Femineers: A Model for Attracting and Retaining Girls in STEM

Dr. Gerri Cole, Outreach Program Director
Dr. Mariappan “Jawa” Jawaharlal, Professor of Mechanical Engineering
Ms. Jaklen Keshishyan, Graduate Student, CSU Long Beach

Learn by Doing
Making Imagination Real
Cal Poly Pomona College of Engineering

- **Large** – 5,500 students
- **Diverse** – HSI, 1st in CA in Hispanic engineering enrollment and degrees
- **Nationally Ranked** – 5th Best Public University among masters granting institutions (US News)
Background

• Curriculum created and funded by Cal Poly Pomona College of Engineering in 2013
• Project-based learning
• Engineering student mentors
• Initial group- 24 female students at Fremont Academy of Engineering and Design in Pomona Unified School District
• Recognized by White House
• Publicized by US News and World Report
ON THE RISE: WOMEN, STEM AND AMERICA'S FUTURE

Blanca Lopez: Making Tech Her Mission
Mission

• To inspire K-12 female students to pursue STEM (Science, Technology, Engineering, and Math) in their education and future careers.
Goals

1) Provide K-12 female students with project-based learning opportunities.

2) Provide professional development workshops to K-12 teachers who will facilitate the Femineer Program at their respective schools.

3) Provide assistance from Cal Poly Pomona professors and students in implementing the Femineer Program at K-12 partner schools.

4) Provide K-12 students and their families with opportunities to participate in other engineering outreach events at Cal Poly Pomona.
Selection Criteria

• Minimum 3.0 GPA
• Minimum B average in math classes
• Outstanding behavior
• Outstanding attendance
• Recommendation from teacher
Program Implementation

- 3-year program
- Cohort of approximately 24 female students per K-12 partner
- Each school year, students are engaged in a 30-hour project where they develop a finished product.
- At the end of each school year, each participant will present her finished product at a Femineer Summit.
Year 1 Curriculum

Creative Robotics

• Safety procedures
• How to use tools
• How to work in teams to design robots out of everyday materials
Year 2 Curriculum

Wearable Technology

• Basic Circuitry and C programming
• How to use conductive thread, bright neopixels, and wearable microcontrollers
Year 3 Curriculum Plans

Under development

• Learning how to program in languages like Scratch and Python
• Raspberry Pi
CSU STEM VISTA Builds Capacity

• STEM Student Success Coordinator/Community Liaison
• Build capacity to support student success in STEM
• Enhance outreach and retention in STEM fields
• Historically underrepresented and underserved populations, including women
• Reduce poverty in the community through education
Community Engagement

Community Organizational Approach

• Identify common goals
• Reaching goals
• Highlighted attributes of the build environment
• Built self-efficacy within the STEM discipline
Community Engagement

Outcomes

• One-on-one discussions with the Femineers about their goals and aspirations

• Monthly Femineer meetings that informed the girls about upcoming events, and empowered them to seek out greater opportunities to reach their goals
Community Engagement

Outcomes cont’d

STEM Self-Efficacy

• Classroom visits from Cal Poly Pomona Engineering Alumna and Associate Dean Dr. Cordelia Ontiveros

• Group Expedition off-site

• Leadership Positions
Stay Updated:

Website:

http://www.cpp.edu/~engineering/diversity/cppwe/femineers.shtml
Contact Us

For more information, contact us at:

cpp_we@cpp.edu.
Questions???
An Innovative Approach to Recruiting and Retaining Women in Engineering

Dr. Cordelia Ontiveros, Associate Dean for Academic Programs and Student Services
Dr. Gerri Cole, Outreach Program Director
Cal Poly Pomona Women in Engineering

CPP Women in Engineering: Designing, Developing, Creating the Future
Cal Poly Pomona College of Engineering

- **Large** – 5,500 students
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Why and How CPP WE Started

- Female enrollment below national average (13% vs. 19%)
- Reviewed existing programs: Purdue and RIT
- Developed Mission, Vision, Program Outcomes, Learning Outcomes
Who We Are

- A student support program within the Dean’s Office of the College of Engineering
- Established to provide opportunities and support for all female engineering students

Dr. Cordelia Ontiveros,
Associate Dean for Academic Programs and Student Services

Dr. Gerri Cole,
Outreach Program Director

Ms. Nicole Gutzke,
PLTW and CPP WE Program Coordinator
About CPP WE

- Open to all College of Engineering students
- Membership is not required
- Events and support services are free of charge
- CPP WE is NOT a club, although we encourage partnerships with SWE (Society of Women Engineers), Phi Sigma Rho (STEM sorority), and other student organizations
Mission

• Engage **ALL** women within the College of Engineering

• Promote a close community for female engineering students by providing proactive retention activities.

• Create an environment in which women can thrive in the classroom and beyond in their careers.
Program Outcomes

• CPP WE will engage current students through K-12 outreach activities for young women to increase awareness of and exposure to multiple engineering programs and their great impact on society.

• CPP WE will provide a welcoming environment for prospective students to learn about the college of engineering and the women in engineering programs.

• CPP WE will retain and graduate current female students by fostering a supportive community and enriching their experiences within the college of engineering.

• CPP WE will create a supportive network to provide mentoring to current female students and to increase career and internship opportunities for current female students.
How CPP WE is Funded

CPP WE has been fortunate to receive support and recognition from industry in the form of donations and grants.

- Edison International
- Kellogg Legacy Grant

• These funds are used to:
  - Provide interactive faculty and alumnae workshops and seminars to current female engineering students
  - Provide support for on campus events
Student Roles

CPP WE Student Coordinators

• Three student assistants coordinate and facilitate CPP WE student activities
Student Roles

CPP WE Ambassadors

• ALL female engineering students are invited to apply to be a CPP WE Ambassador!

• Responsibilities:
  - Be trained to provide College of Engineering tours
  - Help introduce other young women to engineering
  - Facilitate the CPP WE table at campus events
  - Serve as a student representative, mentor, and leader
CPP WE Activities 2015-16

• Student Welcome Lunch
• Faculty Lunch Gatherings
• Resume Building Workshop
• Faculty-Student Chats
• Quarterly Ambassador Meetings
• Study Sessions
• Alumnae Speaker Series
• Introduce a Girl to Engineering Day
• E-Girl
• Ambassadors End of Year Recognition
• Graduate Recognition
WE Chat

- Provides the opportunity for female faculty and students to connect and learn about each other.
- Faculty engage in conversations about their career paths.
WE Chat Results

• Attended by all year levels and majors
• Increased levels of confidence
• Desire to seek out the faculty hosting the chat as a mentor
• Increased knowledge about the faculty’s life and career
• Desire to attend more events hosted by CPP WE
WE Chat Results

Statement 1: I am confident in my abilities as an Engineering student.

- Strongly Disagree (SD): 0%
- Disagree (D): 3.40%
- Neutral (N): 18.60%
- Agree (A): 55.90%
- Strongly Agree (SA): 22.00%
- No Response (NR): 0%
Statement 2: After participating in the CPP WE chat with Faculty, I feel more confident in my abilities as an Engineering student.

- Strongly Disagree (SD): 0%
- Disagree (D): 0%
- Neutral (N): 6.80%
- Agree (A): 52.50%
- Strongly Agree (SA): 40.70%
- No Response (NR): 0%
WE Chat Results

Statement 3: I am intimidated by faculty and am unsure how to interact with faculty.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Strongly Disagree</td>
<td>22.00%</td>
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<tr>
<td>Disagree</td>
<td>45.80%</td>
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<tr>
<td>Neutral</td>
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<tr>
<td>Agree</td>
<td>10.20%</td>
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<tr>
<td>Strongly Agree</td>
<td>1.70%</td>
</tr>
<tr>
<td>No Response</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
WE Chat Results

Statement 4: As a result of participating in the CPP WE Chat with Faculty, I learned something new about the faculty that I did not know before.
WE Chat Results

Statement 5: Being in a room with other Engineering females provides me with a sense of community.

- Strongly Disagree (SD): 0%
- Disagree (D): 0%
- Neutral (N): 5.10%
- Agree (A): 39.00%
- Strongly Agree (SA): 55.90%
- No Response (NR): 0%
WE Chat Results

Statement 6: Mentorship is important to me.

- Strongly Disagree (SD): 0%
- Disagree (D): 0%
- Neutral (N): 1.70%
- Agree (A): 40.70%
- Strongly Agree (SA): 57.60%
- No Response (NR): 0%
Statement 7: As a result of participating in this event, I feel that I could easily seek out the faculty hosting the chat as a mentor.
Statement 8: After this event, I am more likely to participate in future Cal Poly Pomona Women in Engineering (CPP WE) activities.
WE Talk (Alumnae Speaker Series)

• Alumnae presentation and Q & A sessions.
• Alumnae offer tools, resources, and advice to succeed in academics and professional development.
WE Talk Results

- Attended by all year levels and majors
- Students able to articulate and describe the job of the featured engineer.
- Students feel an engineering career is both possible and achievable with hard work and persistence.
- Students discover ways to improve their resume.
- Students identify at least one step they need to take to get the job/career they want.
Statement 1: I can articulate and describe the job of the featured engineer(s).

<table>
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<th>Percentage</th>
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<td>69.60%</td>
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<tr>
<td>Agree (A)</td>
<td>26.10%</td>
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<td>Neutral (N)</td>
<td>4.30%</td>
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<tr>
<td>Disagree (D)</td>
<td>0%</td>
</tr>
<tr>
<td>Strongly Disagree (SD)</td>
<td>0%</td>
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</table>
Statement 2: After participating in the CPP WE Talk Alumnae Speaker Series, I feel that an engineering career is both possible and achievable with hard work and persistence.
WE Talk Results

Statement 3: I have discovered ways to improve my resume to make myself more marketable to potential employees.
WE Talk Results

Statement 4: I have identified at least one step I need to take to get the job/career I want.

<table>
<thead>
<tr>
<th>Response Level</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Strongly Disagree (SD)</td>
<td>0%</td>
</tr>
<tr>
<td>Disagree (D)</td>
<td>0%</td>
</tr>
<tr>
<td>Neutral (N)</td>
<td>17.40%</td>
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<tr>
<td>Agree (A)</td>
<td>47.80%</td>
</tr>
<tr>
<td>Strongly Agree (SA)</td>
<td>34.80%</td>
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Quarterly Kick Off Meetings

• CPP WE Ambassadors are invited to organize events and activities.
• Ambassadors share announcements and volunteer opportunities.
Fall Student Welcome Lunch

• Welcome incoming female engineering students.
• Students meet and interact with engineering students, faculty, alumnae.
Student Outreach

Introduce a Girl to Engineering Day

• Annual event on Cal Poly Pomona’s campus
• 100 middle school girls from local area attend
• Encourages the exploration of careers in engineering
• Hands-on activities and lab tours
Student Outreach

E-Girl

• Annual event on Cal Poly Pomona’s campus
• A part of EGR 299 service learning outreach course
• Hands-on activities
• Direct contact with successful engineering professionals and current Cal Poly Pomona engineering students
Student Outreach

Femineers

- Curriculum created and funded by CPP College of Engineering in 2013
- Project-based learning
- Publicized by US News
- Recognized by White House
Female student enrollment has increased

- Female engineering freshmen percentage has increased:
  - 15% in Fall 2011
  - 26% in Fall 2015
- Many students involved are women of color. Hispanic women represent 5% of CPP engineering students and 32% of the female population in the college.
There is an impact on faculty as well

- Faculty speak at WE Chats and attend other key events
- 2nd highest percent female engineering faculty in CA
- Leadership Roles – Associate Dean, Department Chairs
Benefits of CPP WE Activities

Network with Alumnae and Industry Reps!

Scholarship and Leadership Opportunities!

Make life long friends!
Stay Updated:

Facebook: Cal Poly Pomona College of Engineering

Instagram: Cppengineering

Twitter: Cppengineering

YouTube: cppcoe

http://www.cpp.edu/~engineering/diversity/cppwe
Contact Us

For more information about CPP WE, contact us at:

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