
AC 2011-2493: EOE FIRST YEAR INTEREST GROUPS: SUCCESS IN ENGINEERING STARTS HERE A PROGRESS REPORT ON SUCCESSES & ONGOING IMPROVEMENTS

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Andrea M. Ogilvie is the director of the Equal Opportunity in Engineering (EOE) Program at The University of Texas at Austin. Andrea came to the University as EOE director in July 2001 after six years in industry, where she had a very successful career as a structural engineer for Kellogg Brown & Root and HDR Engineering, Inc.

As EOE Director, Andrea leads Cockrell School of Engineering efforts to recruit and retain ethnically underrepresented students as well as students who have backgrounds or experiences that will contribute to the overall diversity of the School. During her term, Andrea has raised more than \$2.3 million from donors to support the EOE program and its mission. Andrea provides guidance and strategic development for EOE initiatives which serve approximately 900 undergraduate engineering students and 950 pre-college students. Each year, Andrea partners with 35-45 corporations to generate funding to support the program, and to develop a support system for engineering students from diverse backgrounds. She also serves as advisor and provides guidance and training to three engineering student organizations with more than 300 members: Pi Sigma Pi Minority Academic Engineering Society, the National Society of Black Engineers, and the Society of Hispanic Professional Engineers.

Andrea is an active member of National Association of Multicultural Engineering Program Advocates and the American Society of Engineering Education (ASEE). She has held multiple leadership positions in both organizations at the regional and national level. Currently, she serves as Chair for the Minorities in Engineering Division in ASEE. Andrea received her civil engineering degree from The University of Texas at Austin in 1995 and her Texas Professional Engineering License in 2001. She is currently studying public policy at the Lyndon B. Johnson School of Public Affairs at The University of Texas at Austin.

EOE First Year Interest Groups: Success in Engineering Starts Here A Progress Report on Successes & Ongoing Improvements

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Abstract

The Equal Opportunity in Engineering (EOE) Program invites students to become part of an exciting community that focuses on academic success and personal growth. EOE initiatives such as the Fall Kick-Off, First Year Interest Groups (FIGs), and Engineering Peer Leaders help students establish a strong academic foundation and promote the formation of a peer support network. In addition, EOE provides students with access to tutoring, undergraduate research opportunities, and professional development workshops. In partnership with Pi Sigma Pi Minority Academic Engineering Society, the National Society of Black Engineers, and the Society of Hispanic Professional Engineers, the EOE Program builds a network that makes it easy to form study groups and meet other engineering students.

Diverse: Issues in Higher Education magazine ranked The University of Texas at Austin fourth in the nation in producing undergraduate engineering degrees for underrepresented minority groups. This success is due in large part to FIGs offered by the EOE Program. EOE FIGs serve as our most effective retention program for underrepresented minority engineering students. Since Fall 2003, 652 first year students enrolled in FIGs hosted by the EOE Program. Thus far, 75 percent of EOE FIG participants have either graduated from or are still enrolled in the Cockrell School of Engineering. The average one year retention rate in engineering for EOE FIG participants is 92 percent, 11 points above the college average. The average two year retention rate in engineering for EOE FIG participants is 78 percent, 12 points above the college average. This paper provides an overview of EOE FIGs and curriculum content for weekly seminars as well as a summary of results and ongoing improvements.

Program Overview

Introduction

EOE First Year Interest Groups (FIGs) are designed to increase the retention rate of first year minority students in the Cockrell School of Engineering (CSE). Offered throughout the fall and spring semesters, EOE FIGs assist students with building a support network that includes peers, upper division students, faculty, and professional engineers. Each FIG consists of 20 to 25 first year engineering students, one FIG Academic Tutor, two FIG Engineering Peer Leaders, and one FIG Facilitator. The participants in each FIG cohort share a class schedule that includes at least two to four courses in common which are also applicable to their engineering degree plan. One of these courses is a small, one-hour weekly FIG seminar designed to help students get to know each other, improve study skills, and develop strategies for academic success. The weekly seminar is hosted by EOE staff members and upper division minority engineering students who serve as FIG Facilitators, Academic Tutors and Engineering Peer Leaders, respectively. EOE FIG participants are required to attend the weekly FIG seminars throughout the fall and spring semesters.

This progress report builds on a paper called *EOE First Year Interest Groups: A Success Model for Increasing Retention*¹ authored by Andrea Ogilvie and published in the Proceedings of the

2007 American Society for Engineering Education Annual Conference & Exposition. It is designed to capture recent updates to our curriculum content for weekly FIG seminars and program structure that have been implemented in the last two to four years. Our pilot program started with two EOE FIGs in Fall 2000 and then doubled in number by Fall 2003. Currently, the EOE Program offers five major specific EOE FIGs that run through the fall and spring semesters. EOE has offered this 28 week, retention focused cohort program to first year engineering students for more than seven academic years. Since Fall 2003, 652 first year students have enrolled in FIGs hosted by the EOE Program. Thus far, 75 percent of EOE FIG participants have either graduated (n = 69) from or are still enrolled (n = 417) in the Cockrell School of Engineering. The average one year retention rate in engineering for EOE FIG participants is 92 percent, 11 points above the college average. The average two year retention rate in engineering for EOE FIG participants is 78 percent, 12 points above the college average.

Goals and Objectives

FIGs led by the EOE Program are designed to increase the retention rate of first year African American, Hispanic, and Native American students in the Cockrell School of Engineering. EOE FIGs were initiated to address the following challenges: (1) gap in retention rates between minority and non-minority students in the Cockrell School of Engineering; (2) large percentage of African American, Hispanic, and Native American students with limited exposure to strategies for academic success in higher education; (3) large percentage of African American, Hispanic, and Native American engineering students with limited knowledge about academic resources in the University and School.

EOE FIGs provide active support and prepare students to be academically successful in the Cockrell School of Engineering. The goals and objectives for EOE FIGs include the following: (1) develop a community of learners who feel connected to their peers, faculty, and staff; (2) help students make a successful transition from high school to university learning; (3) help students form study groups; (4) increase student knowledge about engineering, strategies for academic success, and university services/resources; (5) increase the number of African American, Hispanic, and Native American students who receive degrees from the Cockrell School of Engineering.

Partnerships & Collaboration

First Year Interest Groups were created at The University of Texas at Austin in 1998 to help students make the transition from being a high school learner to a university learner. The Cockrell School of Engineering fully supports the University wide FIG program and has contributed to its success by taking an active role. In Fall 2010, the Cockrell School of Engineering offered 30 FIGs including five FIGs facilitated by the Equal Opportunity in Engineering (EOE) Program. Each year, the Cockrell School allocates staff to carry out this important student success initiative.

In a letter to the National Action Council for Minorities in Engineering, University President William Powers provided the following statement, “Our campus has gained great strength from the richness of its many voices. As a world-class institution of higher learning, we are committed to expanding those voices, to welcoming even more cultures and ideas and to making educational opportunity available to all.” From teaching and research to public service, the

university’s activities support its mission and core purpose to transform lives for the benefit of society through the core values of learning, discovery, freedom, leadership, individual opportunity and responsibility. EOE FIGs are in direct alignment with the University’s mission, core purpose, and core values.

In partnership with the UT chapters of Pi Sigma Pi Minority Academic Engineering Society (Pi), the National Society of Black Engineers (NSBE), and the Society of Hispanic Professional Engineers (SHPE), EOE invites students to become part of an exciting community that focuses on academic success and personal growth. EOE FIGs serve as the foundation for building an academic community where students encourage each other to achieve excellence on the path to graduation. EOE FIGs engage and support the membership and leadership of Pi, NSBE, and SHPE. In fact, over the last five academic years 10 out of 15 Pi-NSBE- SHPE presidents were former EOE FIG participants.

Planning & Implementation Plan

Getting Started - Program Expenses and Staff Resources

Staffing resources required to initiate and maintain five EOE FIGs on an annual basis include: (1) a program coordinator (allocating 20% of work time for 11 months, July through May); (2) three additional FIG Seminar Facilitators (allocating 15% of work time for 8 months, September through April); (3) ten FIG Engineering Peer Leaders (allocating three hours per week throughout the Fall and Spring semester); (4) five FIG Academic Tutors (allocating four hours per week throughout the Fall and Spring semester). Approximately, \$46,000 per year is required to cover EOE FIG expenses. This includes staff salary, staff fringe benefits, participant support, materials, and supplies. Each year, the EOE staff is required to solicit funding to support EOE FIGs. Currently, the EOE director submits proposals to various corporate foundations to secure funding to cover program expenses. Table 1 details the final expenses from 2009-2010 EOE FIGs.

Table 1. EOE FIG Expenses for 2009-2010.

Item	Expense
1 EOE FIG Program Coordinator (Salary & Fringe)	\$11,100
3 FIG Seminar Facilitators (Salary & Fringe)	\$19,400
10 FIG Engineering Peer Leaders (Salary & Fringe)	\$6,200
5 FIG Academic Tutors (Salary & Fringe)	\$5,875
Participant Support (materials, t-shirts, snacks)	\$2,500
Supplies, Copies, & Postage	\$1,000
TOTAL	\$46,075

Planning, Preparation, and Recruiting for EOE FIGs

The administrative aspect of EOE FIGs is managed by staff from the EOE Program at UT Austin. With support from additional EOE staff, the lead program coordinator for EOE FIGs: (1) generates marketing material; (2) recruits participants; (3) generates the semester schedule and seminar curriculum; (4) reserves meeting rooms; (5) secures presenters and guest speakers as needed; (6) hires FIG student leadership team; (7) monitors students progress during the year; (8) evaluates student feedback; (9) and tracks retention data for previous EOE FIG participants.

At summer orientation, the EOE Program invites first time in college (FTIC) students to attend one of six orientation meetings called “EOE: Success in UT Engineering Starts Here”. During this one hour meeting, FTIC students have the opportunity to meet with EOE Staff and current engineering students in small groups and have their engineering/orientation questions answered. FTIC students learn about a variety of EOE services, including FIGs, tutoring, and professional development workshops.

Curriculum for EOE FIGs

Course Structure

Participants in each major specific FIG cohort share a class schedule for the fall and spring semester. Table 2 and 3 provide details on the course line-up for each EOE FIG cohort.

Table 2. EOE First Year Interests Groups – Cohorts & Fall Course Offerings.

Fall Semester - EOE FIG Cohorts and Courses	
<p>The Achievers (Electrical & Computer) <i>Seating capacity: 20 students</i></p> <ul style="list-style-type: none"> • M 408C - Calculus I • EE 302 - Intro to Electrical Engineering • EE 306 - Intro to Computing • FIG Seminar 	<p>Strength in Numbers (Aerospace & Civil) <i>Seating capacity: 20 students</i></p> <ul style="list-style-type: none"> • M 408C - Calculus I • CH 301 - Chemistry I • FIG Seminar
<p>The Visionaries (Mechanical) <i>Seating capacity: 20 students</i></p> <ul style="list-style-type: none"> • M 408C - Calculus I • CH 301 - Chemistry I • ME 302 - Intro to Mechanical Engineering • FIG Seminar 	<p>The Innovators (Interdisciplinary) <i>Seating capacity: 20 students</i></p> <ul style="list-style-type: none"> • FIG Seminar
<p>Infinite Momentum A (Interdisciplinary) <i>Seating capacity: 15 students</i></p> <ul style="list-style-type: none"> • M 408C - Calculus I • or M 408D Calculus II • CH 301 - Chemistry I • FIG Seminar 	<p>Infinite Momentum B (Electrical & Computer) <i>Seating capacity: 10 students</i></p> <ul style="list-style-type: none"> • M 408C - Calculus I • EE 302 - Intro to Electrical Engineering • EE 306 - Intro to Computing • FIG Seminar

Table 3. EOE First Year Interests Groups – Cohorts & Spring Course Offerings.

Spring Semester - EOE FIG Cohorts and Courses	
<p>The Achievers (Electrical & Computer) <i>Seating capacity: 20 students</i></p> <ul style="list-style-type: none"> • M 408D - Calculus II • PHY 303K - Physics I • EE 319K - Intro to Embedded Systems • FIG Seminar 	<p>Strength in Numbers (Aerospace & Civil) <i>Seating capacity: 20 students</i></p> <ul style="list-style-type: none"> • M 408D - Calculus II • PHY 303K - Physics I • FIG Seminar
<p>The Visionaries (Mechanical) <i>Seating capacity: 20 students</i></p>	<p>The Innovators (Interdisciplinary) <i>Seating capacity: 20 students</i></p>

<ul style="list-style-type: none"> • M 408D - Calculus II • PHY 303K - Physics I • ME 205 – Computers & Programming • FIG Seminar 	<ul style="list-style-type: none"> • M 408D - Calculus II • or M 427K Differential Equations • PHY 303K - Physics I • FIG Seminar
<p>Infinite Momentum A (Interdisciplinary) <i>Seating capacity: 15 students</i></p> <ul style="list-style-type: none"> • M 408D - Calculus II • or M 427K Differential Equations • PHY 303K - Physics I • FIG Seminar 	<p>Infinite Momentum B (Electrical & Computer) <i>Seating capacity: 10 students</i></p> <ul style="list-style-type: none"> • M 408D - Calculus II • PHY 303K - Physics I • EE 319K - Intro to Embedded Systems • FIG Seminar

Weekly Seminar Content

Led by FIG Engineering Peer Leaders, FIG Academic Tutors, and EOE staff members, the one hour weekly FIG seminar is designed to help students build relationships with their peers, improve study skills and develop strategies for academic success. The guiding principle used to generate the curriculum for weekly EOE FIG seminars is based on Alexander Astin's article, *Involvement: The Cornerstone of Excellence*. Astin states, "Excellence in education is directly related to student involvement as measured by five indicators: (1) time and energy devoted to studying; (2) time spent on campus; (3) participation in student organizations; (4) interaction with faculty; (5) interaction with other students."² EOE FIG participants are introduced to Astin's theory on *Student Involvement* and weekly FIG seminar topics are designed to integrate themes or teach skills that relate to the five measurable indicators of excellence in education listed above. In addition, EOE FIG participants are introduced to Skip Downing's *On Course: Strategies for Success in College and In Life*. Seminars expand on four of Downing's eight strategies of successful students. These On Course Strategies include: (1) Accept Self Responsibility; (2) Discover Self Motivation; (3) Master Self Management; (4) Employ Interdependence.³ Table 4 and 5 list the weekly seminar topics for the Fall and Spring semesters.

Table 4. EOE First Year Interests Groups – Weekly Seminar Topics for Fall Semester.

Week	Seminar Topic
1	Welcome & Building Community: Making Engineering Connections for Success
2	Building Community: Communication & Teamwork Challenge Course
3	Accepting Self Responsibility: Who's the CEO of You, Inc.?
4	Strategies for Interacting with Faculty
5	Discover Self Motivation: Goals & Aspirations
6	Building Community: Study Break Activity
7	Employ Interdependence: Study Session - Calculus I, Chemistry, or Engineering Course
8	Master Self Management: Student Success Strategies & Time Management
9	Peer Advising for Spring Courses & Online Tools for Academic Planning
10	Building Community: Pumpkin Carving
11	Employ Interdependence: Study Session - Calculus I, Chemistry, or Engineering Course
12	Building Community: Study Break

13	Engineering Scholarships, Financial Aid, Jobs On-Campus
14	End of Semester Celebration

Table 5. EOE First Year Interests Groups – Weekly Seminar Topics for Spring Semester.

Week	Seminar Topic
1	Welcome Back, Reflections, & Setting Goals
2	How to Prepare for a Career Fair
3	Study Session for: Calculus II, Physics or Programming Course
4	Resume 101 Workshop
5	Intro to Study Abroad, Undergraduate Research, Business Foundations, & UTeach Engr.
6	Introduction to Leadership, Engineering Student Organizations, Engineering Internships
7	Study Session for: Calculus II, Physics or Programming Course
8	Building Community: Study Break Activity + Personal Safety On & Off Campus
9	Peer Advising for Summer/Fall Courses & Online Tools for Academic Planning
10	Stress Management and Student Life Balance
11	Study Session for: Calculus II, Physics or Programming Course
12	Beconomics 304: Guide to Renting & Living in Austin
13	Building Community: Study Break Activity
14	Study Session for: Calculus II, Physics or Programming Course
15	End of Semester Celebration

Assessment

Number of FIG Participants Served

Since Fall 2003, 652 first year students have enrolled in FIGs hosted by the EOE Program. The first time in college class for Fall 2010 includes 259 underrepresented minorities, 71 percent of whom are registered for a FIG in the Cockrell School. Thirty-one percent of the incoming minority engineering students are enrolled in an EOE FIG (n=81) for Fall 2010. Table 6 and 7 provide a summary of the ethnic, gender, and major distribution for Fall 2010 EOE FIG participants. Table 8 and 9 provide a summary of the ethnic and major distribution for Fall 2003 through Fall 2009 EOE FIG participants.

Table 6. EOE First Year Interest Groups – Ethnicity & Gender for Fall 2010 participants.

Ethnicity	Male	Female	Total	Representation
Hispanic or Latino	59	10	69	74%
African American or Black	8	2	10	11%
White	4	1	5	5%
Asian	6	1	7	8%
American Indian or Alaskan Native	1	0	1	1%
Multi-race (one being African Am)	1	0	1	1%
Total	79	14	93	100%

Table 7. EOE First Year Interest Groups – Majors for Fall 2010 participants.

Major	Total	Representation
Aerospace Engineering	6	6%
Architectural Engineering	8	9%
Biomedical Engineering	1	1%
Chemical Engineering	1	1%
Civil Engineering	21	23%
Electrical Engineering	29	31%
Mechanical Engineering	25	27%
Petroleum Engineering	2	2%
Undecided	0	0%
Total	93	100%

Table 8. EOE First Year Interest Groups – Ethnicity & Gender for Fall 2003-2009 participants.

Ethnicity	Total	Representation
Hispanic	326	58%
African American	85	15%
White	57	10%
Asian	59	11%
Foreign	28	5%
Native American	4	1%
Total	559	100%

Table 9. EOE First Year Interest Groups – Majors for Fall 2003-2009 participants.

Major	Total	Representation
Aerospace Engineering	84	15%
Architectural Engineering	11	2%
Biomedical Engineering	7	1%
Chemical Engineering	23	4%
Civil Engineering	77	14%
Electrical Engineering	166	30%
Mechanical Engineering	161	29%
Petroleum Engineering	18	3%
Undecided	12	2%
Total	559	100%

FIG Participant Retention and Graduation Rates

Thus far, 75 percent of EOE FIG participants have either graduated (n = 69) from or are still enrolled (n = 417) in the Cockrell School of Engineering. The average one year retention rate in engineering for EOE FIG participants is 92 percent, 11 points above the college average. The average two year retention rate in engineering for EOE FIG participants is 78 percent, 12 points above the college average. Retention and graduation data for EOE FIGs is summarized in Table 10, 11, and 12.

Table 10. Retention/graduation data for EOE FIG cohorts

all EOE FIG participants	
1 year retention rate in engineering*	92.3%
2 year retention rate in engineering**	77.8%
6 year graduation rate in engineering***	52.3%

*average for Fall 2003 – 2009 EOE FIG cohorts

**average for Fall 2003 – 2008 EOE FIG cohorts

***average for Fall 2003 – 2004 EOE FIG cohorts

Table 11. Retention/graduation data by URM groups for comparison to EOE FIG cohorts

	all CSE undergrads	all Native Am. ENGR undergrads	all African Am. ENGR undergrads	all Hispanic ENGR undergrads
1 year retention rate in engineering*	80.9%	71.8%	71.7%	73.2%
2 year retention rate in engineering*	66.0%	46.1%	53.0%	56.2%
6 year graduation rate in engineering*	51.7%	46.7%	35.7%	38.7%

* average based on last 5yrs - compiled in October 2009 using Fall 2009 12th class day enrollment data

Table 12. Retention/graduation data for each EOE FIG cohort

	Number of Students in EOE FIG	1 year retention rate in engineering	2 year retention rate in engineering	6 year graduation rate in engineering
Fall 2009 EOE FIG cohort	100	87% (87)	pending	pending
Fall 2008 EOE FIG cohort	86	88% (76)	74% (64)	pending
Fall 2007 EOE FIG cohort	91	91% (83)	79% (72)	pending
Fall 2006 EOE FIG cohort	76	89% (68)	68% (52)	pending
Fall 2005 EOE FIG cohort	74	95% (70)	66% (49)	pending
Fall 2004 EOE FIG cohort	71	96% (68)	90% (64)	52% (37)
Fall 2003 EOE FIG cohort	61	100% (61)	88% (54)	52% (32)
CSE average for last 5 years*	n/a	80.9%	66.0%	51.7%

* average based on last 5yrs - compiled in October 2009 using Fall 2009 12th class day enrollment data

Mid and End of Year Evaluations

FIG participants are invited to complete program evaluations mid-semester and at the end of the semester. Quantitative and qualitative data is collected and used to evaluate the effectiveness of EOE FIGs and to direct future efforts to enhance the program. Samples of mid and end of year evaluations are include in the supplemental documents for this proposal.

Planning for the Future - Sustainability, Transferability

EOE FIGs have proven to be an effective method for building an academic community as well as increasing the number of diverse engineering graduates from the Cockrell School of Engineering. This initiative is easily transferable to other universities across the country and is relatively a low cost program to sustain. Future improvements to EOE FIGs, under discussion, include the addition of General Engineering (GE) Courses to the FIG course structure. GE courses will provide four hours of supplementation instruction per week in physics, chemistry,

mathematics, or electrical engineering. The objective is to increase technical GPAs for EOE FIG participants during the first academic year.

References

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