Introduction

The Grand Challenge Workshop is a place for students to consider a broad issue of high socio-economic importance and to propose innovative approaches to addressing the issue.

On September 19th 2014, fifty one students, four mentors and five experts in different areas, gathered at The University of Texas at El Paso, to join efforts in the creation of public/private policies to radically increase the number of women who major in science, technology, engineering, and mathematics in the U.S. This challenge was posed by Dr. Richard Schoephoerster, Dean of the College of Engineering at the University of Texas at El Paso.

The students had the aid of four mentors; Dr. Ann Gates, head of the department of Computer Science, Denisse Olivas, Director of the Center for Hispanic Entrepreneurship, Dr. Natalia Villanueva, Assistant Professor, Department of Computer Science, and Patrick Schaefer, Executive Director for the Hunt Institute for Global Competitiveness. Our mentors guided the students through the development of the project, and provided valuable feedback throughout the event.

After twenty-four hours of intense work, the students presented their ideas to a panel of experts. The following document serves as a compendium of the policies created by these students.
Purpose:

In the next twenty years we will double the graduation percentage rate (20% to 40%) of females in STEM (Science, Technology, Engineering and Math) fields.

Policy:

Recruitment

Our policy will focus on recruiting female students into STEM fields. By focusing our recruitment in incoming students and current students.

Retention

Our policy will focus on retaining female STEM students by restructuring the advising process and creating motivational activities that will be held throughout the school year.

Success

The success of our policy will be measured with different data recollection methods that will help us quantify the changes in the university.

Sustainability

Our campaign will receive additional funding through:
  - Sale Profit
  - Sponsorships (Corporations & Alumni)

Definitions:

- Recruitment is defined as the action of finding new people to join an organization or support a cause.
- Retention is defined as the process of keeping something in possession, or keeping someone engaged or employed.

- Success is defined as:
  i. The accomplishment of an aim or purpose
  ii. The attainment of popularity or profit.
  iii. A person or thing that achieves desired aims or attains prosperity.

Procedures

Recruitment

- Incoming Students
- Current Students

Retention

- Advising Restructuring
- Motivational Activities

Success

- Data Recollection Methods
- Outcomes

Recruitment

1.1 Recruitment with Incoming Students

i. Orientation has a huge role in the decision making of new entering students. Most of the freshman that are entering college are not sure of what field they want to go into, they might have a general idea of what they like but they are not sure of what they can do with their aptitudes and talents. An introduction of all the STEM fields would be extremely helpful to see what you can do in each of them and where they can take you.

ii. A motivational video having women in STEM fields that are successful in different areas (workplace, education, research) and that are equally recognized.

1.2 Current Student Involvement

i. Students that are currently enrolled in the university will be involved with this campaign by deciding what Anna should look like.
The new face that is representing this campaign is going to be created by current students. They can decide name, face, ethnicity, etc. A competition will be created where students will have their own proposals for the enhancement of the female representation of women in STEM.

Retention

2.1 Retention with restructuration of the advising process:

i. A standard will be implemented in all STEM degree programs to inspire and help females pursue a degree in STEM. We will add a few changes in the current advising process that will assist us in reaching our goal of retaining females enrolled in STEM fields.

ii. Before advising, students must take an online quiz about the different STEM organizations on campus to encourage them to join and get involved in their future career as well as motivate and support the females in pursuing their degree.

iii. Students will be assigned to a mentor of whom they choose to aid them throughout their studies.

2.2 Retention through motivational activities:

i. Living a day in the life of an engineer will spark female’s interest in pursuing their education in STEM.

ii. Organizations will benefit females in many ways such as networking, communication skills, and events will allow them to unleash their creativity in STEM projects. Once females are involved and have gained experience we believe females will become passionate in their field.

iii. Increase the number of female keynote speakers to provide female students additional role models to help them continue with their studies.

Success

3.1 Data Recollection Methods

i. The data recollection methods that we will be using are surveys. This method is the most time and cost efficient. We will be implementing the surveys in different phases of the students’ educational career. The following stages are:

1. Admissions Process
a. The admissions application will have an option that will not be tedious or aggravating, which will ask the students’ interest in the STEM field. Filtering the women that are applying (60% of the university’s applicants are women, and only 20% go into engineering) and determining the percentage of interest in STEM fields. Through Goldmine the admissions office can track who of the interested actually declared their majors in a STEM field, and if not to declare the reason why they didn’t opt for that route.

2. Course Completion
   a. Since the Course Evaluation has changed to an online format and it is easier for students to input their opinion. Adding three key questions for the female student body of STEM fields will help determine where they are standing and their experience in the classroom.

3. Graduation
   a. When turning in the graduation packet students will be able to share their experience and what motivated them to continue with that program.

3.2 Quantifying Outcomes
   i. We will be measuring our outcomes with two main revenues streams:

1. Sales and Profit
   a. Anna will be an image that will be marketable and mostly related with Miner Pride. We will create merchandise that will represent her and the women, not only in the STEM field, but women in general.

2. Data Processing from surveys
   a. The information recollected from the student surveys will help visualize percentages with more clarity. We can focus on what our university is doing so that others can mimic and present data to support this type of campaigning and how it is a success.
### Sustainability

**For the Year Ending December, 014**

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**Further Information**
4.1 Long-Term Projects

i. A long-term goal of this project is implementing an early development with education projects in elementary schools, middle schools, and high schools. Here, students can have their hands on fun-STEM field related projects. These projects are sectioned in three different levels; easy, moderate and challenging respectively. Some of the projects will include basic projects such as topple dominoes, light and electricity, structures, materials, travel and movement, harnessing nature, environment, understanding the everyday and miscellaneous. Some of the levels will be optional and some of them are going to be mandatory. In order for the projects to attract the attention of the students the new UTEP image will take over as an advocate of this whole campaign.

References

- ‘UTEP is changing the face of engineering”. Diversity/Careers in Engineering and Information. Technology. Web. 20 Sept. 201
- Cantrell, Emilee. “Western Refining donates $50,000 gift to NMSU College of Engineering”.
- New Mexico State University College of Engineering. 1 April. 2014.Web. 20 Sept. 2014.
- [http://dept-wp.nmsu.edu/engrtest/04_gift/](http://dept-wp.nmsu.edu/engrtest/04_gift/)
Faculty and Staff Involvement in Recruiting and Retaining Women in STEM

Introduction

In today’s economy there is a high demand of jobs in the United States that require STEM education; however, current reports show that there is low enrollment of women in these fields. When the first voice-recognition system appeared it was calibrated for male voices and it failed to recognize female voices. One of the reasons that this product was released with this flaw is that there weren’t any women to test this product (Hoopes, 2011). Why is it that in commercial vehicles there isn’t a designated place for a woman’s purse? About half of the drivers of these cars are women with purses, but apparently the designers of these cars aren’t. Products are designed everyday with the mentality of half of the population of the United States and as Rebecca Blank said, acting deputy secretary of the Commerce Department, “the lack of women in STEM is harming the United States' ability to compete in the global innovation marketplace” (Hoopes, 2011; Why do we need women in stem fields?).

Motivation

Universities such as Westminster College have recruitment through exposing prospective students to successful faculty women. “Westminster’s math and computer science department is 50% female, while the national average is below 15%, according to a study done by the National Science Foundation” (http://www.theprospectordaily.com/showcase/2014/05/06/female-students-progress-through-male-dominated-stem-workforce/).

A common feature of programs that have successfully retained women in STEM fields is that they have “undergraduate research, peer and faculty mentoring, together with the
establishment of learning communities centered on undergraduate research” (Foertsch, Alexander, & Penberthy 2000; Locks& Gregerman 2008; Nnadozie, Ishimaya, & Chon 2001; Stoecklin & Harmon 1998; Summers & Hrabowski 2006).

Different entities have already approached the problem and have been directed in different directions. The University of Michigan approached the issue by supporting faculty; the Louis Stokes Alliances of Minority Participation (LSAMP) evaluation dissected the beneficial factors, emphasizing collaboration among colleges. To support the development of STEM fields, the University of Michigan developed the ADVANCE program, founded by the National Science Foundations (Burke and Mattis, 18). The intention was to direct more attention and resources to the recruitment and retention of women students. Among the initiatives were grants and networking under the direction of a leadership committee (Burke and Mattis, 19).

By supporting faculty and encouraging them to become more active and engaging, more students would become interest in the STEM fields. Faculty then realizes the need to solve the retention rate of women students in engineering. Grants given to faculty will in turn be used for research on which STEM students, including women, can become a part of active hands-on learning. The ADVANCE program proved to be successful in involvement of both, faculty and students, which also disseminated the possibility to pursue graduate studies. An evaluation conducted by Clewell (2006), of the Louis Stokes Alliances of Minority Participation (LSAMP) was designed to study how many STEM students would continue and get graduate degrees (Burke and Mattis, 17).

The evaluation brought up different points that make a positive impact on STEM fields:

- Faculty support
- Interaction between colleges
- Hands-on experiences
- Mentoring

The integration of this positive aspect to STEM development then become implemented among universities. The domino effect creates an effect that positively impacts the retention and recruitment of women in the STEM fields.

**Proposed solution**

For this reasons, the policy proposed in this paper focuses on encouraging and celebrating faculty and staff that engage in programs that help to recruit and retain women in STEM fields. This involvement will hopefully translate into mentoring programs, undergraduate research, outreach events for k-12 students, and other potential activities.
Encouragement and recognition of faculty members involved in recruitment and retention of women in STEM fields would include but is not limited to the following:

- Faculty reviews will include involvement and efficiency of the faculty efforts.
- Qualitative and quantitative evaluations of involvement of tenure track faculty will affect tenure promotion.
- Recognition of outstanding faculty efforts will take place in departmental and institutional meetings.

Improvement of already existing programs for recruitment and retention of women in STEM will include but is not limited to the following:

- Conduct education research.
  - Evaluate efficiency of programs
  - Extend successful practices
- Evaluate follow-up data of the participants of the programs.
- Professional training of staff of the programs.

The wanted outcome is to increase on enrollment and retention of women in STEM fields. Data collected of these programs will be the foundation of metrics that will allow UTEP to go after federal founding.

**Implementation**

Our first year would be to immodestly implement the policy and invest 50,000 in research, awards and recognition for Staff and administration involved is such studies and activities.
Grand Challenge Workshop 2014:

How can we increase the number of Women in STEM fields?

There are various ways of approaching this problem for the simple fact most ideas or recommendations have been tested throughout the years. Here at UTEP they are facing the problem of low enrollment of females in the fields of STEM. Even though UTEP has one the best engineering schools, a diversified staff, great opportunities to both females and males, there is a message not going through for female engineers. Our objective was to figure it out a solution, or a step to take next on this problem, with our behavioral research done we were able to produce the idea that will bring results to the College of Engineering here in the University of Texas at El Paso.

What better way to approach this problem than looking at females that have succeeded and learning what their challenges were and how they overcame them. Instead of concentrating on number, percentages, and statistics this challenge would be best figured out if we would understand how women feel, what they want to be, and what they feel they need. Our research consisted of various women in engineering that have succeeded and overcame the challenges, when we did this we were able to compare and contrast their answers to see if there was any connection between their career and the challenges faced in this field. For example; “Women are outnumbered and they feel like they do not fit in.” – Andresse St. Rose, Research Associate for AAUW; “Women scientists are perceived as less competent than their male peers.” – Kristine De Welde, Florida Golf Coast University; “Girls hold themselves to a higher standard in subjects like math… Because of this, girls are less likely to believe that they will succeed in a STEM field.” - Rebecca G. Book, Assistant Professor at Pittsburg University. These examples provided
show that women are not well supported in the field of engineering, they feel it isn’t for them, or they are shut down the male peers.

As we analyzed this situation and realized that the problem didn’t rely on statistics or awareness but driven by lack of support and motivation the women we took the following steps.

Figuring out the solution required various steps to this, which we will provide below:

• Understand our target market: (Women in the Colleges in STEM)
• Understand what the recruitment process was for the Colleges in STEM. (Which we realized there wasn’t involvement with a female target.)
• Understand the Retaining process (Which is strong with the opportunities and programs offered)
• Most Importantly: Understand who the girl targeting is; a hardworking, motivated, drive, but not supported individual, which if we could target them the increase in attendance will go up by 6%.

When our research was compiled and we realized the items listed above we needed to come up with a solution that let UTEP implement in a quick, and financially stable manner. This idea had to target women who needed support, was motivated, wanted to pursue a field in STEM but has lack of unity between women or males to empower them.

Our marketing approach to this was not to create a campaign or anything similar because awareness is out there, these techniques have been tried throughout the years, our solution had to be something that stayed consistent, be stable, and have a purpose not just support women but be the resource for the women in engineering. This helped us create the following:

“Women Advancement and Resource Center in STEM.”

This is a center established by all STEM colleges to promote the support of women and create a structure for Women organization in STEM to follow to cater to their female market and correctly show their support, ideas, and goals. This center will include the following:

• Resources for women: Information, Contact information to professors, support council, research passed down from professors, student organizations information.
• WSSC (Women in STEM Student Council)- which consists of 1 meeting a week, which will be run by women in the fields (Preferably presidents) to come up with constant new ideas on events, forms of promotion, or support.
• The location of this place, is a small room with two desks and materials needed, two women employees involved in the STEM fields.
• 1 employee will be in charge of creating the structure for the organizations, and creating opportunities for women within these programs that have already existed, and attaining partnerships with established programs. Includes running the WSSC. (Women in STEM Student Council.)

• The other employee will be professional development within STEM for women, she looks for both sponsors, and opportunities that target women, internships, speakers, events, etc. This can give the Colleges of STEM fields a female student perspective to everything they do, which can create an increase in involvement from women in the Student organizations and the Colleges.

This approach to the problem, creates a better retaining process for the Colleges, an increase in involvement from females, a better structure for the Student organizations to follow, which will increase the recruiting rate which is the crucial part to the colleges from thirty four percent overall to at least a forty percent within the first year, and forty six the next until we can hit fifty percent and stay constant.

In conclusion, the problem to the Colleges of STEM isn’t the retaining process but the recruiting process since there is nothing for women to grasp on to that helps them go through with the programs. The recruiting process and support for women is what the Colleges lack, which is what the Women Advancement and Resource Center in STEM will provide to the students increasing involvement and getting results to the College.

Working with a budget of $100,000 for a five year project, still allowed us to hire employees and do the expenses necessary for this center to be created. The financial Planning is shown below:
Team 6

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<th>Name</th>
<th>Degree</th>
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<tbody>
<tr>
<td>Lizette Estrada</td>
<td>Accounting</td>
</tr>
<tr>
<td>Jesus Avila</td>
<td>Finance</td>
</tr>
<tr>
<td>Jorge Flores</td>
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</tr>
<tr>
<td>Chelsea Jurado</td>
<td>Computer Science</td>
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<tr>
<td>Brittan Lujan</td>
<td>Civil Engineering</td>
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Regulatory Retention Procedures

Scope
Policy Statement
Reason for Policy
Procedures
Definitions

**Effective:** 09/19/2014

**Last Updated:** 09/20/2014

**Responsible University Office:**
Lizette Estrada
Brittan Lujan
Chelsea Jurado
Jesus Avila
Jorge Flores

ADDITIONAL DETAILS
Related Information
Projections
Scope

To design an internal policy in The University of Texas at El Paso that will profoundly increase the number of women majoring in science, technology, engineering, and mathematics (STEM). A recent study by the National Science Foundation shows how women continue to be underrepresented in STEM fields despite a 6.9 percent growth of women graduating with STEM degrees from 2011 to 2012. Therefore, the implementation of regulatory changes to current curriculums at the STEM programs should be proposed.

Policy Statement

Implementing changes to current curriculums to better ensure retention needs and generate different opportunities in the STEM programs at the university. Diverse and innovative programs will generate involvement and openings to students with social-cultural and technical desires. Generating new opportunities for students to broaden their horizons and excel in different areas will help aid the retention breach and create a sense of unity. Forming a group of students, implanting a group oriented task, and tying social consciousness will arouse an increment of female interest in STEM programs. Researchers at Worcester Polytechnic Institute state the following, "It makes sense that girls would find more value in project-based learning [...] given that women tend to care more about the social relevance of the work they do." In response, the university will contract these ideas and modify curriculums to fit the current need.

Reason for Policy

The changes and implementations that are being taken into consideration are designed to control and higher-up retention rates. Enhancing curriculums will stimulate students to be more analytical about real world problems and engage them in social and technical complications. Involvement of different colleges across the university will enable the student to acknowledge different areas of study and apply its expertise into the making of.

Procedures

Pilot Program

• By providing the sufficient tools The University of Texas at El Paso will augment a program’s curriculum in which students and faculty will have the opportunity to
interact with each other and incorporate their understandings to develop solutions for local and national issues.

- **Social integration**
  - Projects with social integration and interaction of different colleges. The combination of courses across the university will give the student the opportunity to have the fundamentals of different areas in which they can elaborate in their course project.

- Each professor would be given an incentive of $5,000 to include the program in his/hers curriculum.
  - 3 professors per term.

- The program is targeted for undergraduate summer classes
  - Consists in adding social related projects that utilize the knowledge and retention of information acquired during the course to increase the interest of women in the course objective.
  - Courses are offered only to sophomores, juniors and seniors.
  - After the course, female students will receive a follow-up evaluation for the rest of their careers to help the university gather data and analyze the effectiveness of the program.

The program is designed to focus on attracting more students and decreasing student dropouts.

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**Definitions**

**STEM**

- Science, Technology, Engineering and Math education.
  - Interdisciplinary and applied approach that is coupled with hands-on, problem-based learning
- Cohesive learning paradigm based on real-world applications.
- Teaching and learning goes beyond the mere transfer of knowledge.
- Engages students and equips them with critical thinking, problem solving, creative and collaborative skills, and ultimately establishes connections between the school, work place, community and the global economy.

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**Budget**

| Initial Budget | $20,000.00 |
### Incentives

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### Related Information

Current projects of The University of Texas at El Paso

- **Excites**
  - Engineering Ambassadors.
  - Summer camps targeted to 12 years of age and younger.
- **SIMAA**
  - Partnerships between UTEP and El Paso Schools Districts to increase interest in Science.

### Projection

By the year 2020, the university is expecting a reduction in the drop out’s range, in the engineering courses. By implementing this proposal, The University of Texas at El Paso can serve as a base to other universities nationally.
**Purpose:**

The purpose of this grand challenge is to increase the percentage of women from UTEP not only enrolling into engineering, science, technology, and mathematic degrees but also graduating from them. The challenge UTEP is facing is concerning the percentage of women graduating from a STEM-related field being only 19.5% compared to the males, which is 80.5%, according to the Business Hispanic Magazine. This trend is not only evident in UTEP, but also nationwide. The main problem in El Paso is how the culture stereotypes women to a concept that the only thing that they can achieve is being a housewife, teacher, nurse, doctor, or other non-STEM professions and that men are better at STEM degrees. The main problem is the lack of awareness and reliability to the human aspect of STEM occupation. Team eSTEM is focused on improving the emotional connection young minds have toward such careers.

We want to implement a new five-day summer camp that would be offered to all El Paso middle school girls, free of charge. This would be called UTEP eSTEM Summit Camp and would entail a curriculum biased on STEM fields. Our goal is to initiate interactive, hands on lab in the UTEP engineering building. The events would be fun challenges, competitions and, free lunch. Each subject will be covered so that the young minds become acquainted with the opportunities such fields provide. For example, science activities would include, extracting DNA and Technology would include, assembling a robot and constructing a solar oven. Engineering would include, chemical experimentation by creating your own lip-gloss and on the other hand Mathematics would include, matrix decoding and string art.

eSTEM would unite all UTEP STEM organizations and would require volunteer involvement. eSTEM will also make every participant in the summer camp, a junior member of the eSTEM organization. Doing that we will retain them and promote an impact in their
career paths so they decide to come back and keep volunteering for the next summer camps and create a greater interest for them choose an STEM major and also in UTEP. We would dispense a personality test or speak directly to all middle school girls in order to spark the initial interest . Parents would need to be reached by student invitations sent home from school. The budget would be $15,000 with a $5,000 sponsor by media coverage incentive.

TED Talks is another implication to guide high school juniors and seniors and encourage them to learn about what STEM-fields are specifically. Who graduates in STEM fields and what do they do professionally? The idea of the TED talks is to motivate the girls to study engineering by making conferences with important woman engineers or man that where motivated by woman engineering. It will assure the girl’s confidence and will motivate them to start an engineer career, if they are interested.

The next step in our plan is to reform college clubs to have outreach for middle school students and starting out STEM majors in college. We can devote $5,000 of our budget to this event.

A big problem is that college STEM freshman are intimidated in their introductory classes. A woman is often alone in the class and doesn’t have much to relate to with their fellow students. Building a network of current female college students will help students starting out feel welcome and like they belong. Both the summer camp and TED Talk will inspire girls to develop a new perspective of STEM professions. A quote from the US Department of Commerce did a similar experiment, here are the comments on their successful results, “Through surveys and interviews, Schaefer discovered middle school students experiencing college for the first time did not usually enjoy their first day on campus, but felt more comfortable as the week progressed. By the end of the week, students were talking about college with excitement and discussing a desire to take Advanced Placement courses in high school to get a head start. A major theme that emerged from conversations with students was a deep satisfaction in being able to navigate the college campus.” These facts prove that middle school kids are starting to get a spark of interest on where they want to go to college.

Our strategy is simple and effective and it won’t require a lot of money. The eSTEM program and the TED talks is an efficient way to attack the problem. Our goal with this program is to raise the women’s enrollment and graduation rate by 20 percent over the course of five years.
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   2. A Lack of Encouragement
   3. Women Lack Awareness of the Diverse Employment Opportunities in Engineering

C. Recommendations to Increase the enrollment of Female Students at the University of Texas at El Paso’s College of Engineering..........................................................5
   1. The development of a new four year, 4 level program for UTEP female students, consisting of community activities, mentorship programs, leadership and human relation courses which meet industry needs.
      a. Level 1 “The Emerging Stage”
      b. Level 2 “The Development Stage”
      c. Level 3 “The Maturing Stage”
      d. Level 4 “The Professional Stage”

D. Desire Result..............................................................................................................................................6
   1. To create a structure to ensure retention & success that attract and retain Female Engineer Students at the University of Texas at El Paso, by creating a community that supports a culture of confidence, drive and intelligent skills.
2. Develop a support system for women as part of their educational experience that focuses on women who are about to enter the College of Engineering, thinking about joining or are currently enrolled in it.

3. Provide assistance in finding internships, coops and employment with organizations that are committed to removing barriers for women in Engineering Community.

4. To be established our female students with professional engineers, who can mentor them into a path of confidence, skills enrichment, career inspiration and goal setting success.

E. Conclusion
Introduction

Women comprise over 53.88% of the student population at the University of Texas at El Paso. Unfortunately, only about 20% of that number is enrolled at the College of Engineering.

The number of women enrolling in engineering programs has been declining in recent years, although enrollment of females in other post-secondary programs is increasing. Engineering in Software, Technology, Electrical and in other fields are becoming ever-present in the lives of young people, including girls and young women, yet education and employment in engineering fields are not attracting women.

It is well documented that women are under-represented in the Engineering field at the University of Texas at El Paso. Extensive research has identified a variety of contributing factors for women’s lack of participation. The reasons are many, varied, and often inconsistent or contradictory. Some of the most documented explanations fall under the following categories:

1. General lack of information or inaccurate perceptions about Engineering.
2. Women’s lack of ability or interest
3. Lack of influencers & role models
4. Professions unappealing image – negative stereotype; geeky, boring, isolating
5. Male dominated culture of Engineering.
6. Unequal treatment, discrimination, hostile environment

This lack of participation is a concern, and has caused us to investigate possible reasons, and to propose recommendations for increasing the number of women enrolling in engineering programs at The University of Texas at El Paso.

Increasing the enrollment of women in engineering programs will create opportunities for women that they might not considered as they face issues in obtaining and retaining engineering jobs. Corporations will benefit from having a more diverse workforce and society as a whole will benefit as women can play an integral part in addressing the skills shortage in The United States and their participation in engineering careers will support economic growth. The University of Texas at El Paso will benefit by seeking to better serve the needs of industry and the community.
1. The Culture of Engineering favors Men over Women
   Traditionally males have entered the Engineering profession through math and computer science. Many women have entered the field through different academic paths and non-traditional sources. In a recent study of the New York Times, it was discovered that women now earn close to 60% of bachelor's degrees overall, but only 20% of the degrees in computer science, 20% of those in physics, and 18% of those in engineering.

   The study focused also on the Engineering Culture based on women discrimination, and found out as an example, that women had been disconcerted to find themselves as one of only three girls at a physics course in college, and even more so when the other two dropped out. Also, the constant teasing and harassment of their male classmates or sometimes even teachers have played a negative influence role in this gender inequality problem.

2. A Lack of Encouragement
   According to Yale Physicist Professor Meg Urry, the minds of young female engineers might naturally be subjected to under-rate their intelligence because a cultural concoction or a difference in how female brain responds to encouragement, based on a male driven culture.

   According to the words or Professor Meg Urry, Women need more positive reinforcement, and men need more negative reinforcement. Men wildly overestimate their learning abilities, their earning abilities.

3. Women Lack Awareness of the Diverse Employment Opportunities in Engineering
   Generally, there is a lack of information about Engineering opportunities and choices; the field is poorly defined. The popular misconception is that Engineering is a male-dominated, non-creative profession. The fact is that engineering is an exciting career because of its flexibility.

   An accurate and updated picture of Engineering is needed to reflect the current reality. Many professionals who work in the Engineering sector are problem solvers and thinkers.

   **Software Engineering** is a growing area that may be of particular interest to women and could provide new opportunities. The U.S. Bureau of Labor Statistics predicts that IT will be adding nearly 1.4 million job openings by 2020 and over two-thirds of these jobs could go unfilled due to an insufficient talent pool based on College Board findings. Women tend to be interested in fields with social impact and technology certainly impacts most of society. IT is a Software Engineering field where women can create a difference in the society, by creating the products, programs and services that will make an important difference for this world’s future generations.
Recommendations to increase the enrollment of female students at the College of Engineering

1. Development of a New Program

What is needed to attract more women to the Engineering field and to begin to address the labour shortages is a complete overhaul of how Engineering is packaged and delivered the University of Texas of El Paso’s College of Engineering.

We are proposing that an interdisciplinary program that integrates community activities, mentorship programs, leadership and human relation courses, that will enrich and develop the confidence of women, as well as igniting the passion and drive for engineering pathways of innovation and success.

Recommendations

1. New four year, 4 level program for UTEP female students, consisting of community activities, mentorship programs, leadership and human relation courses which meets industry needs.
2. The program would provide on-going support to women enrolled in this program through peer support, mentoring and counseling
3. The program will also create real life applications for learning in female supported workplaces e.g. summer internships, co-op positions, field trips
4. The program’s effectiveness will be measured by quality test that will demonstrate the students attained skills, level of confidence, motivation and enthusiasm towards the College of Engineering and a career in the Engineering field.

a. Level 1 “The Emerging Stage”
   • College activity rotation interactive
   • Interactive presentation of world innovators
   • Mixer intro of Faculty and students
   • Collage of inspiration media
   • Team building activities

b. Level 2 “The Development Stage”
   • Student organization according to interests and major.
   • Encouraging Men and Women faculty advisors
   • Introduction to laboratory research
   • Resume Workshop
   • Presentation and Critical Communications

c. Level 3 “The Maturing Stage”
   • Professional Mentorship (Student Alumni Association)
   • Intensive Innovative Research
• Team Building Leadership Workshop
• Community Outreach
• Internship Mock Interview and Resume Revision

d. Level 4 “The Professional Stage”
• Leadership and Conflict Resolution Workshops
• Education and Career Future Analysis
• Professional internship
• Elevator Pitch Workshop
• Professional Resume and Mock Interviews
• Professional Field Study Program

Desired Results

5. To create a structure to ensure retention & success that attract and retain Female Engineer Students at the University of Texas at El Paso, by creating a community that supports a culture of confidence, drive and intelligent skills.

6. Develop a support system for women as part of their educational experience that focuses on women who are about to enter the College of Engineering, thinking about joining or are currently enrolled in it.

7. Provide assistance in finding internships, coops and employment with organizations that are committed to removing barriers for women in Engineering Community.

8. To be established our female students with professional engineers, who can mentor them into a path of confidence, skills enrichment, career inspiration and goal setting success.

Conclusion

In summary, this report demonstrates that an integrated Engineering approach for women would address the underrepresentation of women in the Engineering field, and would begin to address the labour shortage facing the United States and the rest of the world in the Engineering sector. This includes developing a new four year, 4 level program, creating a community of women learners, connecting women with professionals and successfully positioning women in an engineering career that they feel satisfied with.
Trajectory is paramount. The role of developing a pathway for women in STEM fields throughout the process of their education plays a causal role in determining recruitment and retention as prospective STEM students and ultimately as STEM Graduates. In review current academic literature on female roles in STEM fields show both the qualitative and quantitative absence of women, which hurts the field of science as a whole. Espinosa, Ong, Orfield, Wright elaborate on this data by stating “Women and racial/ethnic minorities, and especially women of color—women from African American, Asian American/Pacific Islander, Chicana/Latina, and Native American groups1—represent tremendous untapped human capital and could further provide a much-needed force for sustaining America’s economic vitality” (Espinosa, Ong, Orfield, Wright). Gender and racial/ethnic diversification within STEM is importantly linked to the academic and scientific enterprise itself: minority women’s unique backgrounds, cultural traditions, perspectives, and experiences could bring dramatically new approaches to scientific discovery and innovation and could be leveraged to help solve the complex technological problems of our time (ACGPA, 2009; Bement, 2009).

The Big Sister and little sister model is to have a minimum of two advisors who are in a STEM field to mentor undergraduates and graduate STEM students to pursue their goals. In addition to this we will need to have a committee board held by deans and chair departments faculty to aid these students. Once a team of undergraduates and graduates students has been created these students will go out in the community to aid elementary, middle, and high schools that have a lower income first. At an elementary level the mentors will simply introduce the topic of what STEM is and what they do. At a middle school level the mentors will have projects with the students where they see how STEM interacts on a day-by-day basis. At a high school level the mentors will have more advanced projects and help them compete in various
fields, and show them what it is that is done at a College level and where you can take this passion to. It is crucial that these mentors are dedicated to their mentees because this will lead on to the college level. In the college level a senior undergraduate/graduate student will mentor a freshman and guide them.

**TIME TABLE**

Our policy incorporates a five-year pathway that starts with deep recruitment action from low-income feeder schools in various independent school districts that will promote and advocate STEM field education on the middle, high school, and the collegiate level. This five-year time table shall establish a class starting in middle school that will allow an expansive population of women to feel prepared and included the STEM education field by the time they enter the University of Texas at El Paso.

**FUNDING**

Proposed budget for this project was set to be $100,000 for a five-year program. This program includes having a budget for actually having two advisors, and five mentees that will later become mentors to go into the community. The following outline is a rough a five-year plan where we can consider we will have grants, scholarship and stipend opportunities. This comes with possible partnerships with existing groups at the University of Texas at El Paso.

**Prospective Budget**

**Year 1 - 15,000**

- 6k 2 Faculty Coordinators
- 3k each stipend
- 8k Program outreach 16 dollars hourly -> 100 hours
- 1k Service Award
- N/C Interns

**Year 2 - 20,000**

- 6k 2 Faculty Coordinators
- 3k each
- 3k Student/Graduate Assistant Coordinator
- 8k Program outreach 16 dollars hourly -> 100 hours
- 1k Service Award
- N/C Interns
- 2k Outreach Materials Budget

**Year 3 - 20,000**

- 6k 2 Faculty Coordinators
- 3k each
- 3k Student/Graduate Assistant Coordinator
- 8k Program outreach 16 dollars hourly ≤ 100 hours
- 2k Outreach Materials Budget
- 1k Service Award
**Year 4 - 20,000**
6k 2 Faculty Coordinators 3k each
3k Student/Graduate Assistant Coordinator
8k Program outreach 16 dollars hourly ≤ 100 hours
1k Service Award
2k Outreach Materials Budget

**Year 5 - 25,000**
6k 2 Faculty Coordinators 3k each
3k Student/Graduate Assistant Coordinator
8k Program outreach 16 dollars hourly ≤ 100 hours
2k Outreach Materials Budget
5k Stem 1301 Course

**ACTION STEM by Committee**

This structure is based on invitations to chair and participate in this committee

*Chairman of the Committee*
- Richard Schoephoerster, Ph. D.

*Vice Chairman of the Committee*
- Dr. Kathleen A. Curtis, Dean, College of Health Sciences

*Board Members*
- Dorothy Ward, Director of the Entering Student Program
- Ann Gabbert, Asst. Director of the Entering Student Prgm.
- Dr. Robert Kirken, Dean, College of Science
- Acosta, Arturo - College of Health Sciences - Social Work
- Dr Natalia Villanueva-Rosales CS Research Assistant professor UTEP
- MentorNet Advisor- Dr. Gates

**Appendix**

**PARTNERS**
- Time Warner Cable-Connect a Million Minds. Status: Local and Market
  - [http://www.connectamillionminds.com/](http://www.connectamillionminds.com/)
  - [http://business.utep.edu/Students/bcc.aspx](http://business.utep.edu/Students/bcc.aspx)
- Nexus. Status: Institutional-
  - Ingrid I. Wright-Alumni and External Relations Coordinator
• UTEP Community Outreach. Status: Institutional
  ○ http://coe.utep.edu/ted/index.php/outreach-service

• Learning Communities. Status: Institutional
  ○ Dr. Ann Gabbert

• Science Runway. Status: Market
  ○ http://www.thesciencerunway.com/

• Institutional Tech Services (Local School Districts) Status: Local
  ○ EPISD

• Mentornet Status: Institutional
  ○ Dr. Gates- MentorNet Supervisor

References:

Team 15

Purpose:
To increase awareness of Science, Technology, Engineering, and Mathematics (STEM) through 8th-12th teachers.

Additional Authority:
UT System

Scope:
Target eighth through twelfth grade teachers to raise awareness in movement of (STEM) field by emphasizing women.

Responsible Party:
Mike Loya Center for Innovation and Commerce, College of Science, College of Engineering, College of Liberal Arts, and College of Education.

POLICY

I. Policy Statement/The National Agenda

The number of women that enroll in STEM fields has decreased and remained at about 12% and out of that around 25% work in the same field. The main goal of this policy is to increase the number of women that enroll in STEM fields. Research has shown that interests for engineering and computer fields peak at around late elementary and early middle school.
II. Formulation

According to research the most effective way to attract and retain women in the STEM fields is to do hands on work. Teachers will be demonstrated activities performed in (STEM) fields by UTEP staff so teachers can spread awareness to students. The critical age to carry out these workshops for students is between grades 8 and 12. This is when an individual is more inclined to choose the type of industry they will decide to work in. To implement this strategy The University of Texas at El Paso is to engage in the following.

A. As part of all university courses, students in STEM fields are required, as part of the courses curriculum, to participate in workshops at high schools to directly engage students. Students are to be engaged in the following ways:
   1. An introductory session that defines the roles that are most popular and available in the STEM fields will be given to the students to create a basic understanding of the work that professionals in these fields do.
   2. After the introductory session workshops are to be carried out that involve hands on activities. As it has been proven by extensive research hands-on activities are what help women pay more attention and increase their interest in STEM fields. Workshops should be engaging and complemented by exciting activities.
   3. Teachers are to be given another course that will help them understand how stereotypes can affect the career path a person decides to pursue. As shown by research, teachers only tend to persuade boys to go into engineering and other STEM fields. This is also true for parents. With a basic understanding about how to encourage all students equally on pursuing a career that interests them and complements their strengths, more and more will teachers push for women in STEM fields.
   4. In all session workshops it will subliminally emphasize that women in STEM fields can be successful. There are to be women role models and women students in the STEM fields presenting in all session workshops and encouraging that everyone has an equal chance to make it in the STEM fields.
   5. In the workshops it is important for professors and student volunteers to instruct the teachers from 8th to 12th grade about encouraging students to which they see have potential to excel in any of the STEM fields and to refer them to the Program Director of this initiative in order to gain their interest
in STEM fields and have them engage more in programs that UTEP already has to offer such as RET, Nexus, EXCITES.

III. Adoption

The University of Texas at El Paso along with the Mike Loya Center for Innovation and Commerce should push the colleges that have majors in the STEM fields to target schools in the El Paso area to focus their efforts in.

A. El Paso High School would be the first target, intriguing teachers to implement (STEM) project strategies and spreading awareness to students.

B. Over the last few years, UTEP, has created University classes that are relevant to each college (Engineering, Business, etc.) As part of the curriculum students are to participate and be involved in this initiative in order to pass the class. A minimum of 10 hours should be dedicated to these efforts as a requirement of each class.

IV. Implementation

This initiative is to be presented to selected deans of ever college. Once approved it should be presented to UTEP President Diana Natalicio. If Dr. Natalicio approves this initiative then it should be taken to the UT System.

A. Once the UT System approves of this initiative it should be implemented throughout all the selected colleges that teach STEM and have college specific university courses.

V. Evaluation

Like mentioned before there are to be selected schools that represent key strategic places to start that will also aid in the evaluation process.

A. Principals at the schools will aid the process of surveys to measure performance and growing interest in women in the STEM fields with yearly surveys on their interest in any of the STEM fields and seeing what is the rate of change between each grade
from 8th grade in middle school to 12th grade in high school and seeing if there will be an increase in enrollment within STEM fields

B. UTEP is to track the growing interest and see the percentage of women that become interested and eventually enroll in the STEM fields offered at UTEP.

C. After, a yearly workshop we can survey everyone who participated to see how effective the workshops and activities are as soon as they are done in order to prove minor problems throughout the initiative.