Reinventing Recruitment Strategies to Increase Attendance by Women

Mrs. Melissa Renee Casner, Purdue University at West Lafayette (PPI)

Melissa Casner, a 1996 graduate of the computer and information technology program, is a dedicated mentor who helps attract and retain female students by providing relatable guidance. She fosters connections with professors, peers, and potential employers, creating a united campus community. Over the past year, Melissa has participated in high school recruitment and community outreach. Her passion for mentoring is evident through her informal guidance, with plans to establish formal mentorships for ample student support. She sponsors cross-campus teams in the Data4Good competition, ensuring strong female representation, and addresses networking challenges by educating women about opportunities and encouraging campus involvement.

Melissa, an assistant professor of practice at Purdue Polytechnic, supports multiple campuses and fosters a unified community. She mentored students who developed an innovative safety software system for university labs, the focus will be to replace SDS hardcopy books with a user-friendly app. Her versatility in teaching online, in-person, and hybrid classes ensures high-quality education for diverse learning styles. By seamlessly transitioning between teaching modalities, she maintains continuity in education and fosters a dynamic learning experience, ensuring equal opportunities for all students.

Melissa's dedication to the academic community is demonstrated through her active participation in various committees, including the Technology PhD Infosec Graduate Student Committee and the Polytechnic Faculty Senate Committee. She also contributed to the Readmission and Academic Renewal Committee, the PPI Alumni Awards committee, and the Industry Advisor Council. Her involvement underscores her commitment to supporting students and enhancing the university's environment.

Additionally, Melissa played a pivotal role in organizing events with the local Purdue alumni club, fostering connections among alumni from diverse fields. She inspires students to lead initiatives and provides unwavering support, hosting gatherings to ensure students feel a sense of belonging within the Purdue family. Her efforts extend beyond the classroom, actively connecting students across campuses and fostering collaboration. She is currently enrolled in Indiana State University's Instructional Leadership (PhD) Online graduate program.

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Dr. Lollar has served in various leadership roles, including her tenure as Campus Director at Purdue Polytechnic Institute Columbus, where she fosters industry-academic partnerships and drives initiatives to expand educational access. She is actively engaged in research projects such as Building Rural Community Systems: Education to Employment Partnerships and Expanding Access to Economic Opportunities through Educational Success, collaborating with organizations like CivicLab and the Indiana Commission of Higher Education.

Beyond academia, Dr. Lollar is a dedicated community leader, serving on boards such as the Greater Columbus Indiana Economic Development Corporation and Columbus Propeller Makerspace. She is a lifelong advocate for workforce development, innovation, and continuous learning.

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***Abstract*—As engineering technology educators at Purdue Polytechnic Institute in Columbus, we are reinventing recruitment events to attract local high school students and industry partners, with a special emphasis on increasing attendance by women. While traditional events have their place, today's students expect individualized approaches amidst a plethora of in-person, hybrid, and online post-secondary delivery options. This paper explores nontraditional and specialized recruitment strategies, differentiating them from common events. Additionally, we will highlight insights from the 2024 State of Higher Education report discussed at a recent webinar.** [1]

Higher education is no longer traditional. We must engage in civic dialogues to understand what keeps students awake at night and provide hands-on experiences that set us apart from other institutions. It is not just about the degree they will earn; prospective students need to see the value we offer. As Stephen Covey suggests in Habit 2, we must help them 'Begin With the End in Mind' [2] **and be there with them to help achieve successes along the way. Education is no longer linear; students need to feel a sense of belonging.**

***Index Terms* – Engineering technology, technology, gender, women, mentorship, connectedness, innovativeness, belonging, career preparation, recruitment, students, universities.**

I. Introduction

Purdue Polytechnic Columbus is more than just an extension of the main campus at Purdue University's Polytechnic Institute in West Lafayette, Indiana. It is a place that is focusing on the recruitment of women into technology careers after post-secondary education. The purpose of our statewide program is to bring the Polytechnic programs to where the students are physically, logistically, academically, and mentally.

Although the main Purdue University campus in West Lafayette is a large land grant state university with over 50,000 undergraduate and graduate students situated on nearly 2,500 acres and more than 150 major buildings, the Columbus statewide site shares less than 8 labs and classroom in two physical buildings. At the Columbus, Indiana site, Computer and Information Technology (CIT), Mechanical Engineering Technology (MET), Electrical Engineering Technology (EET) and Engineering Technology (ET) programs are offered. When it comes to recruiting women students, the focus is on using methods to create a sense of belonging through one-on-one mentorships, campus connectedness, programs that encourage innovativeness, and the proverbial career planning pipeline. Recruiting any students into a small 4-year university puts distinctive challenges in today's online educational landscape, but a whole other level of complexity is added when the categorization of 'women in technology' to the recruitment efforts is made.

This paper will discuss some of the methods our school has used to level out the equity towards the recruitment of the high school or non-traditional female student. After looking at a plethora of successful and obstacles with several recruitment strategies, the purpose of this paper is to bring to light a few of the simplistic approaches for enhancing female student recruitment and retention at Purdue's statewide Polytechnic program in Columbus, Indiana.

The discussion will first review some literature that has successfully helped to close the equity gap that small universities and colleges have been facing. Subsequently, it will delve into specific recruitment initiatives that have been undertaken at our campus. Through an analysis of these efforts over the last 3 years, this paper will evaluate their effectiveness and offer insights into refinement strategies that might appeal to prospective women students interested in technology.

Ultimately, insight and speaking from experience about the complexities of women student recruitment at small institutions is crucial for growing the program and ensuring the sense of belonging echoes through the landscape of higher education.

II. Related Work

Technology is still one of the priority areas of intervention in which women constitute an even smaller fraction of the workforce. Inequity, underrepresentation, and a lack of access to resources and networks create cultural and institutional barriers for women. Rising to these challenges requires elaborate recruitment and retention strategies, including mentoring, connectedness, innovative approaches, a feeling of belonging, and practical preparation for a

career path. Evidence-informed approaches will work for organizations to make the technology sector inclusive and equitable.

A. Mentorship

Mentorship, as demonstrated by Pinchot et al., provides empowering ways of advancing women in technology. It provides the avenue for technical know-how and psychosocial support- a means of overcoming stereotypes and building confidence [3]. The transformative power of mentorship in creating a safe, supportive platform for women, dispelling imposter syndrome, and dismantling barriers that often deter them from tech careers is truly inspiring.

Freedman et al. harnessed the power of shared narratives in mentorship to highlight that peer advice and encouragement enable women to be more confident in male-dominated areas [4]. Formal and informal mentorships help women in STEM improve their academic performance and increase their preparedness for their future careers. Furthermore, this would help them stay in technology fields longer. Mentorship is critical, as according to the National Academies report, women of color face more significant challenges than their white peers, often due to the compounding effects of intersectional barriers. Programs that specifically address these needs offer a safe place for personal and professional growth, creating ripples in success for mentees and their communities [5].

Successful mentorship initiatives, like DARE IT, connect women with experienced professionals who guide them in developing skills, career planning, and overcoming industry-specific challenges [6]. This structured program helps build a strong support system, and women will have everything they need to succeed. Further analysis on DARE IT is provided in the subsequent sections.

B. Connectedness

Connectedness is the most crucial factor in encouraging collaboration, retention, and career satisfaction among women in technology. According to Zhao et al., including women in STEM programs is significantly attributed to commitment and persistence [7]. An inclusive culture, which values diversity and equity, is associated with better retention rates and innovation due to the pool of ideas.

Deloitte argues that building professional networks is one strategy for promoting connectedness. Building professional networks is mainly done in collaboration with educational institutions,

industry leaders, and professional societies [8]. The resulting partnerships form webs of support beyond academics, enabling women to navigate adverse job dynamics.

Freedman et al. note that connectedness is created through meaningful interactions and relationships with colleagues who offer professional and emotional support. Events like hackathons, industry gatherings, and networking programs provide a fertile ground for fostering a sense of community and developing strong bonds of coherence and unity of purpose among women technologists. This sense of belonging and support is reassuring and encouraging.

C. Innovativeness

As Felgueira et al. discuss, innovation is a key driver in dismantling barriers and establishing gender equity in technology [9]. Such programs on entrepreneurship, which provide hands-on experiences in applying technical knowledge in real-life scenarios, have paved avenues for women to deal with competitive positions in the technological sector. Innovative approaches will not only prepare them for the future but also shape and create an optimistic sense toward it in the context of the technological sector.

Other scalable efforts, such as the Challenges by DARE IT, have shown how such collaborative projects form portfolios for women that prove their skills and competencies, making them more employable [6]. Correspondingly, Berry et al. reported that effective recruitment and retention of women in computing courses included gamified learning in authentic problem-solving projects [10].

This innovative approach using DARE IT Challenges highlights the transformative impact of hands-on learning. This program creates real-world, project-based learning experiences for women entering the tech field, allowing them to build comprehensive portfolios in software development, UX/UI design, cybersecurity, and tech project management [6]. Similarly, Purdue Polytechnic Columbus's Boiler Tech Challenge (BTC) focuses on high school students, offering team-based STEM challenges in engineering design, CAD modeling, robotics, networking, programming, and sustainability. While DARE IT targets women seeking professional growth in technology, BTC introduces younger students to engineering principles, promoting early STEM engagement [11]. Further analysis of BTC is provided in the subsequent sections.

Both initiatives emphasize project-based learning, technical skill development, and mentorship—foundational strategies for reducing the gender gap in technology. BTC offers students hands-on experience in engineering through one-day challenges, while DARE IT provides multi-week

mentorships and structured learning paths. Together, they exemplify scalable models that bridge the gap from education to employment.

Microsoft and Slack are now embracing innovative recruitment and development methods, increasing their use of apprenticeships, returnships, and career re-entry programs. Apprenticeships provide hands-on training and experience, returnships are structured programs that help individuals re-enter the workforce after a career break, and career re-entry programs provide a pathway for individuals who have been out of the workforce to return and transition into tech roles. These programs provide unusual ways of entering the tech world from atypical backgrounds and show how innovation can reshape talent pipelines [8].

D. Belonging

A sense of belonging is critical to creating an inclusive environment where women thrive. Rainey et al. illustrated that feelings of belonging are promoted through cultural inclusion, representation, and interindividual interaction. They further entice women to perceive themselves as valuable tech community members [11]. Organizations that promote a sense of belonging provide an environment where women feel valued, supported, and inspired to seek leadership roles.

Freedman et al. are closely related and belong to shared narratives, where peer advice and mentorship overcome feelings of isolation and self-doubt among women [4]. The National Academies report identified a sense of belonging as the number one factor for women of color, who often face systemic inequities that erode their sense of inclusion. Targeted initiatives, including employee resource groups and representation in leadership, can overcome such barriers and build a culture of belonging [5].

Programs such as Deloitte's Encore exemplify how organized initiatives build belonging. The program creates peer cohorts, mentorship opportunities, and professional development workshops. Through these programs, women build strong networks and become more confident in their career realization [8].

E. Career Preparation

Indeed, a preparatory career approach ensures that women acquire all the necessary competencies and self-confidence to succeed in technology. For instance, Athey and Palikot showed that job readiness, especially for transitions from non-STEM fields, is significantly enhanced through programs involving mentorship and portfolio building [6]. These programs

respond to the deficiency in technical capabilities by offering tangible proof of women's competencies.

Zhao et al. discussed how informal learning opportunities support career preparation. These hands-on opportunities in informal settings, with science, technology, engineering, and math activities, build self-efficacy, practical skills, and confidence in preparation for professional career challenges [7]. Felgueira et al. underlined the role of entrepreneurial activities in career-readiness development as an essential means for women to be equipped with the knowledge and networks necessary to master technology [9].

Freedman et al. indicated that practical advice and mentoring support the transition to new career opportunities and prepare women for leadership roles [4]. These programs address the broader systemic barriers and offer support and opportunities for advancing women.

F. Addressing Systemic Barriers

According to Deloitte, gender bias is one of the main barriers preventing women from reaching leadership positions, along with work-life integration challenges and a lack of access to mentorship 2. The National Academies stressed how critical intersectional approaches (approaches that consider the interconnected nature of social categorizations such as race, class, and gender as they apply to a given individual or group, regarded as creating overlapping and interdependent systems of discrimination or disadvantage) are in dealing with unique issues that women of color face in accessing professional networks and equitably designed policies [5].

Pinchot et al. suggest that mentorship programs can break systemic barriers by offering women the confidence and support to overcome systemic challenges in cybersecurity and other technical fields [3].

G. Expanding Early Engagement

Early STEM engagement is crucial for long-term interest and success in technology. Microsoft's STEM programs focus on sparking curiosity and building foundational skills as early as K-12 to create a pipeline of diverse talent [8]. Zhao et al. found that informal science learning programs are particularly effective in promoting early interest in STEM, especially for underrepresented groups [7].

Felgueira et al. pointed out that early exposure to entrepreneurial activities will encourage young women to pursue careers in innovation and technology, where they will be provided with the confidence and tools to succeed [9].

H. The State of Higher Education

In the State of Higher Education 2024 Report [1], a high number of the adults surveyed (94% of the respondents) stated that some sort of education after high school is valuable. It might be a two- or four-year degree, certificate, or a combination of both. The problem is that only 35% of those individuals feel as if they can afford to get a quality degree or certificate. During our first YouTubeLive recruitment event [12] made up of first year students, recent graduates, alumni, advisors, professors, and other campus staff member as panelists, the savings, value and connectedness of attending the Purdue Polytechnic Columbus Campus was stressed to all students and parents in attendance. Of the adults surveyed, 71% of them are delaying big purchases and life events because their student loan payments and the overall debt are too high [1]. The financial drain from attending traditional college campuses is changing students' perspectives.

During the State of Higher Education 2024 webinar event, the panelists were interviewed by two renowned moderators. During the webinar event, there were three education institutions represented. The panelists were all referring to Maslow's Hierarchy of needs pyramid over and over. They highlighted that, after the pandemic, there are still basic needs that are not being met. Those physiological needs like the cost of food, gas, car maintenance, housing including babysitting of children, and clothing are barely being met. If a student does not have those foundational needs covered, they will never, ever meet their potential. They also talked about resocialization and multiple responsibilities which is part of the next level of Maslow's Hierarchy of needs covering safety and security. Prospective students need help on how to recover from being isolated. They want to feel a sense of belonging [13]. Here at Purdue Polytechnic in Columbus, we are offering these specialized and nontraditional recruitment events and have listed numerous activities that we have put together or are participating in to meet these prospective students where they are.

III. DISCUSSION

At Purdue Polytechnic Institute in Columbus, many faculty members have experience in both industry and academia. One professor, however, stands out for having earned her degree in computer and information technology from our campus. Having a female faculty member who understands the student experience provides valuable mentorship, helping to attract and retain female students. Our female professors understand what it takes to succeed in a male-dominated

engineering technology school and technology field. We are committed to helping women technology students build connections with professors, peers, and potential employers. By fostering a sense of belonging and mentoring all students, not just those in the computer information technology program, she promotes unity across all programs. In a close-knit campus, there should be no dividing lines—uniting women across all campuses is essential.

Building a network of women students who can connect, share experiences, and support each other fosters a sense of belonging and campus engagement. Over the past year, we've encouraged women students to participate in high school recruitment and community outreach events. When faculty and staff share the same passion as their students, mentorship naturally develops. Our faculty dedicate time to informally mentor students and plan to establish formal mentorships in the future. Women faculty share their experiences of transitioning from student to professional, ensuring there are enough mentors for all students. Over half of female students seek mentorship from faculty and report feeling a stronger sense of belonging when mentorship is formally established.

Boundaries should not limit the sharing of campus opportunities across statewide, downtown Indianapolis, or the main campuses. For two years, our campus has sponsored cross-campus teams in a competition, proactively recruiting two women alongside two men to ensure strong female representation. Women often report challenges in forming connections and networking. To address this, our women faculty have started educating female students about networking opportunities and how to find them. Encouraging involvement in campus activities and empowering students to lead initiatives is crucial for their success both on campus and in the community.

I. Recruitment activities at our campus focusing on women.

1) *YouTubeLive:* Before 2020, virtual events for recruiting college students were rare. However, during 2020, virtual events became expected. We created a YouTubeLive event [12], recorded for future recruitment, which not only appealed to students but also featured a recent female graduate as the emcee.

2) *Parades:* Participation in three local parades with Purdue alumni where our female students showcased technology by driving a remote-control car and the use of lights to illuminate a float featuring our students. All three of these parades had strong STEM women leading the charge.

3) *Data 4 Good:* Participation in two artificial intelligence data competitions where 4 female students among 8 students across 5 campuses participated. Of the 8 students,

7 of them became AI-900: Microsoft Azure AI Fundamentals certified, all women who participated were certified.

4) *High School College Fairs:* Participation of students asking questions seems to increase at local high school recruitments where our recruitment team has been known to have all women in attendance.

J. Interview Dialog from 2024 High School Senior. [14]

1) *College fairs and career fairs:* Most high schools host one or two college and career fairs. One student felt intimidated by the inquiry tables for both colleges and industries. She typically only approached tables of personal interest or past interactions. She noted that knowing which tables represented local colleges and in-demand industries helped, but the only incentive to overcome her hesitation was the offer of swag and prizes.

2) *Campus Tours:* One student preferred one-on-one campus tours, as they felt more personalized. In larger groups, students felt intimidated to ask questions.

3) *Admissions Information Sessions:* A student shared that their school offers SRT (Student Resource Time) where various schools present information. Typically, only genuinely interested students attend. These sessions, often smaller in size, allow for more interaction with representatives, fostering a sense of belonging. Some sessions include games and prizes for answering admission questions, making them more engaging. The student found peer responses more relatable than those from the presenters. They also attended virtual sessions, which provided general information but lacked detailed, candid insights. The student emphasized the importance of covering all concentrations in virtual sessions for better engagement.

4) *Recruitment Events at High Schools:* This student's high school hosts lunch and learn days featuring show-and-tell events by the armed forces, which are engaging for those interested in the military. Recruiters bring activities like pull-up bars to attract attention. The student suggested it would be great if college teams could showcase their latest robots for the VEX Robotics team. Similarly, students in other concentrations would benefit from seeing relevant demonstrations. For example, a friend interested in mobile app development would appreciate presentations by students, professors, and their projects.

5) *Parent Information Sessions:* Yes, financial aid is important, but also emphasize aspects that provide peace of mind, such as being heard and feeling part of a community.

6) *Virtual Events:* The students interviewed preferred in-person events, but they said there are times that virtual events, subgroups, or specific cohorts of students can meet the informational need.

7) *Alumni Events:* One student attended a 2024 alumni dinner and found it inspiring to see current high school teachers who graduated from the school they were admitted to for Fall 2024. This event fostered a sense of a larger community. When the student's friends chose not to attend post-secondary school, it was reassuring to see others committed to the same school.

8) *Orientation Programs:* One of the students was eager to participate in orientation programs. She began with virtual sessions for the disability resource center and early start classes. She's also taking a self-paced online course to learn about campus resources and will join an on-campus orientation to meet other new students. She wants to feel a sense of belonging.

9) *Specialized Events:* The student really likes when she can participate in hands-on activities. Each program can have a varying component of hands-on activities, but the she wants to take what she heard them talk about and try to implement it. The competitive part of it isn't a factor in her participation but it is for some students.

DARE IT is an initiative to address the underrepresentation of women in the tech sector. It offers opportunities for advancement, mentorship, and hands-on experience for women willing to start exploring or pursuing advancement opportunities in the tech sector. DARE IT provides professional advancement opportunities through advancement advice, mentorship, and hands-on experience.

Research indicates that structured, scalable initiatives like DARE IT significantly improve women's participation in technology. By incorporating mentorship, project-based learning, and career development resources, the program successfully addresses critical barriers such as a lack of industry connections, skills gaps, and imposter syndrome—common challenges faced by women entering tech fields [15].

The mentorship scheme set up by DARE IT creates resilience, instills assurance, and improves career advancement preparedness. It proves that targeted programs can yield positive outcomes in advancing women within STEM fields. Companies that partner with DARE IT also gain by accessing diverse talent and overcoming the industry-wide shortage of female professionals.

DARE IT integrates mentorship, hands-on learning, and networking opportunities to provide an innovative and effective solution for closing the gender gap in technology careers.

K. DARE IT: A Model for Women's Career Development in Technology: [15]

1) *Mentorship Program:* DARE IT connects women with experienced professionals in technology, offering one-on-one guidance in career navigation, skill development, and overcoming industry challenges. These mentorship programs are designed to be highly personalized, ensuring that mentees receive customized advice based on their career goals and experience level.

2) *DARE IT Challenges:* A hallmark initiative within the program, DARE IT Challenges provide participants with real-world, project-based learning experiences. These challenges reflect workplace scenarios, enabling participants to acquire practical skills in software development, UX/UI design, cybersecurity, and other technical fields. The projects also allow mentees to create portfolios that showcase their talents to potential employers *[15].*

3) *Skill Development Workshops and Courses:* The program provides various technical and soft skills workshops. These include coding boot camps, digital transformation training, resume-building workshops, and mock interview sessions. These workshops empower women with job-ready skills, ensuring they remain competitive in the tech job market.

4) *Networking and Career Advancement Opportunities:* DARE IT organizes networking events, hackathons, and industry meet-ups to help participants build professional connections. These opportunities allow women to engage with industry leaders, recruiters, and peers, promoting a sense of community and professional support that can result in job placements and career advancement *[15]*.

5) *Employment Support and Job Placements:* One of DARE IT's primary objectives is to connect participants with job opportunities. The program collaborates with tech companies to create hiring pathways, ensuring that participants develop skills and gain access to job openings, internships, and apprenticeships within the industry. This focus on employability establishes DARE IT as a direct pipeline into technology careers for women *[15]*.

The Boiler Tech Challenge (BTC) is a high-impact STEM engagement and recruitment initiative organized by the Purdue Polytechnic Institute Columbus. Its goal is to attract high school students participating in Project Lead The Way (PLTW) pre-engineering programs, introducing them to hands-on problem-solving, engineering principles, and real-world technology

applications. The BTC serves as both an educational event and a strategic recruiting tool for Purdue Polytechnic Columbus, helping to enhance enrollment in STEM degree programs by providing early exposure to engineering disciplines.

The Boiler Tech Challenge (BTC) is a longstanding STEM engagement and recruitment initiative designed to introduce high school students to engineering, technology, and problem-solving through hands-on, team-based challenges. Since its inception in 2010, BTC has offered students the chance to apply engineering and technical skills in a competitive yet collaborative environment. The challenge is a one-day competition hosted by Purdue Polytechnic Institute Columbus, involving students from several high schools across the Region 9 workforce area in south-central Indiana and beyond.

BTC participants are grouped into small teams and tasked with addressing engineering and technology challenges that reflect real-world industry issues. These challenges vary each year but center on key STEM disciplines.

L. The Boiler Tech Challenge: A STEM Pipeline Initiative for High School Students: [11]

1) *Engineering Design & Prototyping*: Using engineering principles, teams create, build, and evaluate physical structures or mechanical systems.

2) *Computer-Aided Design (CAD) and Digital Modeling:* Participants create 3D models and technical drawings with CAD software to develop innovative solutions.

3) *Robotics & Automation:* Programming and handling automated machinery or robot equipment to perform various tasks is challenging.

4) *Environmental & Sustainability Issues:* Solutions can also span clean energy, conservation, and the environment.

5) *Problem-Solving & Critical Thinking:* Students will find constraints when solving, optimizing, and upgrading their designs under realistic engineering circumstances.

6) *Networking and Programming:* Students engage in challenges that focus on core concepts of computer information technology to explore coding principles and solving data management issues, develop simple applications and design secure networks in real-world scenarios.

Each challenge tests students' abilities in innovation, teamwork, and applying STEM knowledge. It focuses on hands-on experimentation, engineering design principles, and technical skill development.

BTC adds a competitive aspect by assessing team performance according to criteria such as creativity, functionality, efficiency, and problem-solving methods. Judges consist of faculty members, industry professionals, and alums who offer constructive feedback and assist students in grasping the practical applications of their designs.

M. In addition to the competition, BTC features career and professional development in STEM:

1) *Informational sessions:* Informational sessions about Purdue Polytechnic Columbus and its engineering and technology degree programs to encourage students to explore STEM career pathways.

2) *Industry speaker sessions:* Industry speaker sessions, where professionals share insights on careers in engineering, manufacturing, automation, and emerging technologies.

3) *Networking opportunities:* Networking opportunities introduce the students to professionals from the industry, the university's alums, and faculty members, bringing valuable exposure to their future careers. The BTC has adapted to showcase the latest technology, industrial innovations, and workforce demands, keeping the competition contemporary, challenging, and relevant for the next generation of engineers and technologists.

The Boiler Tech Challenge (BTC) and DARE IT Challenge are structured learning programs designed to foster problem-solving skills, technical expertise, and career readiness. Though they target different audiences—high school students for BTC and women professionals for DARE IT—both utilize project-based learning and industry exposure to cultivate a strong STEM talent pipeline.

The Boiler Tech Challenge (BTC) has been offered for 12 years since it's conception 2010. The population dataset for 2010 and 2015 only contained event winners and not the complete student registration data. In years 2020 thru 2022, the program was suspended due to the Covid-19 pandemic, but was restarted in 2023. In Table 1, the attendance population frequency distribution depicts and showcases not only the absolute number of attendees but the relative percentages for each year. This visual representation highlights the trends and shifts in participation over time, making it easier to grasp the program's impact and reach.

Table 1: BTC Attendance Population Frequency Distribution

Year	Frequency	Percent	Cumulative Percent
2010*	0	0	0
2011	196	11.6	11.6
2012	190	11.3	22.9
2013	194	11.5	34.4
2014	214	12.7	47.1
2015*	0	0	0
2016	158	9.4	56.5
2017	185	11.0	67.4
2018	198	11.7	79.2
2019	132	7.8	87.0
2020*	0	0	0
2021*	0	0	0
2022*	0	0	0
2023	98	5.8	92.8
2024	121	7.2	100.0
Total	1686	100.0	

**Suspended during pandemic 2020 thru 2022 or incomplete data 2015.*

N. *The Role of BTC in STEM Education and Workforce Development is more than just a competition:*

1) *Introduce High School Students to STEM Careers:* BTC exposes students to diverse STEM career choices and real-world engineering challenges, while developing their technical competence and teamwork skills. It covers various engineering disciplines, including mechanical, aerospace, environmental, and software engineering.

2) *Act as a Recruitment Tool for Purdue Polytechnic Columbus:* BTC attracts PLTW students engaged in pre-engineering coursework, make strong candidates for Purdue Polytechnic's STEM programs. It addresses declining enrollment by creating a pipeline of interested students for Purdue's engineering technology degree programs.

3) *Build Industry and Academic Partnerships:* BTC fosters partnerships with Indiana's manufacturing, aerospace, and technology industries. Industry experts mentor students, critique designs, and share STEM career insights, bridging the gap between education and job demand.

4) *Encourage Teamwork and Innovativeness:* Students enhance communication, problem-solving, and teamwork skills through group work. Themed challenges foster creative and innovative thinking, simulating real-world engineering challenges.

The Boiler Tech and DARE IT challenges are structured learning experiences that develop problem-solving skills and offer hands-on exposure to real-world challenges. Both programs focus on career readiness, mentorship, and industry engagement. While BTC supports early STEM exploration, DARE IT serves as a re-entry or transition program for women in tech, illustrating complementary approaches to building a diverse STEM workforce.

The Boiler Tech Challenge (BTC) and the DARE IT Challenge are high-impact STEM engagement programs that prepare participants for technology-driven careers through hands-on experiences, problem-solving, and industry exposure. While BTC focuses on high school students exploring engineering and STEM education, and DARE IT supports women transitioning into technology careers, they share many core similarities in structure, objectives, and outcomes.

O. Boiler Tech Challenge (BTC) vs. DARE IT Challenge Comparison

Table 2 BTC vs DARE IT Challenge Comparisons

Criteria	Boiler Tech Challenge	DARE IT Challenge
Target Audience	High school students in Project Lead the Way (PLTW) pre-engineering programs.	Women seeking entry or transition into technology careers
Primary Objective	STEM exposure and recruitment tool for Purdue Polytechnic Institute Columbus programs	Career development, mentorship, and industry readiness
Format	A one-day event with hands-on engineering challenges and guest presentations	Structured mentorship program with project-based learning
Challenges/Projects	Varies annually but focuses on engineering, automation, CAD modeling, sustainability, networking, programming and industry-driven challenges	Industry-aligned challenges in software development, UX/UI design, cybersecurity, and tech project management

Criteria	Boiler Tech Challenge	DARE IT Challenge
Team Collaboration	Students work in teams of four to complete an assigned challenge	Participants collaborate in small project teams with industry mentors
Time Commitment	2-hour hands-on challenges as part of a day-long event	Multi-week mentorship and project-based learning experience
Professional Exposure	Industry presentations from professionals in the space industry	Direct industry connections, networking, and mentorship with tech professionals
Outcome & Impact	Encourages students to pursue STEM majors at Purdue Polytechnic Columbus	Equips women for jobs, detailed portfolios, and professional connections for careers in tech.

Table 3 BTC vs DARE IT Challenge Similarities

Similarities	BTC & DARE IT Challenges
Project-Based Learning	Both challenges utilize hands-on, collaborative projects to enhance technical skills.
Industry Exposure	Participants connect with STEM professionals and industry mentors to gain insights into career opportunities.
Networking Opportunities	Both initiatives offer mentorship and professional connections to assist participants in transitioning into STEM careers.
Career Readiness Focus	BTC and DARE IT help students develop essential technical and problem-solving skills, enhancing their competitiveness in STEM careers. These programs effectively promote STEM education and careers while playing a crucial role in nurturing the technology talent pipeline at various stages of the educational and career journey.

Both initiatives emphasize project-based learning, where participants engage in real-world challenges that foster critical thinking, teamwork, and technical skill development. A significant parallel is also seen in the investments toward building skilled workforce capacity and nurturing talent pipelines. BTC is the recruiting and engagement platform for Purdue Polytechnic Columbus, raising awareness among students traversing the continuum for studying engineering and technology careers. DARE IT presents similar mentorship, career coaching, and hands-on experience to support women in technology as they transition into and progress through their professional careers.

IV. Conclusion

Multiple initiatives are required to reimagine the recruitment strategy for women in technology more thoroughly. Successful programs must be built on mentorship, connectedness, belonging, innovativeness, and career preparation. Systematic and structural barriers must be removed to make the environment inclusive; innovation within the tech sector will occur and be sustainable.

Reimagining recruitment strategies requires a multifaceted approach that acknowledges diverse student needs and backgrounds. Both the Boiler Tech Challenge and DARE IT Challenge demonstrate the power of project-based learning, mentorship, and industry engagement in fostering belonging and career readiness. While BTC serves as an early pipeline into engineering and technology, DARE IT supports women at critical junctures in their professional journeys.

By integrating key elements from both initiatives—such as hands-on challenges, mentorship, and structured career pathways—institutions can create hybrid recruitment models that attract and retain underrepresented groups in STEM. As we continue to refine our strategies at Purdue Polytechnic Columbus, we recognize that scalable, adaptable programs like these are essential in closing the gender gap in technology and building a more inclusive academic and professional landscape.

Future research should focus on evaluating the long-term retention rates and career outcomes of women recruited through these specialized strategies. Additionally, exploring the scalability of hybrid recruitment models across other small-campus environments could provide valuable insights for institutions facing similar challenges. Expanding community partnerships, increasing alumni involvement in mentorship programs, and leveraging data analytics to track recruitment success rates will further strengthen efforts to close the gender gap in technology fields.

Higher education needs to begin by incorporating mentorship programs into all recruitment efforts of all students especially those female students who tend to embrace the connectedness of a mentorship program. Most college students are not sure where to begin their journey; they simply know they want to attend college, either for themselves or because someone encouraged them to do so. To quote Stephen Covey's Habit #2, "Begin with the End in Mind" [2]. Faculty and staff need to make deliberate efforts to help students begin to envision how their college years will enable them to be successful in the end. They need to know that they can come to

their mentor with all the raw emotions of not knowing their goals or what their next move is. It is theirs to shape into how they want to mold their futures, but they should feel assured by faculty and staff that they will be there from point A to point B or Z if need be.

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