Creating Pathways for Success and Engagement for Women in Engineering

Ms. Jalonda NaKay Thompson, University of Tennessee at Knoxville

Jalonda Thompson has more than 13 years of progressive experience in STEM research and higher education. She is the inaugural Director of the Women in Engineering Program at the University of Tennessee, Knoxville (UT). Before this role, she has served as the Assistant Director of Engineering Diversity Programs in the Tickle College of Engineering (TCE) at the University of Tennessee, Knoxville. In her role, Thompson advises senior leadership and oversees programming that contributes to women's recruitment, retention, and graduation within the TCE. Thompson has mentored student leaders throughout her career, most recently with women-centric organizations in the college. She has served as a Chancellor appointed member of UT's Commission for Women and a board member with NASPA's Center for Women. Thompson has received numerous recognitions and honors, including the 2017 NAMEPA Outreach Program Award, 2017 NAMEPA Wings to Succeed Award, 2014 Outstanding New Professional, 2014 NACADA Region III Excellence in Advising – New Advisor (NC), and 2012 Gold Winner-Student Health, Wellness, Counseling and Related-Excellence Award.

Thompson earned a Master's degree in business administration from the University of Tennessee, Knoxville and a Master's degree in higher education from the University of North Carolina at Greensboro. She received a Bachelor's degree in biology and psychology from Salem College.

Dr. Anne Skutnik, Tickle College of Engineering

Anne Skutnik received her degree in Educational Psychology from the University of Tennessee Knoxville. The focus of her research is on precollege engineering education outreach as a complex human activity. She works as the Engagement and Outreach Coordinator for Tickle College of Engineering, UTK.

Dr. Jamie Baalis Coble, University of Tennessee at Knoxville

Dr. Jamie Coble is the Southern Company Faculty Fellow, Associate Professor, and Assistant Department Head of Undergraduate Studies and Service in the Nuclear Engineering department at the University of Tennessee, Knoxville. Her research interests expand on past work in nuclear system monitoring and prognostics to incorporate system monitoring and remaining useful life estimates into risk assessment, operations and maintenance planning, and optimal control algorithms.

Dr. Anahita Khojandi, University of Tennessee at Knoxville

Anahita Khojandi is an Associate Professor in the Department of Industrial and Systems Engineering and the director for the Reliability and Maintainability Engineering program at University of Tennessee-Knoxville. She received her Ph.D. in Industrial Engineering from University of Pittsburgh. Her research interests include decision making under uncertainty and partial information, machine learning, and reinforcement learning, with applications in healthcare, environmental engineering and sustainability, intelligent transportation systems, manufacturing, and maintenance optimization.

Dr. Angelica M Palomino, University of Tennessee at Knoxville

Dr. Angelica Palomino is an Associate Professor in the Civil and Environmental Engineering Department at the University of Tennessee, Knoxville. She joined UTK in January 2012. Dr. Palomino received her BSCE, MSCE, and Ph.D. from the Georgia Institute of Technology, specializing in Geotechnical Engineering. She remained at Georgia Tech for one year as a post-doctoral fellow in the Particulate Media Research Laboratory. Her research interests focus on the characterization and behavior of fine-grained soils, their response to changing chemical environments (i.e. changes in pH and ionic concentration), and traditional and non-traditional soil modification techniques (e.g. polymer-modified soils) for improving engineering properties. Dr. Palomino teaches undergraduate and graduate courses in materials characterization and testing, soil mechanics, geosynthetics, and soil properties.

Dr. Veerle Keppens, University of Tennessee at Knoxville

Veerle Keppens is Chancellor's professor and Head of the Materials Science and Engineering Department at the University of Tennessee. She earned her bachelor's degree (1989) and Ph.D. (1995) in Physics from the Katholieke Universiteit Leuven (Belgium). She joined the faculty in the materials science and engineering department at the University of Tennessee, Knoxville (UTK) in 2003 where studies the elastic properties and lattice dynamics of novel materials. She served as the associate dean for faculty affairs from August 2012 till October 2016. In 2015, she became department head of Materials Science and Engineering.

Dr. Ozlem Kilic, University of Tennessee at Knoxville

Dr. Kilic is the Associate Dean of Academic and Student Affairs in the Tickle College o Engineering at University of Tennessee, Knoxville. She has over 15 years of academic experience in various leadership positions. Prior to joining academia, she was an Electronics Engineer at U.S. Army Research Laboratory, Adelphi MD where she managed Small Business Innovative Research (SBIR) Programs for the development of hybrid numerical electromagnetic tools. Dr. Kilic has over five years of industry experience at COMSAT Laboratories as a Senior Engineer and Program Manager with specialization in satellite communications, link modeling and analysis, and modeling, design and test of phased arrays and reflector antennas for satellite communications systems.


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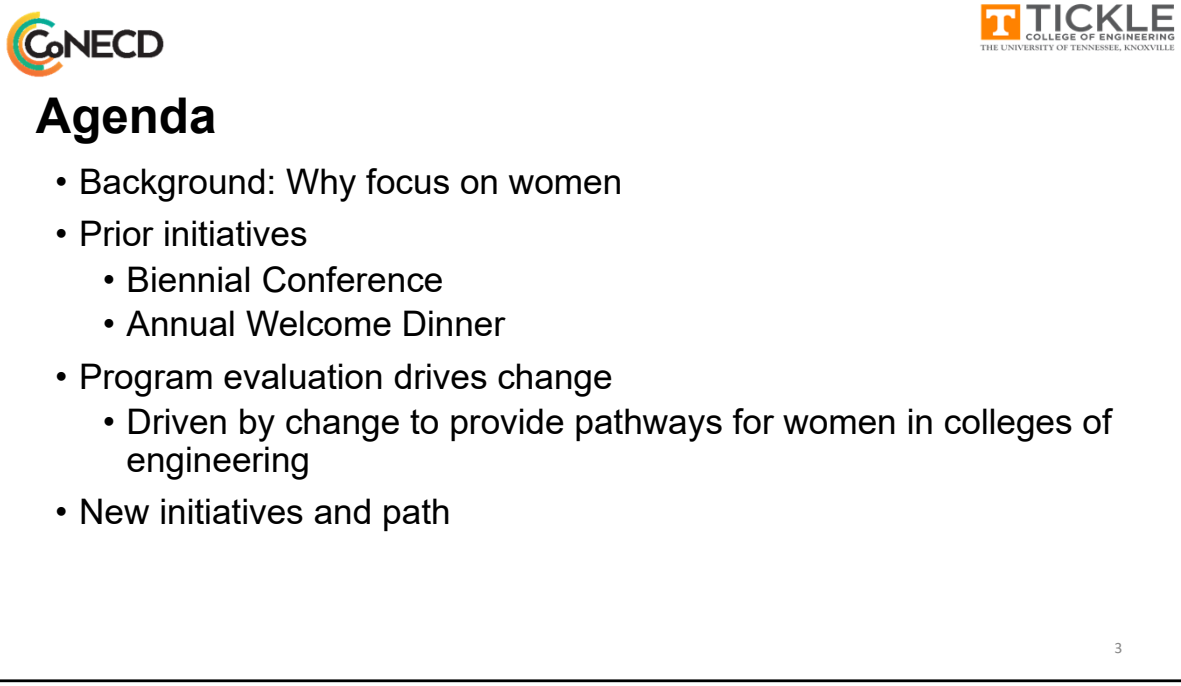
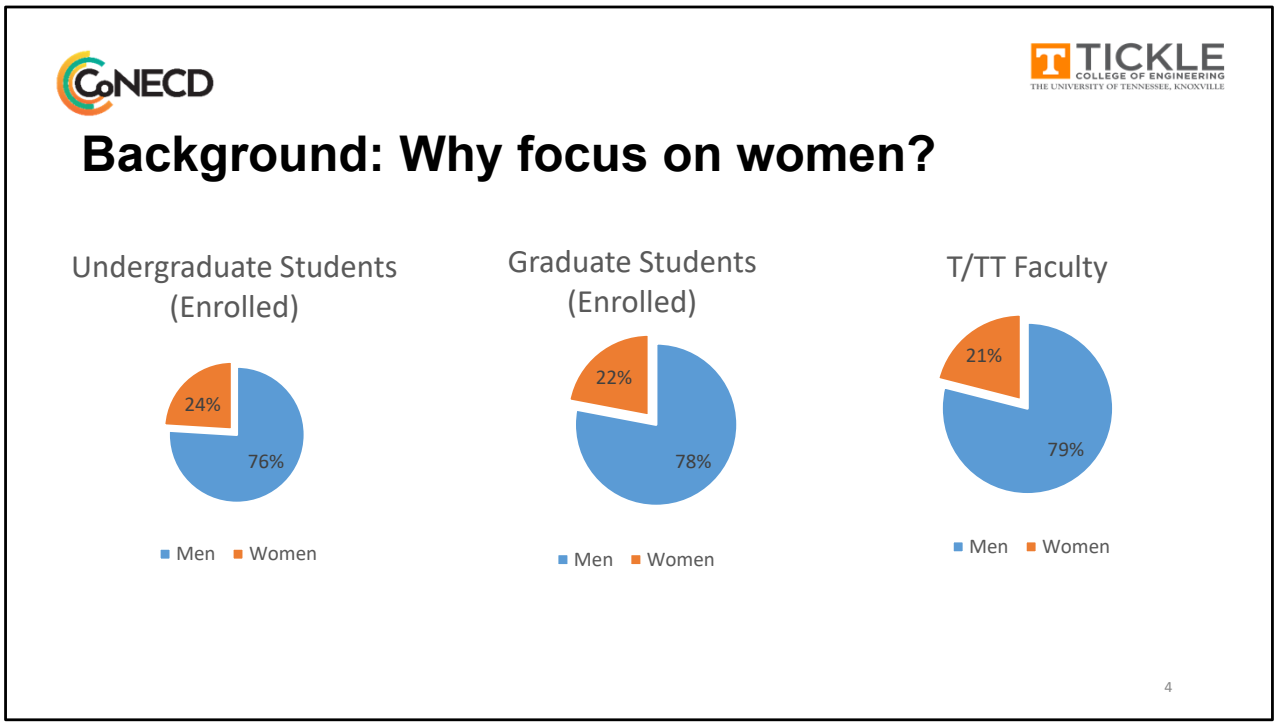


Women are underrepresented in many STEM disciplines' majors and careers, including engineering. We have found these problems also at our institution, a large research university, which has led to restructuring our initiatives to prioritize the pathway of women undergraduates, graduate students, and faculty in engineering.

This presentation will focus on the efforts of our college of engineering faculty, staff, and students to increase support for women in engineering by fulfilling our land grant mission of ensuring accessible engineering education integrated with research for student success. We will share how we use existing best practices to create and sustain innovative retention programs for undergraduate women, assist our graduate students in becoming well-rounded engineers through networking programs, and support our women faculty through continued professional development. This process engages university constituents as well as K-12 administrators, teachers, counselors and students, alumni and Board of Advisors by utilizing tools, resources, and best practices for student success.



Women are underrepresented in the field of engineering, including at the undergraduate and graduate levels. At our university, we have found that we tend to enroll and graduate students at about the national average for undergraduates (21.8% in 2018), though at lower rates for graduate degrees [3] We also are moderately higher than the national average of T/TT faculty in engineering (17.4% in 2018). But we know we can do better.

Reasons why we might have an underrepresentation of women:
1. According to current research in engineering education, studies show how narrow conceptualizations of the engineering “pipeline” overgeneralize the experiences of women into a single shared experience, ignoring the intersectionality of today’s female students [1].
2. Once in college, women are faced with lack of mentoring and social support, leading to attrition [2].

How we started

- Ground-up student-lead activities
  - Students set the tone of what would be happening
  - Faculty supported them
  - Mostly large scaled efforts

WomEngineers Day

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Many of our targeted retention programs for female students were spurred by requests and feedback from students across the college. After reading the book "Lean In", Systers (a student group to support women in electrical engineering and computer science) brought forward the idea of WomEngineer's Day, a one-day professional development conference, as well as identification of needs they saw in their program and across the college for greater mentorship and community-building among women students.

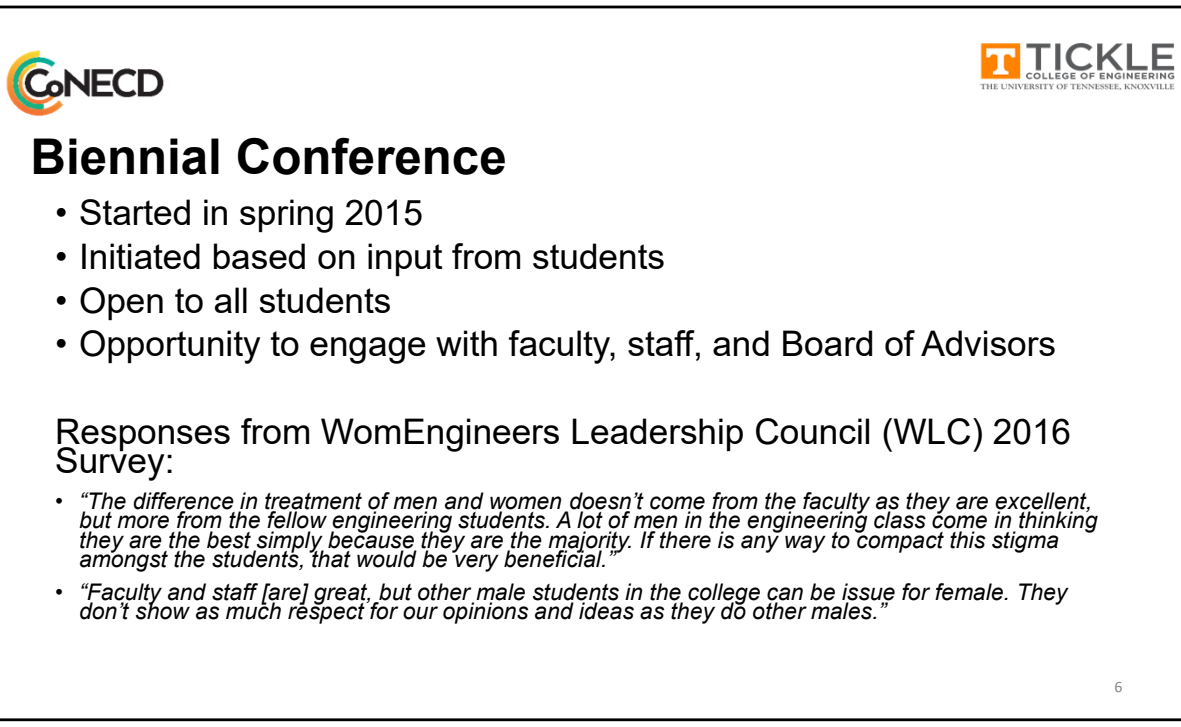
The inaugural WomEngineers Leadership Council (WLC) listening session was held in spring 2015, composed of students, faculty, alumni, and college Board of Advisor members.

For undergraduate students, the college provides critical networking and professional development opportunities to female engineering students through two periodic events: the biennial WomEngineers Day conference and the annual WomEngineer Welcome Dinner.

The WomEngineers Day conference is open to all students (all genders and class ranks) at no charge to remove barriers for attending the event.

The annual WomEngineer Welcome Dinner is targeted to first year and transfer female students to introduce them to the college and the support structures that exist in departments, at the college level, and across the university (for example, department student societies, Office of Professional Practice, Office of Diversity Programs, Study Abroad). The WomEngineer Welcome Dinner is routinely attended by student society officers, faculty, undergraduate advisors, and department heads to give our new female students an opportunity to engage with department leadership early in their undergraduate career.

Both the Welcome Dinner and WomEngineers Day conference began as collaborative efforts between the students who initiated the ideas and the college administration, faculty, and staff.



Under the coordination of the WLC, WomEngineers Day, a biennial conference was started in Spring 2015. The half-day conference focuses on skills for the long-term success of female students such as workplace leadership, career opportunities, work-life balance, and negotiation techniques.

Researchers [4] have often attributed involvement opportunities like the biennial conference to increase management skills and increase self-confidence.

The development and implementation of the WomEngineers Day conference is led by a group of students under the mentorship of the faculty, staff, and Board of Advisors members of the WomEngineers Leadership Council. We work to engage as many students in the planning and execution process as possible to ensure a broad representation of student needs and to provide leadership development opportunities to many students.

For each iteration, a student vice chair is selected through an application and interview process. The student vice chair commits to supporting the planning and execution of that year's conference as well as leading the planning and execution of the next conference (in two years) as the student chair. This gives mentorship to upcoming student chairs as well as continuity of knowledge across two-year

periods. Typically, the student vice chair is a second-year student or a third-year student intending to complete a co-op rotation to ensure they will be available for the following biennial conference.

Other major needs are fulfilled by student committees, typically with one student as the area lead and several support students. These students are also selected through an application and interview process and span the range of undergraduate and graduate students in the college. Student-led committees typically include speaker liaison (to help identify, recruit, and organize speakers), tangibles (to select, order, and organize conference giveaways and speaker gifts), communications and marketing (to promote the event through social media, design and distribute flyers, hold student registration events), student volunteer coordination (to recruit additional volunteers for day-of execution and organize those volunteers).

The conference planning team, comprised of the student chair, student vice chair, and committee leads, work together to identify the major topics for panels, workshops, and speakers during the conference. This committee-led organization and planning leads to different focuses and topics covered at each conference, so that the topics do not become stale, as many students participate in multiple WomEngineers Day conference during their time in the college.

Annual Welcome Dinner

- Started in fall 2016
- Incoming first-year and transfer women
- Opportunity to engage with faculty, staff, and Board of Advisors

Response from WLC 2016 Survey:

"Maintain the current atmosphere, but also find ways to specifically foster an environment that inspires women engineering students to continue their degree in welcoming and encouraging atmosphere."

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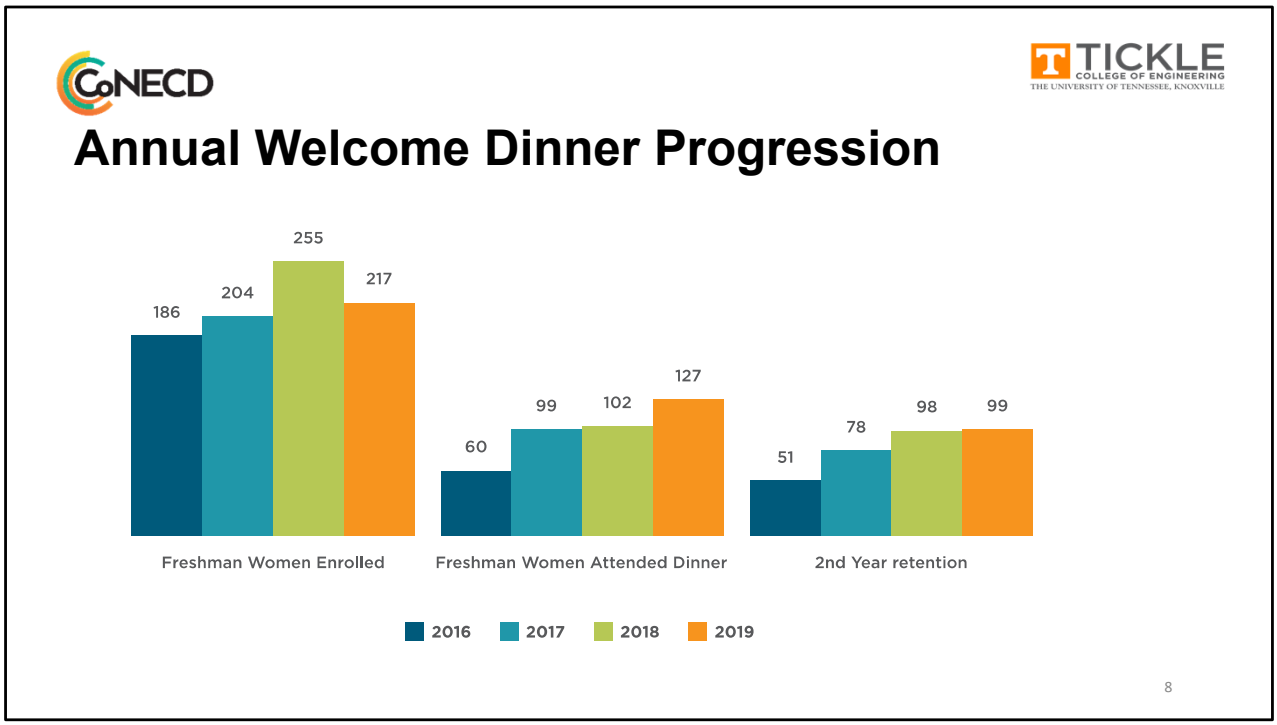
Our welcome dinner was established in response to feedback received in our 2016 survey administrated to first-year women in our honors and standard first-year engineering program.

Starting in fall 2016, the WLC also hosts an annual welcome dinner for incoming first-year and transfer women in engineering. Over the summer prior to their first-year on campus, we invite students to the welcome dinner via email and a post-card invitation mailed to their home address. Once on campus, we partner with our first-year engineering program to advertise the welcome dinner beyond our digital marketing displayed in building within our college.

The dinner provides female students an opportunity to network with faculty, explore student organizations and support services, and connect current engineering students within the college. Ultimately, this event exposes incoming female engineering students to the potential leadership, mentoring, networking, and community outreach opportunities available through the college. Equally, attending faculty, staff, members of college's Board of Advisors, and upper-level students from student organizations also benefit from the networking opportunities of engaging with these students.

The annual WomEngineer Welcome Dinner is planned and organized by college staff with input from the incoming student chair of the WomEngineers Day conference. Through invited presentations during the dinner, we highlight a successful woman (typically from the college Board of Advisors) and a successful later-stage undergraduate student. Topics and speakers of interest are identified with the help of the incoming student chair to ensure that we're providing development information and opportunities of greatest interest to the audience.



Our retention-based programs were developed in reaction to our students need for professional development and community. Our initial measure of success was based upon the number of event attendees, event satisfaction survey, and retention numbers. The Annual Welcome Dinner Progression graph reflects of our fall first-year student classes from 2016 - 2019.

The first section reflects our number of incoming first-year women enrolled in our college. The second section accounts for the first-year women who attended the welcome dinner. Finally, we collaborated with our Office of Institutional Research and Assessment to calculate how many women who attended the women dinner were retained through the 14th day of their second year within the college. In our next slide, we will examine how our retention numbers for our annual dinner compare to women in the college, college-wide, and university-wide retention from first-year to second year.

College & University Comparisons

	2015	2016	2017	2018	2019
WomEngineer Welcome Dinner Attendees	N/A	78%	96%	78%	85%
Full-Time, First-Time First-Year to Second Year Retention Rate (College's Women)	75.3%	75.9%	69.1%	75.0%	74.5%
Full-Time, First-Time First-Year to Second Year Retention Rate (College)	73.9%	74.7%	71.4%	71.1%	78.1%
University Retention Rate	86.3%	85.5%	86.8%	86.5%	88.6%

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The university retention rates came from the university's Face Book, and the college rates came from the Office of Institutional Research and Assessment. Our second-year retention rates for full-time, first-time (FTFT) first year women who attend the annual welcome dinner are retained at a higher rate compared 1) FTFT first-year women in the college and 2) FTFT first year students in the college. Conversely, our retention numbers for this group is lower than the university's retention rate. We acknowledge student's self-selection process contributing to these numbers. Moreover, students who engage in high impact programs like these are presumably already more likely to persist than those who do not participate such programming.

As of Fall 2021, we are please to announce corporate and alumni funding to support our biennial conference and annual welcome dinner. With new leadership within our college of engineering, we have marked our college's commitment to women by transitioning the management of these programs from alumni and student driven initiatives to sustainable programs with our college's Women in Engineering Program.

We are now positioned to:

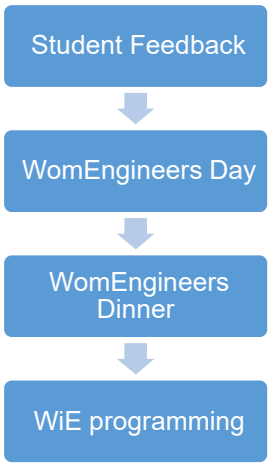
1. Connect our desire outcomes from these retention programs to shifting college-

wide priorities
2. Leverage assessment plans with our college's newly formed diversity action plan to future assess these programs

For example, research suggest that student involvement increases a student's connection to the university, increase pride in the university, and establishes positive relationships and learning outside of the classroom [5]-[6]. We are planning to assess our female students' reasons for participation and track student's engagement within the college and university (i.e. experienced classroom culture, attainment of leadership position and/or internships, etc.). This will enable us to further create pathways for student so progress from prospective students to confident leaders within industry or academia.

Program Evaluation Drives Change

- Used student feedback arguing for need to prioritize women as jumping-off point
- **BUT:** Student-lead ground-up efforts can't change the entire institutional culture of a school
  - Need combination of students-faculty-staff-stakeholders to create change [7]
  - Admittedly more reactive than proactive at first
- We realized we needed to approach our women in engineering programs from a new perspective if we wanted to sustain them



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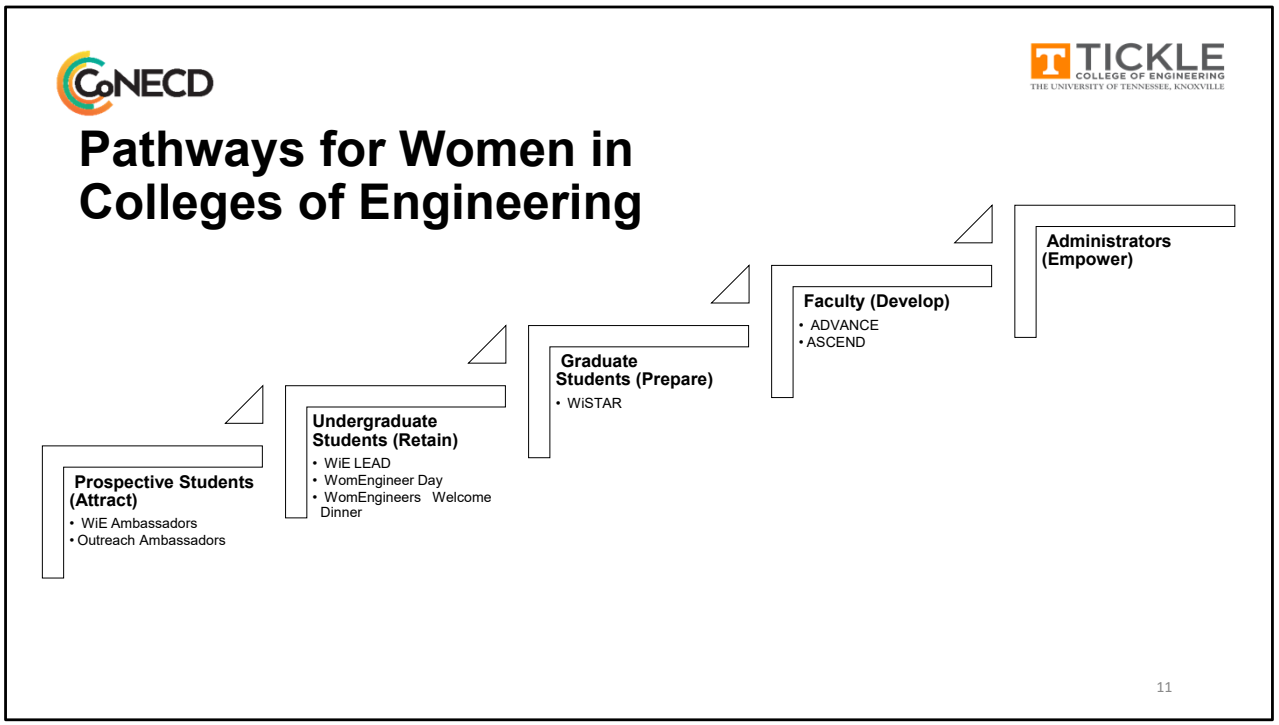
While events like WomEngineers day were student-led and ground-up change, it's impossible to sustain any meaningful change using only students. Undergraduate students are only here for four-five years, and have other demands on their time besides enacting change. Researchers [7] point out that meaningful change comes in the form of multiple invested parties like students, faculty, staff, and other stakeholders.

Luckily for us by 2016 we had already started to reach out to other stakeholders: we used the student feedback of needing more women-centered programming to conduct program evaluation of our existing offerings. We surveyed those in our WomEngineers Leadership Council as well as had focus groups and listening sessions with our Board of Advisors, students, and faculty to determine future program decisions. The programs we mention next are those that came about after these discussions.

The National Academies publication, Promising Practices for Addressing the Underrepresentation of Women in Science, Engineering, and Medicine: Opening Doors (2020) [8], recommends that significant institutional change can happen through using a change process. In this process, program planning is treated like an iterative process, with data collected and reviewed systematically to facilitate

decision-making. We see change process as an extension of change theory in that we are using evidence-based practices to guide our program changes [9]. In this presentation, we will provide evidence of our process as well as how changes have yielded positive results, and where we can go in the future.

In the beginning, as we started to make changes to our women-centric programming, we were not using an iterative, evidence-driven process. In fact, we were reactive where we should have been proactive, allowing a blend of top-down initiatives and ground-up student requests to drive programming decisions with little evaluation. As we have evolved our programs, built our team, and set our course, we have changed our process to be more reflective and intentional. We have primarily used metrics and some post-assessments to drive our program evaluations, but we are moving towards embracing a theory of change which includes retrospective assessments, focus groups, and other formative and summative measures.

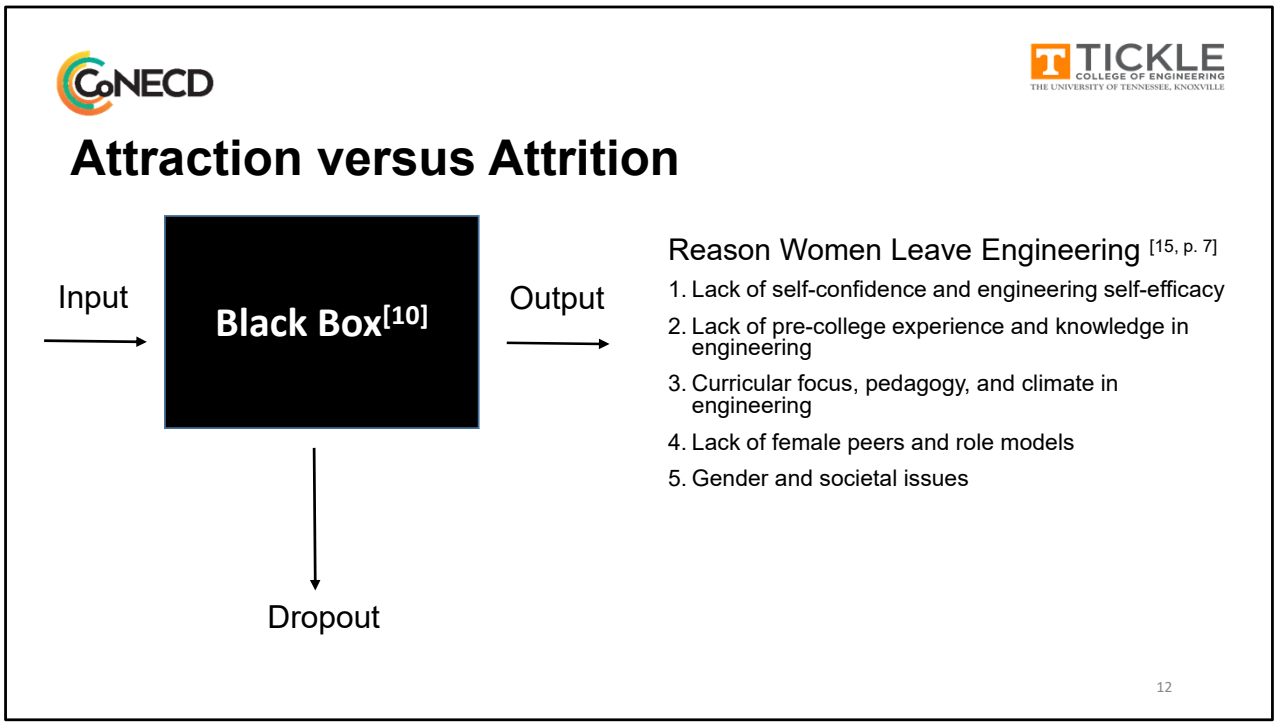


Our college's diversity action plan has helped to form our five pathways for women in our college of engineering. Specifically, we strive to contribute to the experiences of women by:

1. Creating and sustaining a welcoming, supportive, and inclusive campus climate.

2. Attracting, retaining, and graduating increasing numbers of undergraduate and graduate students from historically underrepresented populations and international students.
3. Attracting and retaining greater numbers of individuals from historically underrepresented populations into faculty, staff, and administrative positions (particularly department heads, directors, deans, and vice chancellors).

As we progress through the presentation, we will show how data help inform our initiatives, preview the initiatives, and highlight our desired outcomes and assessment plan.



As we seek to create pathways for women in engineering, we must ask ourselves what attracts women into engineering and why are women leaving engineering. Our college's Women in Engineering Program is partnering with our Engagement and Outreach Coordinator to examine individual choices and systemic issues within the K-12 system and higher education.

Padilla's retention model [10] provides some insight. At the input, we have students and faculty entering colleges of engineering from various backgrounds. The black box refers to the unknow areas connected with our women in engineering unique backgrounds and lived experiences. Seeking to understanding these factors within the black box is an important step when developing support for women in engineering.

In addition, researchers have identified five themes contributing to the attrition of women in engineering[15, p 7]:

1. Lack of self-confidence and engineering self-efficacy
2. Lack of pre-college experience and knowledge in engineering
3. Curricular focus, pedagogy, and climate in engineering
4. Lack of female peers and role models

5. Gender and societal issues

Based upon these themes, institutional data, and feedback from women in our college of engineering, we are establishing pathways to increase the number of undergraduate, graduate, faculty, and administrators within our college. Our goal is to provide transformative experiences that address these themes and shifts the narrative to a model of empowerment.

Pathway #1 – Recruiting and Yielding Undergraduate Women into Colleges of Engineering

	2016 Year	2020 Year
UG Enrollment	African American: 127 (3.9%) Hispanic/Latino: 111 (3.3%) Women: 646 (19.6%)	African American: 143 (4.1%) Hispanic/Latino: 148 (4.2%) Women: 838 (23.5%)
Graduate Enrollment	African American: 21 (2.0%) Hispanic/Latino: 31 (3.0%) Women: 209 (20.2%)	African American: 24 (2.4%) Hispanic/Latino: 29 (2.9%) Women: 208 (21.0%)

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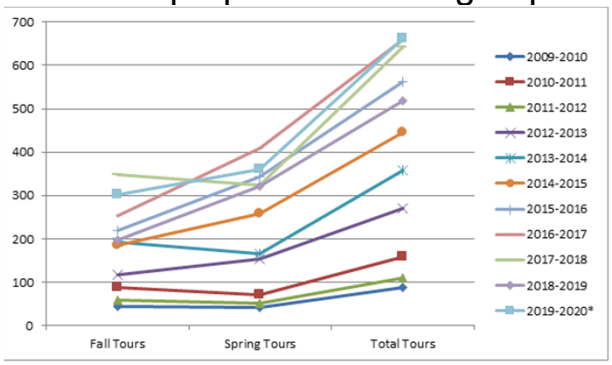
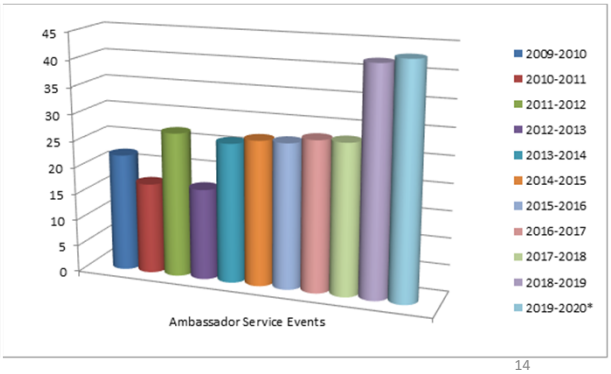
This slide depicts our enrollment numbers for our undergraduate and graduate women within our college. For both undergraduate and graduate students, we are enrolling students at about the national average for undergraduates and at a slightly lower rates for graduate degrees.

Based upon this data, the college is making strategies strides to prioritize women in engineering. The first component of this pathway focuses on our expanded outreach and recruitment efforts for women in engineering.

Ambassadors (Outreach & WiE)

- Modeled after the college's ambassador program founded in 2004
- The purpose of these groups are to increase enrollment of





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Prior to the addition of the Outreach and WiE Ambassadors the efforts to recruitment women were done through limited middle school outreach, within coed settings, or through our student organizations. For example, our Society of Women Engineers (SWE) hosts an annual outreach program for K-12 students and our college host college-wide tours and events for all prospective students interested in engineering.

The college initiated the Outreach Ambassadors and WiE Ambassadors in Fall 2020 and Fall 2021 respectively to compliment the efforts of our undergraduate recruitment team called Engineering Ambassadors. The program has many factors to measure success, including:

# of families impacted
# of tour request
# of Ambassador Hours
# of Ambassador Service Events

Represented in this slide is longitudinal data of two indicators of success, including "Number of tours" and "Service Events" conducted about the ambassadors.

With the addition of eight new ambassadors, we expect to see broader outreach to prospective students and focused efforts to yield students into our college of engineering. The next slide projects our indicators of success and assessment plan for our new Outreach and WIE Ambassadors.

Indicators of Success & Assessment Plan

Impact of WiE Ambassadors

- # of families impacted
- # of tour request
- # of Ambassador Hours
- # of Ambassador Service Events

Impact on Recruitment & Yield

- # of WiE Students Contacts
- UT Applied
- UT Accepted
- TCE Accepted
- UT Enrolled
- TCE Enrolled

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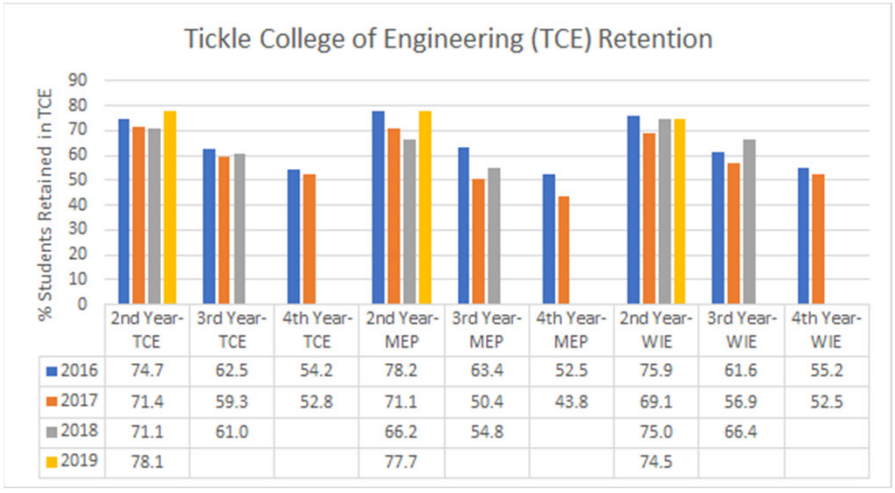
Data pulled from Ambassador Service 2019-2020 report.

Pathway #2: Retaining Undergraduate Women in Engineering Students (UG)



	2nd Year-TCE	3rd Year-TCE	4th Year-TCE	2nd Year-MEP	3rd Year-MEP	4th Year-MEP	2nd Year-WIE	3rd Year-WIE	4th Year-WIE
2016	74.7	62.5	54.2	78.2	63.4	52.5	75.9	61.6	55.2
2017	71.4	59.3	52.8	71.1	50.4	43.8	69.1	56.9	52.5
2018	71.1	61.0		66.2	54.8		75.0	66.4	
2019	78.1			77.7			74.5		

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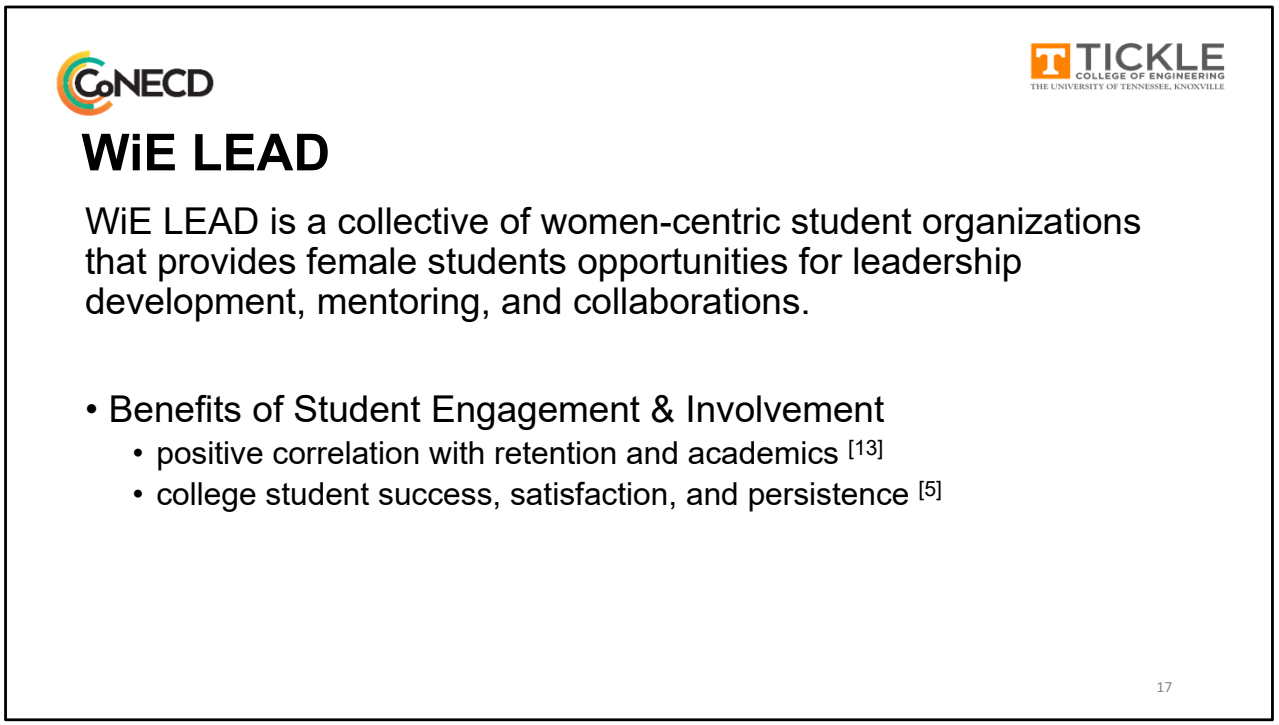
As we recruit and yield more women into the college, we must ensure that we are ready to support our undergraduate women. Prior to the launch of our new Women in Engineering Program, retention efforts were being championed by departments within our college of engineering, such as our first-year program, our living and learning community, and advising team.

Overall, women are being retained within the college. Our goal is to address the attrition that occurs during their sophomore year. As we evaluate existing efforts and seek to understand the needs of our undergraduate women, we developed a centralized mentoring model for our growing women-centric student organizations based upon several prominent women in engineering programs. [12]-[15]

Acronym Legend
TCE – college wide
MEP – Multicultural Engineering Program (African-American, Hispanic, Native American, Alaskan Native, Pacific Islanders)
WIE – Women in Engineering (all women regarding of race or ethnicity)



Prior to WiE LEAD, the college's WomEngineers Leadership Council provided a limited number of students the opportunity to develop event and project management skills, receive mentoring from C-suite alumnae, and contribute to the college's biennial conference. The day of the event student volunteers assisted in the implementation of the conference. This group was active for four months on a biennial basis.

Seeing the benefits of ongoing personal and professional development, the college established WiE LEAD in Spring 2021. Currently, WiE LEAD is a collective of five women-centric student organizations that provides female student opportunities for leadership development, mentoring, and collaborations. The groups consist of:

1. Alpha Omega Epsilon (A.O.E.) STEM Sorority
2. Society of Women in Engineering (SWE)
3. SYSTERS: Women in Electrical Engineering and Computer Science
4. Women in Industrial and Systems Engineers (W.I.S.E)
5. Women in Nuclear (W.I.N)

All groups are open to any student who supports the mission of their organization.

Indicators of Success & Assessment Plan

Indicators of Success	Example of Metrics	Assessment Type/Data Source
Retention & Graduation Numbers	• Retention of student leaders in WIE LEAD • Retention of members of women-centric groups • Graduation rates of student leaders in WIE LEAD • Graduation rates of members of women-centric groups	• Tracking via 14th day/census data • Graduation data from institutional research
Participation Numbers	• Number of students returning to future meetings, programs, etc. • Number of collaborative events hosted by WIE LEAD groups • Number of women-centric student organizations participating in college-wide retention initiatives	• Satisfaction survey measuring value in attending program • Attendance tracking
Perceptions & Behaviors	• Improved confidence in leadership ability • Increased sense of mattering and belonging	• Focus Groups • Retrospective Assessments

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As part of a campus-wide initiative, a cross-functional team in our college developed a Diversity Action Plan. The purpose of the plan is to evaluate and assess existing and forthcoming diversity, equity, and inclusion effort within our college and surrounding community. The plan was constructed with multiple layers of feedback from administrators, faculty, staff, students, and alumni.

Collectively, the WIE Ambassadors and WIE LEAD initiatives were developed to address goal # 3: Attract, retain, and graduate increasing number of undergraduate and graduate students from historically underrepresented populations and international students. WIE Ambassadors focus on the attraction of women into our college of engineering. Once in engineering majors within the college, our WIE LEAD provides opportunities for leadership development, mentoring, and collaborations among our women-centric student organizations. We hypothesize these experiences will reinforce their major choices and potential within the field of engineering.

The above table provides examples of three indicators for success and how we plan to measure it.

Pathway #3 – Retaining Graduate Students

- Women in STEM Advancing Research, Readiness, and Retention (WiSTAR^3) to support women pursuing graduate degrees across STEM disciplines
  - Initiated by a Mechanical, Aerospace, and Biomedical Engineering faculty member as part of her Higher Education Research Services (HERS) Institute experience
  - Supported through funding from the Chancellor's Commission for Women, Tickle College of Engineering, College of Arts and Sciences, and private donations
- Hosts social and development programming
  - Build community among women in STEM fields
  - Prepare students for success through their graduate studies and into their careers
- WiSTAR^3 mentoring program works with STEM professionals from UTK, Oak Ridge National Laboratory, Y-12 National Security Complex, and area companies to provide professional and career development

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Our college of engineering has several opportunities to engage STEM graduate students. Women in STEM Advancing Research, Readiness, and Retention (WiSTAR3) was established by a female faculty member in Mechanical Engineering as a home for female graduate students across all STEM disciplines to engage in networking, professional development, and social events to prepare for careers in advanced research and academia. With the nearby [NATIONAL LAB] and active women post-doctoral researchers, research scientists, and faculty at the University, role models of successful women in STEM fields are plentiful at every career level. WiSTAR3 organizes a graduate-level mentoring program that pairs graduate students at any stage with post-docs, faculty, and research professionals from across the local region to provide one-on-one mentoring, professional development workshops, and networking opportunities. WiSTAR3 provides students with additional opportunities to assume leadership roles outside of their own research and develop interpersonal and management skills to help them succeed in their post-graduation careers.

Pathway #4: - Recruiting and Retaining Women Faculty

Unit	Assistant Professor	Associate Professor	Full Professor	Total
Tickle College of Engineering (TCE)	7	8	6	21
Biosystem Engineering and Soil Science (BESS)	0	1	1	2
University of Tennessee Space Institute (UTSI)	0	1	1	2
Total	**7**	**10**	**8**	**25**

Source: ASEE in Fall 2020 – based out of 183 T/TT faculty

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This table reflects the number of tenure and tenure track female faculty across three affiliate groups associated with our college of engineering. Although our number of female is moderately higher the national average, the number of female faculty is still disproportionate to the 183 faculty with these groups.

Pathway #4: - Recruiting and Retaining Women Faculty (cont)

- ADVANCE – NSF funded effort to recruit and retain female faculty in STEM
- ASCEND Initiatives
  - Climate Improvement Strategies
  - Collaborating and Networking Strategies
  - Work-Life Integration

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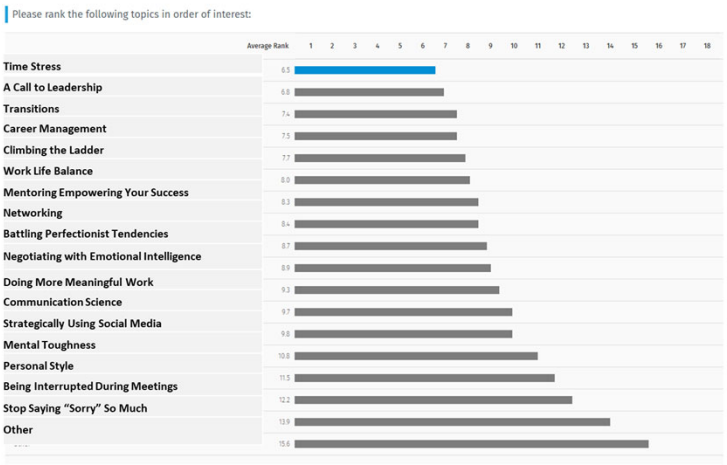
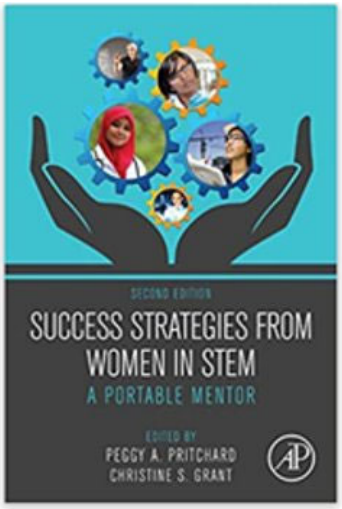
Our ASCEND initiatives target three specific institutional problems identified by female STEM faculty within our college of engineering: (1) a culture of implicit bias, (2) experience of social and professional isolation, and (3) lack of support for work-life integration.

To do so, ASCEND will have three tracks, each incorporating multiple strategies:

[UNIVERSITY]-CLIMBS ([UNIVERSITY] Climate Improvement Strategies) will tackle implicit bias and develop equity advocates within individual units,
[UNIVERSITY]-CONNECTS ([UNIVERSITY]Collaborating and Networking Strategies) will build social and professional support networks to reduce isolation, and
[UNIVERSITY]-WINS ([UNIVERSITY]Work-Life Integration Strategies) will enhance work-life integration.

Pathway #4: - Recruiting and Retaining Women Faculty (cont)





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Various activities are also undertaken to support professional development of women faculty in the college. This includes monthly meetings attended by non-tenure track and tenured/tenure-track faculty, women administrators, as well as the Associate Dean of Faculty Affairs and Engagement.

The goal of these meetings is to inform the faculty about various professional development opportunities on- and off-campus, empower the faculty, enable networking, and discuss and facilitate needed structural changes. Examples of activities include reading and discussing the book “Success Strategies from Women in STEM: A Portable Mentor;” organizing the film screenings, e.g., “Picture a Scientist,” followed by panel discussions; discussing scholarly articles related to Women in STEM; and hosting administrators to open more direct channels of communications between the administration and women faculty.

For instance, in this slide, the results of a survey are presented that was conducted in the beginning of the academic year. Women faculty inputted their preferences about the topics that were mostly drawn from the book "Success Strategies from Women in STEM: A Portable Mentor." The results were collected, a few topics were selected, and they were consequently covered and discussed in the monthly meetings.

Indicators of Success & Assessment Plan

University data is available for the impact of this program; however, it is not disaggregated enough to help us make programmatic decisions. Going forward, we will focus on college-specific data collection.

- Reduced incidents of bias
- Increase opportunities for social, professional, and leadership development
- Improved campus climate and support

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In collaborations with the university's ASCEND Program Coordinator, our college will seek quantitively and qualitatively measure the success of this program. The specific areas will focus on:
1)reducing incidents of bias;
2)increase opportunities for engagement and improving the campus climate for women faculty within the college

Summary and future directions

- Understand your why
- Evaluate existing programs
- Start with the data and explore best practices
- Partner to start new initiatives, then assess

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As we have moved to become more proactive in our decision-making, we have found that we are making positive strides towards providing well-rounded programming for our female students and faculty. We still have work to do, however, which is why we are continuously working to improve.
What we have learned:
- Understand your why: We needed to understand why we were doing what we were doing, and it came back to a call from our university students to do better and to create more opportunities
- Evaluate Existing programs: We looked at the programmatic data we had, and made decisions how to improved based upon that. We even went a step further and now have a GRA with a background in program evaluation and data analysis to help us collect more data as well as understand more about the data we have
- Start with the data: What is the data telling us? That we may be doing at the same level as the national average quantitatively, but feedback from our students and faculty tells us we can do better.
- Partner with new initiatives, then assess: When we approach this process iteratively, we can build on our prior successes and try new things, but
We will continue to develop programs to make this pathway broader and more easy to travel for all our women

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Appendix A - Acronyms

- ASCEND – Adaptions for a Sustainable Climate of Excellence and Diversity
- NSBE – National Society of Black Engineers
- SASE – Society of Asian Scientists and Engineers
- SWE – Society of Women Engineers
- WiE Ambassadors – Women in Engineering Ambassadors
- WIN – Women in Nuclear
- WiSTAR – Women in STEM Advancing Research, Readiness, and Retention
- WiE LEAD – Women in Engineering LEAD
- WLC - WomEngineers Leadership Council

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