

Successful mentoring practices for women undergraduate STEM students

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Successful Mentoring Practices for Women Undergraduate STEM Students

Beth Hart, UNIVERSITY OF DAYTON
Suzanne Zurn-Birkhimer, PURDUE UNIVERSITY

Undergraduate Peer Mentoring

University of Dayton:

Mid-size private R2 university

2,300+ Engineering students

Purdue University:

Large public R1 institution

11,000+ Engineering students

Topics:

- The Programs
- The Unique Features
- Participant Commitment
- Collaboration
- Transferability



This talk came together after a group of Women in Engineering practitioners met in May 2023.

Mentoring is a well documented success tool to retain women in STEM degrees but there is room and necessity to make a mentoring program fit a University's culture and mission. Hence, there is reason to discuss how different institutions approach undergraduate mentoring to fit the particular needs of a program or institution.

WEP at Dayton and WiE at Purdue have developed a collaborative relationship where they have shared tips and strategies to develop mentoring programs as they stand today.

We will start with a brief description of our programs and then talk about our collaboration and transferability of mentoring components.

Why Mentoring?

- ❖ Students with a mentor are **more likely to succeed** in their major (NASEM 2019).
- ❖ Pairing entering female students with female mentors was associated with a **significant improvement in participants' psychological experiences in engineering, aspirations to pursue post graduate engineering degrees, and emotional well-being**. They also found an increased retention in STEM majors through college graduation (Wu et al. 2022).
- ❖ First-year women who participated in a Women in Engineering mentoring program **earned their BS degrees at a higher rate** than both those who did not participate and their male peers (Zurn-Birkhimer and Serrano 2022).

Research shows that mentoring works. In particular, longitudinal research is being conducted by the Purdue team through and initial results indicate that students in the mentoring program graduate at higher rates than their peers not in the program.

Reviewer 1 stated: “*Oftentimes, in academia especially, mentorship programs are used as a superficial band-aid for systemic inequities and toxic cultural norms.*”

We acknowledge that there are systemic inequities and would argue since this is a Women in Engineering presentation, the audience will be well-aware of those. We also acknowledge that mentoring falls into Frame 1 of the Four Frameworks Model for Creating Inclusive Organizations of explained on the next slide.

References:

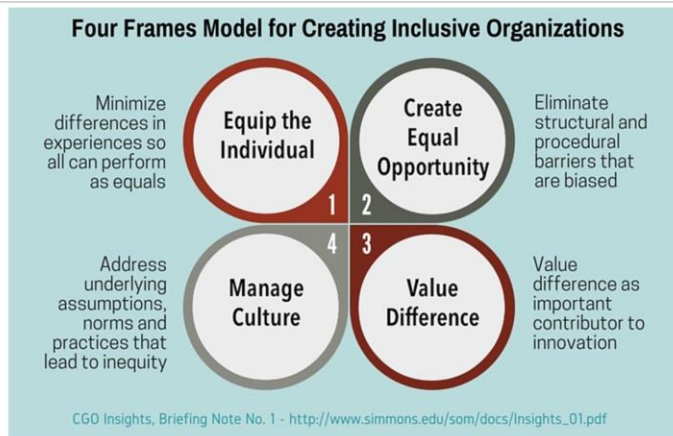
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Framework for Promoting Gender Equity in Organizations



Graphic from <https://www.wepan.org/fourframes>

Mentoring work falls into Frame 1: Equip the Individual. These particular mentoring programs teach students to cope within the current academic culture/workplace culture and navigate the barriers that exist. The emphasis is on the individual level (minimizing differences – not on changing the culture or systemic factors).

Note that both WiE programs do work in all Four Frames but this talk is specifically targeted to mentoring programs.

Note: the wording below is from <https://www.wepan.org/fourframes>

Frame 2: Create equal opportunity/level the playing field – focuses on structural barriers within organizations/institutions to create equal opportunity by eliminating discriminatory structural and procedural barriers (legal or policy-based changes).

Frame 3: Value Difference – places gender equity within a broader diversity perspective. Acknowledging gender as one of many important differences among a group of people. Strategies focus on diversity training to promote tolerance and understanding of difference.

Frame 4: Manage Culture – focuses on changing the underlying systemic factors that

lead to inequity. This is an organizational/institutional change in culture or practice that will benefit women, men, and the organization that are both effective and gender equitable.

Mentoring at University of Dayton

Network Mentoring Model

Total participants: ~130

Leadership: Program is overseen by WEP Director and ran by a Graduate Student, with help from two student scholars and six undergraduate students living in the mentoring house.

Assessment: Formative and Summative through participant surveys and data analysis.

Monthly workshop topics that focus on personal and professional development to sense-of-self and sense-of-belonging to retain women within STEM degrees.

Monthly socials to create community within our women in STEM degrees.

Option for students not “officially” part of the mentoring program to “**drop-in**” to workshops.

- Students in a 2+2 partnership with community college are invited
- Incentive to “bring a friend”

University of Dayton’s philosophy – Participant are organized in families which is part of the university’s community philosophy. The Mentoring program is designed for personal and professional growth in a supportive community or family. The Goal is for growth of sense-of-self and sense-of-belonging to retain women within STEM degrees. Intentional reflective exercises are woven into each workshop which links the growth over the year.

The program is financially supported by the Provost with funding for Graduate Students and shared financial budget responsibility from the Dean of Engineering and Dean of Arts & Science. A Grant from the Clare Boothe Luce Foundation supports scholarships for two student scholarships to develop programming and support the mentoring program workshops. We also have a unique housing situation at the university where students can write proposals to live under a proposed theme. A group of senior mentoring participants are organizing and facilitating the monthly social events at their university house.

Funding sources isn’t an intentional topic of this presentation but instead was a way of demonstrating the growth of the University of Dayton program and the opportunity to have more impact with our women identifying students. If we have time, we can talk

about how UD ran the program with no money, grant money, and eventually budgeted program money. Opportunities exist to follow Purdue's program funding model by corporate and alumni donations.

We also have invited students enrolled in the 2+2 program with a community college to participate in the program.

Outline of the current program: monthly workshops for personal and professional development with social programs happening between the workshops. Topics for the workshops start with personal development and transition to professional development. Students can add or drop in at any point of the semester.

Unique to University of Dayton

Mentoring in Families

- Mentoring happens in a **“family” of students** to align with the community focus of the university.
- Students were given opportunity to **request to be placed** in family with another student.
- Students can **add to the program at any time** and join a **“family”** with incentives to bring a friend.

Workshop Topics

- Imposter Syndrome
- Risk Taking
- Dinner with Women STEM faculty
- Salary Negotiation
- Being the only Woman in the Room

Mentoring House (social events)

- Family Weekend Open House
- Halloween Social
- Friendsgiving Meal
- Destress before finals

Our program centers around participating in a family which aligns with the community, Marianist mission of the university. We allowed students to request one student to be part of their family which allowed our first-year students to always go with a friend while they develop their friend network on campus. It allows our mentors to share the mentoring responsibilities with another student they know and trust.

Again, students can drop into any session even if they are not part of the program and we are incentivizing students to bring a friend by offering coupons for a scoop of Ben & Jerry’s ice cream for you and your friend or a large specialty coffee from Starbucks.

Discussion of the workshop topics and what is covered in each session will be done. An overview of how the social events went will be conducted.

Mentoring at Purdue University

Network Mentoring Model

Total participants: ~1,050

Monthly Meetings: dinner, conversation, mentoring, networking, and professional development

Monthly Socials: destressing & community building

Leadership: Program run by WiE staff member and 15 undergraduate leadership team members.

Assessment: Formative and Summative through participant surveys and data analysis.

Paired Mentoring component:

~700 participants

Goal is to aid first year engineering students in the transition from high school to college to choosing their majors.

Encouraged to **meet weekly**

Curriculum provided 2x/month includes Discussion Topics with Activities and suggestions for bonding activities.

Purdue WiE philosophy – network mentoring allows for participants to act as mentors/mentees depending on the topic being discussed and their lived experiences.

Three strategic goals lead the mission of the mentoring program: (1) [support](#) through contacts with women role models and the opportunity for community building; (2) [affirmation](#) by building confidence through meaningful interactions; and (3) building their tool-kits by delivering [strategies](#) for success. These goals are achieved through Monthly Meetings, monthly Socials, optional paired mentoring, and alum engagement events.

Program Structure:

Monthly Meetings: Fall 2023 focused on the topics of mentoring, networking, and the transition from college to workplace. Spring 2024 will focus on the growth mindset, goal planning and intentional next steps, and creativity in engineering. These topics guide the LT in the planning and implementation of the Monthly Meetings which include dinner & icebreaker discussions, guest speaker, a mentoring minute activity, and a networking activity.

Social activities: events for 2023-24 included a scavenger hunt, Halloween crafting, community service activity - dog toys, and pre-finals week destressing event.

Paired Mentoring: The 1:1 paired optional mentoring is for FYE students who want an upperclass mentor. Participants are provided a curriculum through our DL2 course management software and are empowered to take the lead in building this relationship.

Unique to Purdue University

Network mentoring through Monthly Meetings and structured Social activities.

Goal at the Monthly Meeting is to structure activities to facilitate networking.

- Icebreaker
- Guest Speaker
- Mentoring Minute
- Networking Activity

Program is run by **student Leadership Team**.

Optional Paired Mentoring

Incoming students are paired with an upperclass student in their intended major. Because of the size of the program, an **algorithm was developed** to do the matching:

1. Major
2. Personality
3. Area(s) of Mentoring

Assessment of the Pairing Algorithm is currently underway.

Unique to Purdue: size of the program. Pre-covid, Purdue had two mentoring programs run by two separate student leadership teams: paired mentoring with 120 participants and group mentoring with 500 participants. Post-covid, these programs were merged into one large group program with over 1,000 participants who could also choose to participant in an optional paired mentoring component (currently, 700 of the 1,000 participants opted into this program). The mentoring program is now run by one 15-student Leadership Team.

Leadership Team unique aspects: A Leadership Team (LT) handbook was developed over the past 20 years that includes employee expectations and an overview of employee roles at various events. The LT meets once/week with the WiE Assoc Director and once/week for LT worktime. LT students work 8 - 15 hours per week. Senior LT members are paired with new LT members for mentoring and professional growth.

Accommodating the large number of participants: Monthly Meetings, with the same content, are offered on 3 consecutive nights since our room seats only 200. Participants can choose to attend the night that works best in their schedule. Strategy 1: by focusing on network mentoring, students do not need to attend with

their mentor/ee. Those interactions happen outside of the Monthly Meetings. This also encourages community building.

Strategy 2: a newly developed 'Pairing Algorithm' was created in Fall 2023 to pair mentees with mentors in their desired major, by personality, and the area(s) of desired mentoring (academic, professional, personal).

In the 1:1 program, mentoring occurs in 3 areas:

1. Academic: class experiences, choice of major, concentration areas, how to find study groups, etc. (note: a mentor is NOT a tutor)
2. Personal: finding your fit at Purdue, study abroad, exploring your interests outside of the classroom, getting involved in clubs, etc.
3. Professional: how to find internships/jobs, networking, career discovery, getting involved in research, etc.

Department - # of participants in Fall 2023

ME - 215

BME - 168

AAE - 146

ECE - 145

CE/CEM - 102

CHE - 94

IE - 76

EEE - 48

ABE - 46

MSE/NE/MDE/IDE - 15/16/9/3

Participant Commitment

UNIVERSITY OF DAYTON

Mentoring in “families” for workshop

Mentoring House with optional social events

Rewards for participation

- Families with highest participations earn a reward
- Housing “path” points awarded for attending workshops

PURDUE UNIVERSITY

Network Mentoring

1:1 optional paired mentoring

Participant Semester Requirements:

- 2 Monthly Meetings
- 1 Social
- 1 Access Alum

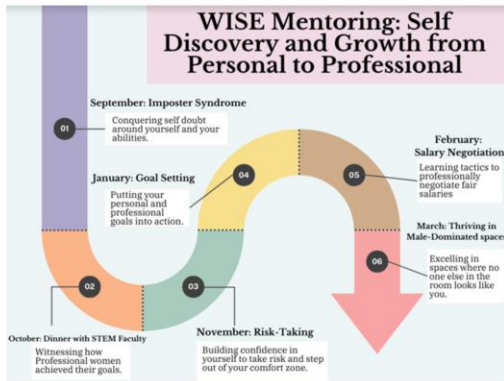
Dayton: There are no requirements to participate in UD’s mentoring program. Students are incentivized to participate regularly in several ways:

- Students who participate in monthly workshops earn housing “path” point. (Explain briefly UD’s housing path system).
- The social events are all optional but will give the families a set time to meet up and check in with each other.
- Incentives to bring a friend.
- Reward to the family with the highest workshop attendance monthly.

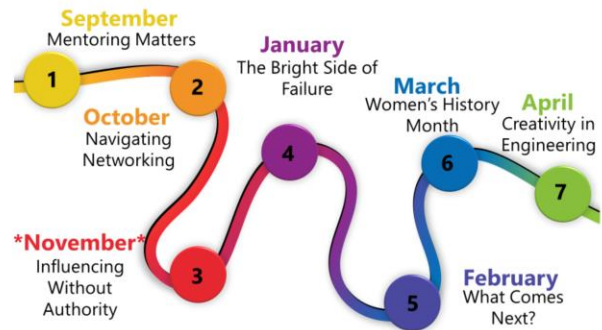
Purdue: Participants are encouraged to meet semester requirements. Those who do so earn WiE swag at the end of each semester.

Intentionality of Program Topics

University of Dayton



Purdue University



Both program are intentional about their programming topics.

The University of Dayton is intentional about starting with topics for self discovery for personal growth and resiliency that moves into professional development that gives women the tools for success in the current job market.

Purdue University is intentional about providing topics on both personal growth and professional growth. Topic ideas are gathered from participants in April of each year. The LT select the annual topics and schedule to intentionally scaffold ideas/activities/growth throughout the year. It is also important to note that we have returning participants, so there is intentionality to avoid topic repetition.

Collaboration

Programs have their *own flavor of mentoring program dependent on the culture and norms of the institution*. However, it is important to share best practices that one can readily modify to their particular needs.

DAYTON - modifying from Purdue

- Created family-mentoring and let the paired mentoring evolve more organically
- Use of a student leadership team to facilitate conversation which became the “aunts” of the families
- Developing a mentoring handbook this year to be in place for next academic year

PURDUE - modifying from Dayton

- Instituted a curriculum for paired mentoring
- Developed a study abroad experience for engineering students

We highlight the importance of collaboration among institutions. Namely, Program directors from large and mid-sized institutions can glean insights from one another.

Purdue will discuss the curriculum for paired mentoring that was put into place this year based on Dayton’s paired (student to alum) mentoring curriculum. Two lessons per month are uploaded onto the course management software page:

- 1 lesson focuses on professional development that includes talking points, resources, and a paired growth activity.
- 1 lesson focuses on personal development that includes talking points, resources, and a fun activity.

Purdue WiE is offering its first study abroad experience stemming from discussions with Dayton director.

University of Dayton will discuss:

- Through my collaboration with Purdue, I was liberated from the constraint of 1-on-1 mentoring. I was able to take the family concept we had used successfully used with mentoring pairs and drop the need to be paired 1-on-1. I was able to allow the mentoring relationship to occur naturally in a small group setting or what we refer to as “mentoring family.”

- I also adapted Purdue's leadership team into the "aunts" of the family which facilitate the conversations at the workshops and communication within the family.

Transferability

- Paired mentoring curriculum
- Leadership Team handbook
- Monthly Meeting topics
- Structure mentoring program to fit the culture of your campus
- Building community among women engineering students
- Meeting the needs of the students regardless of campus size



Transferability of program aspects: a WiE practitioner will be able to develop a new or improve on an existing mentoring program to fit their campus culture.

CONCLUSIONS

- ❑ Mentoring programs *teach the students to cope within the current culture and navigate barriers that currently exist.* (Working within Frame 1).
- ❑ **Student Leaders help set the direction** of the program. They are intimately involved in the programmatic planning, the content development, and the program implementation.
- ❑ **Formative and Summative** participants assessment aids the leadership in implementing new ideas and keeping the program relevant to current students.
- ❑ **Collaboration and Transferability** among WiE practitioners also aids in programmatic improvement.

Thank you!

*We welcome
Questions & Discussion*

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