

## **Empowering Male Students as Allies for Gender Equity Within an Engineering College**

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## **Abstract**

Women comprise more than 50% of those who attend college. In spite of this, much has been made of the chilly climate or unwelcoming environment for women in higher education. Elements of this chilly climate include both overt and covert behaviors by faculty, administrators, and students (e.g., sexist humor, stereotypical comments of women's abilities) as well as institutional policies and practices. Studies have shown that a chilly climate can have a negative impact on cognitive development and can also influence women's desire to stay and persist within a science, technology, engineering, or math (STEM) field. At The Ohio State University College of Engineering (COE), women are currently 20% of the overall undergraduate student population within the College.

Improving women's retention in engineering fields requires a multifaceted approach. Both direct support for women, along with the development of allies, are crucial to promoting a long-lasting, positive climate for women studying in this field. Allies for Women Engineers (AWE) at The Ohio State University is a pilot cohort of 11 male undergraduate and graduate engineering students who have been trained as allies for women in the COE. Through participation in a one-year program focused on gender equity, implicit bias, microaggressions, and sociocultural conversations, these individuals are equipped to act as allies specifically for women in the COE, but also for other underrepresented groups, as they move from academe into the professional arena. This paper will highlight details and logistics of the ally program as well as the first phase of assessment.

## **Introduction and Background**

Fifty percent of students pursuing undergraduate degrees in the United States are women.<sup>1,2</sup> In spite of this, much has been made of the chilly climate, or unwelcoming environment for women in higher education, particularly those in science, technology, engineering, or math (STEM) fields.<sup>2-7</sup> Elements of this chilly climate include both overt and covert behaviors by faculty, administrators, and students (e.g., sexist humor, stereotypical comments about women's abilities), and institutional policies and practices. Direct discrimination can add to this unwelcoming, even hostile, environment.<sup>7</sup> A study by Haines found that 16% of women reported experiencing sexual discrimination from faculty versus only 4% of men reporting the same. Subtle forms of discrimination can also have a detrimental effect on climate.<sup>7,8</sup> Research regarding group dynamics has shown that men interrupt women more frequently than women interrupt men, and that work contributed by a woman is often undervalued, and even exploited by men.<sup>9</sup> Many times these subtle occurrences of discrimination go unnoticed by women.<sup>10</sup> However, they can have a lasting impact on an individual's desire to persist in an inhospitable environment.<sup>7</sup>

The potential for negative cognitive effects along with the perceived hostility within male-dominated majors such as engineering often places women at a greater risk of leaving the college

or university prior to degree completion.<sup>11,12</sup> For example, in engineering the national retention rate from entry into the major to graduation is just under 60% for women and men.<sup>13</sup> Although the overall retention of female undergraduates in STEM disciplines is similar to the retention rate for men and has improved over time, understanding why women leave STEM majors is still an important area of research.<sup>14</sup> Women make up a smaller number of STEM students from the start, so the loss of women from these majors is of special concern. Studies have also found that the inhospitable environment in these disciplines can have a negative impact on women's self-confidence, thus acting as a major barrier to success.<sup>1,2</sup> Additionally, this climate is a small reflection of general gender inequity within higher education and society as a whole as it is often documented that women lag substantially behind men when it comes to their representation in leadership positions.<sup>15</sup>

The proportion of women engineers has only marginally increased in the last decade in spite of the implementation of support programs, such as mentoring.<sup>7</sup> Mentoring alone is not enough to increase the retention of women in STEM fields as it does not eliminate the career barriers women face or alter the campus climate.<sup>16</sup> Improving women's retention in STEM fields requires a multifaceted approach. Direct support for women, along with efforts involving allies, are crucial to promoting a long-lasting, positive climate for women studying in these fields. If women perceive a positive and welcoming environment, they are more likely to be retained and matriculate to graduation.<sup>6</sup>

While awareness of gender barriers for women in engineering programs is increasing, related work in the field designed to remove such obstacles is still evolving. Preliminary studies suggest that men are more likely to reject results that indicate sexism in STEM fields, in spite of the abundance of evidence that suggests otherwise.<sup>17</sup> In STEM departments, men constitute the dominant group and as such, they play a vital role in working toward gender equity.<sup>18</sup> From a social justice perspective, having allies, i.e., those from the dominant social group who understand the inequity placed on those in the minority, is critical in addressing issues with climate and improving the experience for all.<sup>19,20</sup> Since men in STEM fields have social power, they have the ability to be important agents of change.<sup>18</sup> As Munin and Speight state, "Allies are a positive, disruptive force in an overarching system of oppression that melds institutional discrimination and personal prejudice into a pervasive web of domination."<sup>20</sup>

The concept of male allies has been applied to academia at a number of institutions. North Dakota State University developed an Advocates and Allies program to lead change in addressing the chilly climate for women in technology workplaces.<sup>18</sup> Participants in this program are male faculty members whose goal is to educate other male faculty about gender inequities in academia and strive to bring about positive change in their departments. Other institutions, including Louisiana Tech University, West Virginia University, Lehigh University, and the University of Maine have adopted similar models and programs.<sup>18</sup> Evidence suggests that Advocates and Allies faculty programs have a positive impact on the men who attend the trainings; one study found that 92.7% of the male faculty who attended ally training agreed to promote a more welcoming and inclusive environment for women faculty.<sup>18</sup>

The development of male allies as an equity strategy can also be applied at the student level. Undergraduate and graduate men who are committed to promoting gender equity in STEM fields can serve as peer mentors for other male students. Gender in mentoring relationships is an important factor. Same-sex mentoring promotes more psychosocial functions and an increased comfort level within the mentoring relationship.<sup>21-23</sup> One barrier to men supporting gender initiatives is fear of lowered social status among other men.<sup>24</sup> The nonprofit organization, Catalyst, suggests that one way to remove this barrier is to expose men to male role models who are advocates for gender inclusion.<sup>24</sup> A male allies program for students can help create role models and mentors, thus countering the fear of compromised social status.

Male allies within collegiate STEM environments can help change the unwelcoming culture that women face, reinforcing a positive climate for everyone. Developing allies to support gender equity promotes all students' sense of belonging. Sense of belonging is defined as "students' perceived social support on campus, a feeling of connectedness, or that one is important to others."<sup>25</sup> Numerous studies have shown that students' sense of belonging is directly tied to retention and persistence to graduation.<sup>26-28</sup> Allies who promote a positive climate can help to create the community and connectedness that women in engineering need to succeed at higher rates than has historically been the case.

Allies for Women Engineers (AWE) at The Ohio State University is a pilot cohort of 11 male undergraduate and graduate engineering students who have been trained as allies for women in the COE. Through participation in a one-year program focused on gender equity, implicit bias, microaggressions, and sociocultural conversations, these individuals are equipped to act as allies specifically for women in the COE, but also for other underrepresented groups, as they move from academe into the professional arena.

Improved retention of students, especially women, in the The Ohio State University COE will inevitably indicate immediate success of this initiative; however, the overall significance goes beyond retention numbers. AWE promotes equity for all students in the COE while also providing personal and professional growth opportunities for cohort members as well as classmates and colleagues who participate in outreach activities led by members of the cohort. The assessment and evaluation of this program is multidimensional and includes the impact of the program on men within the cohort, as well as both men and women who attend the outreach programming throughout the year.

To understand and assess the current climate in undergraduate engineering in universities across the United States, a comprehensive survey called the Project to Assess Climate in Engineering (PACE) was conducted in 2008 and 2012 by the Center for Workforce Development at the University of Washington.<sup>29</sup> To ensure that women and underrepresented minorities were adequately represented, oversampling was done for these entries. The stated purpose of PACE is to "identify issues that affect persistence among engineering undergraduates while paying specific attention to the intersection of race, gender and academic experience."<sup>29</sup>

The PACE surveys conducted for the College of Engineering at The Ohio State University in 2008 and 2012 showed that while there was an overall improvement in the climate, there was still more that could be done to increase support for female engineering students. In 2012,

approximately 14% of female students compared to 0.3% of male students reported that they had been singled out unfairly because of their gender. Additionally, over 18% of female students compared to only 8% of male students reported having heard faculty express stereotypes about men and women.

Another metric which could be helpful in assessing the climate is the willingness of undergraduate students to pursue graduate studies. Approximately 50% of male students compared to only 39% of female students reported that they had plans to pursue a graduate degree in engineering.

The 2012 survey report concluded that “continued cultural awareness and professional development could go a long way” to change the climate in the College of Engineering at The Ohio State University. These survey results led to the development of the AWE initiative.

What follows are details and logistics of the AWE cohort curriculum, as well as a description of the first phase of assessment.

## **Approach**

### *Cohort Recruitment*

The four female leaders of AWE (or mentors, as they will be termed in this paper) consist of one associate department chair from the College of Engineering who specializes in diversity and outreach, one lecturer in the COE, one assistant director from the university’s multicultural center whose focus is higher education, and a doctoral student in higher education. The mentors worked together on the development and funding of the program as well as on leading and mentoring the students in the cohort. The goal was to recruit 20 male students as initial participants, a size optimal for large group training as well as small group work with the four mentors. Professors, academic advisors, and academic support staff were solicited for student nominations. Due to the timing of the program funding, the request for nominations was not sent until the last week of the semester, resulting in 15 nominations received. Nominees were asked to complete an application and were subsequently interviewed by at least two of the mentors. Of the 15 nominees, 13 were invited to join the program (one student didn’t respond for an interview and one student was graduating). Table 1 shows the demographics of the male student cohort. Once selected, these students were asked to come to campus prior to the start of the autumn semester to undergo four days of intensive training to prepare for the upcoming year. They were also asked to commit to spending up to five hours per week on AWE training and outreach for both autumn and spring semesters. A \$300 book scholarship for each semester completed as a cohort member was guaranteed to each participant.

Table 1. Demographics of the Male Student Cohort.

	Race/Ethnicity	Rank	Major
Student 1	Asian	Graduate (PhD)	Engineering Education
Student 2	Asian	Graduate (PhD)	Electrical and Computer Engineering
Student 3	White	Graduate (MS)	Mechanical Engineering
Student 4	White	Undergraduate (Junior)	Chemical Engineering
Student 5	White	Undergraduate (Junior)	Chemical Engineering
Student 6	American Indian	Undergraduate (Junior)	Chemical Engineering
Student 7	White	Undergraduate (Sophomore)	Computer Science and Engineering
Student 8	White	Undergraduate (Sophomore)	Industrial and Systems Engineering
Student 9	White	Undergraduate (Senior)	Welding Engineering
Student 10	Asian	Undergraduate (Senior)	Chemical Engineering
Student 11	White	Undergraduate (Senior)	Welding Engineering
Student 12	White	Undergraduate (Junior)	Electrical and Computer Engineering
Student 13	Asian	Undergraduate (Junior)	Computer Science and Engineering

### *Training*

The curriculum for the cohort was intentionally structured to leverage Broido’s model of ally development.<sup>30</sup> According to Broido, individuals first gather information needed to be an ally; they then learn to make meaning of this information, and finally apply the information within a given context.

During the intensive training before the autumn semester started, the cohort focused on the first stage, gathering information. This consisted of workshops, seminars, and speakers. One workshop centered on the book *35 Dumb Things Well-Intentioned People Say: Surprising Things We Say That Widen the Diversity Gap*.<sup>31</sup> Another workshop was on identity and several more were on teambuilding. Seminar topics included diverse social identities, women in engineering, and implicit bias. The Dean of the College, the Chief Diversity Officer of the College, and male faculty trained in diversity and inclusion spoke to the cohort. Members were trained in the purpose of their work as allies within the College, and special focus was given to the value of retaining women in engineering programs for all students.

During the autumn semester, AWE members had the opportunity to make meaning of the training, reflecting on how it impacted them personally, as well as on how it could impact their peers in the College. The meaning-making stage allowed cohort members to understand the applicability of social justice work in STEM fields and the roles they play in creating systemic change. Throughout the semester, AWE members attended training sessions on presentation skills, including how to manage an audience, how to speak in front of large groups, and how to facilitate sensitive discussions. They also worked on building cohesiveness as a group as they

started to examine possible locations and audiences for outreach in the university community. The time spent on AWE-related activities by cohort members ranged from one to five hours per week. The cohort began to understand how their work is systemic rather than immediate, something that requires continual focus. While most cohort members advanced in their understanding and application of gender equity advocacy, it became apparent that one individual was not a good fit for the group. He was asked to leave AWE but did receive the \$300 book scholarship for the semester. Another member decided during the early part of training that he didn't have the time to commit to the program and withdrew. This resulted in a cohort total of 11, 10 of whom moved forward to the spring semester as active participants (one member of the cohort took a co-op position for spring semester).

### *Outreach*

The third stage of Broido's ally development model consists of applying the information within a given context.<sup>30</sup> At the beginning of the spring semester, the cohort was divided into five teams, each comprised of two male students and a mentor. All teams were charged with implementing three student outreach efforts prior to the end of the academic year, such as workshops in residence halls or fraternities. The primary goal of these outreach initiatives was to educate other engineering students, faculty, and staff about the importance of creating an inclusive climate for all engineering students, particularly women.

In conjunction with the university's multicultural center, the cohort established partnerships with other campus units to help coordinate outreach and educational efforts. These initiatives within and beyond the COE gave the cohort opportunity to apply what they had learned to help promote an inclusive academic environment for everyone within the university and the COE. It was estimated that if each of the five teams implemented three outreach efforts throughout the university community with at least 30-50 students participating, the program would impact 450-750 students in one academic semester. Before facilitating "live" workshops, each group delivered at least one presentation to a team of mentors. At the time of this paper, all groups are conducting approved outreach events and the cohort is on track to meet outreach targets for the spring semester. The table below provides details about the outreach events.

Table 2. Outreach Events.

Outreach Events	Audience	Approximate Number in Attendance	Gender of Audience
Department seminar	Faculty, staff, undergraduate and graduate students	20	Mostly female
Industry talk on women in IT	Engineers, IT professionals	100	Mostly female
Student chapter of American Society for Engineering Education	Engineering undergraduate students	5	3 women, 2 men



Living learning community	Engineering undergraduate students	150	Approximately 50% women, 50% men
Residence hall event	Residence hall staff	50	Approximately 50% women, 50% men
First year engineering honors class	Engineering undergraduate students	72	65 men, 7 women
Fraternity	Engineering and agriculture undergraduate students	50	100% men

**Assessment**

This program features a multifaceted assessment component: a mixed methods approach for assessment and evaluation including qualitative and quantitative techniques. Pre and post surveys as well as focus groups and interviews have been or will be conducted with students in the cohort. Qualitative and quantitative analyses will be done to assess the impact the autumn training had on these students. At the time of this paper, a pre-survey has been administered; additionally, unstructured one-on-one interviews have been conducted with all 10 participants. Due to the Institutional Review Board approval process timing, the pre-survey was administered after the week-long training that occurred and before the autumn semester started. Some of the results from the 10 students who persisted to the spring are in Table 3 below:

Table 3. Pre-survey Administered to Students in the Cohort. Numbers Reflect how Many Students Chose the Description for the Given Statement.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I can identify micro-aggressions that occur in my life			2	4	4
I can explain to another person what micro-aggressions are		1	2	4	3
I know how to address bias and discrimination when it arises		2		6	2
I am comfortable addressing bias and discrimination when it arises	1	1		7	1

Evaluations were also given to AWE cohort members on the last day of the week-long training. Many of the comments were very insightful and will be used to make adjustments to future training modules. Some of the comments from the students who went through the week-long training are listed below in Tables 4 and 5:

Table 4. Comments From the Male Cohort Following the Week-long Training.

<b>What did you gain from this experience?</b>
Sessions about microaggression were helpful. Helped realize how small things like the way you word/phrase something can have a large impact. Also why allies are important in diversity/inclusion efforts.
Simply put, awareness of the extent, complexity, and purpose of problem.
I gained insight on topic from a white man's perspective.
I gained confidence in having good balanced values towards underrepresented groups.
I learned a lot from this experience about the prevalence of women being disenfranchised in the engineering environment and about what it means to have privileges as a white male, and what I can do to help.
Whole new insight about how women feel, what things are inappropriate. I still have a lot I need to work on. Experience has opened my mind to a lot.
Gained a new perspective from hearing so many different people speak. Feel way more educated about the experiences females go through in male-dominated cultures. I feel like I've had a lot of ideas that can be implemented into this program.

Table 5. Comments From the Male Cohort Following the Week-long Training.

<b>How will you incorporate this information and awareness into your daily life and/or life in the COE?</b>
Know more about microaggression and bias, I feel I can better recognize and prepare how to respond. I know how to better convey a message without insulting.
Conduct my personal mannerisms differently and suggest opposition when someone exhibits an implicit and explicit microaggression.
Be more aware of some of the microaggressive comments I make.
Turn a head to prejudices and discrimination a little stronger.
More aware of the situations around me and the times when women are not being treated fairly. Now I will have more confidence to speak up.
I have been trying to be a more inclusive person who is respectful of our collective differences and challenges and this enforces that and keeps me motivated.
Correct myself in the things I say, hold myself accountable, listen, try to pass on the information I learned.
Take this knowledge and awareness and extend it outwards to the whole COE. I want to do this in my daily routine (reducing microaggression, increasing microequalities) and in this program. I want to be a role model for my peers.

Post surveys have been and will be administered to outreach program participants. These surveys are considered indirect measures of participants' learning and ask the participants to self-assess their understanding of the topic. The research team will assess each event using a quantitative survey directly tied to the learning outcomes of the outreach initiative.

In addition, all outreach participants have been and will be encouraged to sign an online pledge committing to supporting an inclusive environment for women students in the COE at The Ohio State University. This will be a more immediate measure of the impact of the program.

## Future Plans

At present, cohort groups are conducting outreach events throughout the university community. Mentors continue to meet with the cohort and will do so for the duration of the spring semester. These meetings are intended to monitor the student teams as events are planned and implemented with the goal of making adjustments in real time for maximum outreach impact.

The ultimate aim of AWE is to be a sustainable endeavor that promotes gender equity in the COE. Short-term plans include continuing the cohort program for subsequent years. In addition, as an extension to the program, plans are underway to embed it in the university curriculum in the COE through the creation of a class based on the existing model. Current students in the cohort will be used as teaching assistants for the class and future teaching assistants will come from the class. Collectively, these efforts are expected to create meaningful and lasting change for all students in the College of Engineering.

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