Educating the Educator

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Abstract - The Gender Parity Initiative of the SMU School of Engineering has the goal of reaching 50% female enrollment in SMU's undergraduate engineering population. SMU Engineering is taking a unique approach to achieving gender parity by engaging both students and their influencers. One key group of influencers is high school educators, so SMU Engineering developed Educators' Day, a 3-hour workshop that provides high school math teachers, science teachers, and guidance counselors with information on engineering. The workshop covers four major content areas including: (1) basics of engineering and the need for more female engineers, (2) how to identify future engineers, (3) tips for writing better letters of recommendation, and (4) career opportunities in engineering and information on SMU Engineering. To date, three workshops have been held with a total of twenty five educators attending who represented sixteen area high schools. Workshops were promoted through SMU Engineering's databases and website. The workshops were free to participants, but registration was required. Participants earned three Continuing Education Units for attending. Post workshop evaluations were conducted to determine the effectiveness of the workshop and areas for future improvement. An overwhelming 92% of participants reported their interest in attending attributed to a desire to learn more about engineering. Participants were also asked to rate how strongly they agreed with statements pertaining to the content of the workshop on a scale of 1 (strongly disagree) to 5 (strongly agree). All statements received ratings greater than 4.0, indicating that the participants gained new information from the workshop. In the coming year, four Educators' Days will be offered throughout Texas.

Introduction

The Gender Parity Initiative at SMU has the goal of reaching 50% female enrollment in undergraduate engineering within five years. The Gender Parity Initiative began in 2002 with efforts focused on recruiting undergraduate female engineering students. Over the past three years, the Initiative has grown to include a multi-faceted approach with targeted programs for key audiences:

- Female High School Students
- High School Math and Science Teachers
- High School Guidance Counselors
- Female SMU Engineering Students

- Female Engineers in Industry

Female students comprise 30% of the undergraduate engineering population at SMU. In the spring of 2005, research was conducted to determine what factors influenced students to study engineering and engineering at SMU. Focus groups were conducted with current female engineering students, and a survey was conducted of all students. One of the most important findings was the influence of teachers and counselors on female students' decision to study engineering.

Educators' Day was developed to provide high school guidance counselors, math teachers, and science teachers with information on engineering. The workshops also serve a secondary purpose – enhanced recruiting efforts by reaching students through their counselors and teacher, key influencers of students.

Participant Recruitment and Logistics

The Educators' Days were promoted to high school educators in the Dallas-Fort Worth area through email and mail and on-line at SMU Engineering's website. Locations and dates were selected to be convenient for educators. Three Educators' Days have been held to date – two sessions in the Summer of 2005 held at SMU (main campus) from 1:00 to 4:00 p.m. and one session in the Fall of 2005 held at the SMU at Legacy campus (located in a northern suburb) from 5:00 to 8:00 p.m. Participants earned 3 Continuing Education Units for participation. Light refreshments were served at the summer sessions and a light dinner was served at the fall session. Each educator received a SMU Engineering portfolio with the brochure and booklets, a pen, and a lanyard. The Educators' Days were funded through money received from a local awards benefit.

Content

The presentation included information on the basics of engineering, the need for more female engineers, how to identify future engineers, tips for writing better letters of recommendation, career opportunities in engineering, and information on SMU Engineering. Following is a summary of each section:

- Basics of Engineering and Need for More Female Engineers
    - What is engineering?
    - What do engineers do?
    - Types of engineering (i.e. Mechanical, Chemical, etc)
    - Female friendly description of engineers
    - National statistics
    - Number and percent of female high school students who pursue engineering degrees

- How to Identify Future Engineers
    - High school math and science preparation for college engineering
    - Sample first year engineering schedule

- Influencers in students' decision to study engineering
- Time at which students choose to study engineering
- Most common pre-college programs students participated in prior to college engineering (i.e. Talented and Gifted, BEST, etc)
- Interpersonal skills – communication, teamwork, etc.
- Talking points when speaking with students about engineering
- Opportunities teachers can provide for students (i.e. field trip to engineering company, invited speakers, etc)

- Tips for Writing Letters of Recommendation
  - Materials students should provide
  - Suggestions for content
  - Teacher versus Counselor letters
  - Style tips

- Career Opportunities in Engineering and SMU Engineering
  - Engineering today – workplace environment
  - A word on outsourcing
  - Average staring salaries
  - Benefits
  - Adjectives current engineering students use to describe SMU Engineering
  - Top 5 factors influencing students' decisions to attend SMU Engineering
  - SMU Engineering opportunities
  - SMU Engineering students
  - Engineering departments, majors and minors
  - Upcoming events at SMU Engineering

The program included three interactive exercises -

1) Problem Solving: Crossing the Bridge

Problem Statement:

Night has fallen, and 4 people must get across the bridge quickly. However, they only have 1 flashlight and must travel in pairs. Each pair can only travel as fast as the slowest person. The people walk at the following speeds:

Bunny	1 minute
Harry	2 minutes
Gina	5 minutes
Tom	10 minutes

Challenge:

Find the shortest time required to get all of the people across the bridge.

Solution:
17 minutes

1 and 2 go across, 1 comes back with the flashlight (3 minutes)
10 and 5 go across with the flashlight, stay, give the flashlight to 2 and 2 comes back (12 minutes)
1 and 2 go across (2 minutes)

2) Identify the items invented by women

Air Conditioning	Signal Flares
Rollercoaster	Fire escape
Laser	Street cleaner
Balloons	Medical Syringe
Floppy Disk	Windshield Wiper
Safety Pin	Drip Coffee Machine
Baby Carriage	Disposable Diaper
Integrated Circuit	Computer Compiler
Teflon	Apgar Score
Refrigerator	Kevlar

The answer is all of the items in the right hand column.

3) Critiquing Letters of Recommendation – participants were given two example letters of recommendation and asked to critique the letters – what was good about each letter and what could be improved. Note – the letters were provided by the Admissions Department and were pretend letters not written for an actual student.

At the conclusion of the workshop, all participants were asked to complete an evaluation which included Likert scale items, open ended comments, and a space to indicate interest in future interaction with SMU Engineering.

Participation and Evaluation

To date, twenty five educators representing sixteen schools have attended the workshop. The majority of participants were a mix of guidance counselors, math teachers, and science teachers. Additionally, one computer teacher and one career and technology teacher attended. All educators worked with more than one grade level and taught regular and honors/AP sections.

All educators attending the workshops completed the evaluation. When asked why they signed up for the workshop, nearly all (92%) indicated the opportunity to learn about engineering. The second most frequently cited reason was the opportunity to improve their recommendation letter writing skills. Participants were also asked to rate how strongly they agreed with 10 statements pertaining to the content of the workshop on a scale of 1 (strongly disagree) to 5 (strongly agree). All statements received ratings greater than 4.0, indicating that the participants gained new information from the workshop.

Statements receiving the highest level of agreement include:

1) "I learned characteristics of future engineers to look for in my students."
2) "I learned about the need for more women in engineering."

Participants echoed their enjoyment of and learning from the workshop in their open-ended comments. All educators requested further interaction with SMU Engineering including classroom speakers on engineering, educator professional development, student opportunities, and tours of SMU engineering. Four Educators' Days are planned for 2006 throughout the state of Texas.

References

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