MITE with the exception of travel to and from the UT campus. Outstanding African American, Hispanic and Native American students, as well as those who have overcome any social or economic hardship, are strongly encouraged to apply. Table 1, 2, and 3 provide details on the ethnicity, gender, and educational level of MITE 2004 participants.

Table 1. 2004 MITE Participant Data – Ethnicity Breakdown.

Ethnicity	# of Participants	Percent
African American	21	21.9%
Hispanic	62	64.6%
White	1	1.0%

Asian	8	8.3%
Other / Not Reported	4	4.2%
Total	96	100%

Table 2. 2004 MITE Participant Data – Gender Breakdown.

Grade Level	**# of Participants**	**Percent**
Female	39	40.6%
Male	57	59.4%
Total	96	100%

Table 3. 2004 MITE Participant Data – Grade Level Breakdown.

Grade Level	**# of Participants**	**Percent**
Rising Senior	56	58.3%
Rising Junior	40	51.7%
Total	96	100%

While residing on the UT campus, MITE participants attend interactive workshops that highlight: engineering disciplines; the SAT; the college admissions process; and financial aid/scholarships. In addition, student teams participate in a week long design competition where they are required to design, build, and test a working model rocket to meet given specifications within a budget. The week culminates with team presentations, a rocket launch, and an awards ceremony. Table 4 provides details on the weekly schedule for MITE participants.

Table 4. MITE Program – Weekly Schedule.

Day	**Activity**
Sunday	• MITE participant Check In • Parent & Student Orientation (.75 hour) • Campus Tour (.75 hour) • Student Ice Breakers (1 hour) • Mini Civil Engineering Design Competition (1 hour) • Introduce MITEy Rocket Design Project & Assign Teams (1 hour)
Monday	• Work on MITEy Rocket Design Project (5 hours) • Electrical Engineering Workshop (1 hour) • Biomedical Engineering Workshop (1 hour) • Introduction to SHPE & NSBE Student Organizations (1 hour)
Tuesday	• Work on MITEy Rocket Design Project (4 hours) • SAT Workshop (1 hour) • UT Freshman Admission Presentation (1 hour) • Aerospace Engineering Workshop (2 hours) • Civil Engineering Workshop (1 hour)
Wednesday	• Work on MITEy Rocket Design Project (3 hours) • Admission Application (Essays & Resume) Workshop (2 hours) • UT Financial Aid & Scholarships Presentation (1 hour) • Mechanical Engineering Workshop (1 hour) • Chemical Engineering Workshop (1 hour)

Thursday	• Work on MITEy Rocket Design Project (2 hours) • Introduction to Undergraduate Research Projects (1 hour) • Mini Design Competition (1 hour) • Engineering Student Discussion Panel (1 hour) • Team Presentations - MITEy Rocket Design Projects (3 hours)
Friday	• MITEy Rocket Launch (2 hours) • Awards Ceremony for Students & Parents (1 hour) • MITE Participant Evaluations & Check Out

The MITEy Rocket Design Project is a major component of the program curriculum. MITE participants spend four to six hours per day working on their designs. This team design competition requires MITE participants to apply physical and mathematical principles that are used when solving engineering problems. While forming fictitious companies that are tasked with developing a rocket prototype to meet specific criteria, students take on roles and responsibilities such as: Project Manager, Engineer, Launch Director, Budget Director, and Marketing Director. Students learn to use a Computer Aided Design (CAD) Software Package called RocSim to design the rocket models. Student design teams are required to: (1) define rocket specifications; (2) research alternate designs; (3) develop working drawings and materials lists; (4) create budgets and track expenses; (5) construct and test model rockets. Each team prepares a business proposal and PowerPoint presentation to showcase their rocket design. A panel of judges, consisting of engineers and UT engineering students, evaluate the business proposals and team presentations. The team's score is based on the success of the launch, the rocket's cost efficiency and the team presentation. Prizes are awarded to the top three design teams and certificates are distributed to all MITE participants.

Getting Started - Funding & Staff Resources

Staffing resources required to initiate and maintain the MITE program on an annual basis include: (1) a program coordinator (allocating 100% of work time from January through June); (2) an administrative assistant (allocating 20% of work time from May through July); (3) eight MITE counselors (allocating a total of 580 hours over the course of two weeks). Approximately, $50,000 per year is required to cover MITE program expenses. This includes staff salary, staff fringe benefits, participant support, materials, and supplies.

Planning and Preparation

The administrative aspect of the MITE Program is managed by staff from the Equal Opportunity in Engineering (EOE) Program at UT Austin. The lead program coordinator for MITE: (1) generates marketing material; (2) recruits applicants; (3) selects participants; (4) generates the weekly schedule and curriculum; (5) reserves rooms, housing, and food; (6) secures presenters and guest speakers; (7) hires MITE counselors; (8) monitors students progress during the week; (9) evaluates student feedback; (10) and tracks recruitment data for previous MITE participants. Table 5 details the project timeline for MITE.

Table 5. MITE Program – Project timeline for 2003-2004 academic year.

Time Period	Task
July	• Set program dates for next June • Secure housing & food contract for participants and counselors

	• Submit proposals to secure program funding
August	• Continue to solicit program funding • Analyze fall college enrollment data for previous MITE participants
September	• Continue to solicit program funding
October	• Continue to solicit program funding • Update marketing materials and post online
November	• Update marketing materials and post online • Update MITE application and post online
December	• Generate MITE weekly schedule • Submit room reservations (computer labs, classrooms, auditoriums)
January	• Distribute MITE marketing materials to HS teachers and counselors • Extend special MITE invitations to students in university database
February	• Recruit MITE applicants
March	• Recruit MITE applicants • Generate curriculum and presentation content (as needed)
April	• MITE applications are due • Review MITE applications & select participants • Respond to MITE applicants – Admit, Denied, Alternate
May	• Line up presenters, guest speakers, and special volunteers • Interview and hire MITE counselors • Purchase materials and supplies • Prepare materials and info packets for MITE participants
June	• Train MITE counselors • Session 1: MITE Program (50 students) • Session 2: MITE Program (50 students) • Review program evaluations & prepare final reports

Application Process – Recruiting Applicants & Selecting Participants
The recruitment process for MITE applicants officially begins in January. To be eligible, students must be a rising junior or senior and have a strong interest in engineering, science or math. MITE information and application packets are sent to counselors at over 300 Texas high schools with at least 30 percent minority representation. Program information is also sent to the Texas Alliance for Minorities in Engineering State Office for dissemination to alliances all over the state. Prospective MITE participants can access all program details and the application packet online at: http://www.engr.utexas.edu/eoe/intro_engr_current_year_info.cfm. In order to apply for MITE, students must submit the following items: (1) a completed application; (2) a one-page personal statement outlining the student's interests in MITE; (3) a resume; (4) an official academic transcript; and (5) a letter of recommendation from a teacher.

Completed MITE applications are evaluated by the EOE program coordinator using a combination of objective and subjective criteria. Table 6 details the criteria and point system used to select MITE participants.

Table 6. MITE Program – Criteria for Candidate Selection.

Objective Criteria (maximum 135 points)	
Category	**Maximum Points**

Class Rank	Up to 25
GPA for all Math & Science Courses	Up to 25
(P)SAT Score	Up to 25
Parent(s) Educational Background	Up to 25
In State Residency	Up to 10
Family Income	Up to 25
Subjective Criteria (maximum 50 points)	
Category	**Maximum Points**
Letter of Recommendation	Up to 25
Personal Statement	Up to 25

Program Expenses

Each year, the EOE staff is required to solicit funding to support the MITE program. In the past, MITE was funded by a $25,000 grant from the Texas Education Agency plus in kind support from UT Austin. Currently, EOE staff members submit proposals to various corporate foundations to secure additional funding to cover program expenses as they have increased over the years. Table 7 details the final expenses from the 2004 MITE Program.

Table 7. MITE Program Expenses for 2004.

Item	Expense
Program Coordinator (Salary & Fringe)	$18,500
Administrative Assistant (Salary & Fringe)	$6,000
8 MITE counselors (Salary & Fringe)	$5,000
Room & Board (5 nights for 100 students + 8 counselors)	$14,0000
Participant Support (materials, t-shirts, snacks)	$1,800
Supplies, Copies, & Postage	$1,100
National Conference Registration & Travel	$1,800
TOTAL	$48,200

Program Assessment

Evaluation surveys are administered to MITE counselors, MITE participants, and their parents. Quantitative and qualitative data is collected and used to evaluate the effectiveness of MITE and to direct future efforts to enhance and evolve the program. Most importantly, MITE has enable EOE to increase the number of African American, Hispanic, and Native American students that apply to and enroll in the College of Engineering at UT Austin. Table 8 details the UT Austin and College of Engineering (COE) recruitment rates for students who participated in either MITE 2002 or 2003. Recruitment rates for MITE 2004 participants will be available at the beginning of Fall 2005.

Table 8. 2002 & 2003 MITE Participant Data – Recruitment to UT

MITE Participants (from Summer 2002 & 2003)	**#**	**Applied To UT**		**Accepted To UT**		**Enrolled At UT**		**Enrolled In COE**	
Eligible Enrollment–Fall 03	57	23	40%	20	35%	12	21%	6	11%
Eligible Enrollment–Fall 04	80	54	68%	42	53%	25	31%	16	20%
Eligible Enrollment–Fall 05	89	-	-	-	-	-	-	-	-

Overall, MITE participants leave the UT campus with a greater understanding and appreciation of the different engineering disciplines. MITE participants indicate they receive the information they were seeking when they applied for the program**.** Table 9 details the breakdown of 2004 MITE participant responses to the statement, "I was able to accomplish what I hoped by participating in MITE 2004."

Table 9. 2004 MITE Participant Data – "At MITE, I accomplished what I hoped."

Response	**# of Participants**	**Percent**
Yes	84	87.5%
No	2	2.1%
Unsure	5	5.2%
No Reply	5	5.2%
Total	96	100%

Ongoing Challenges & Opportunities for Future Enhancements to Program

MITE has generated positive results over the past 25 years. However, there is always room for improvement. Opportunities to enhance the existing program include: (1) increasing the number of MITE applications from African American, Hispanic and Native American students; (2.) marketing the MITE program to the target audience referred to above. Current plans designed to address this challenge include distributing additional MITE information packets (paper and electronic copies) to: (1) high school math and science department chairs; (2) "high flyer" students listed in UT Austin recruitment database; (3) and administrators of pre-engineering and magnet programs.

References

1. The University of Texas at Austin, Office of Institutional Studies, Website URL [http://www.utexas.edu/academic/oir/], site visited January 3, 2005

Biographical Information

ANDREA OGILVIE is the Director of the Equal Opportunity in Engineering Program at UT Austin. She came to UT as Director in July 2001 after six years in industry where she worked as a Structural Engineer for KBR and HDR Engineering, Inc. designing petrochemical and commercial structures, respectively. Andrea received her BS Civil Engineering degree from UT in May 1995 and her Texas Professional Engineering License in February 2001.