# Gender in Sustainability Studies

## Systematic Gender Inequalities in STEM, An American Perspective

*Yasemin Besen-Cassino, Nina Cheung, Matthew Murray, Elizabeth Emery, Brian Johnson, Nina M. Goodey and Amy R. Tuininga*

**Abstract** *There is a long-standing record of systematic gender inequalities for women who study and work in Science, Technology, Engineering, and Mathematics (STEM). This paper explores the role of gender inequality in sustainability internships. Thus, we aim to explore the impact of internships on women to challenge systematic gender inequalities in STEM. As a part of a five-year National Science Foundation NSF-funded project, we surveyed students participating in our internship in sustainability before and after the program about their attitudes towards STEM, analyzed their responses, and found that internships have a differential effect on women compared to men. Our findings show female students show higher learning gains in all categories and benefit more from internships.*

**Keywords** *Sustainability; STEM; Science; Science Education; Gender Inequality*

With the rising climate crisis and major threats to the environment, sustainability and STEM are gaining attention in the United States. However, they are not isolated issues; they can be connected to issues of inequality. The systematic inequalities in majoring in STEM and pursuing careers in STEM are well-documented in the United States. Earlier studies establish that even though women outpace men in college attendance and graduation rates, they are underrepresented in STEM fields and STEM careers (Koch et al.) not only in the United States but also in many other countries (Stoe and Geary). The systematic inequalities that discourage women from majoring in and staying in STEM fields should be contemplated because prior research documents the impor-

tance of equal gender representation in STEM fields. Women who persist in STEM fields and become established in the field as professors or practitioners inspire and encourage other women. The lack of female role models and mentors jeopardizes the future recruitment and retention of women in STEM (Nealy et al.; Rainey et al.). Therefore, the question of what interventions can be implemented to encourage women to study and persist in STEM should be posed. Existing research points to the vital role of even small acts and interventions (Whalen and Shelley) to increase confidence among women. In this paper, we focus on the gender differences in the study of STEM. In particular, we explore the role of internships as an important intervention in women's attitudes towards STEM majors and careers. Do internships have differential effects on male and female students? What is the role of internships in changing systematic inequalities in STEM in the United States?

## Prior Research

Gender inequalities in STEM have been well-documented (NSF). Today, specifically in the United States, women outpace men in college attendance and graduation rates, yet women are still being underrepresented in STEM fields both as majors and later in STEM careers (NSF). The existing research on gender inequalities in STEM operates under a few strands.

First, a substantial body of research focuses on the role of self-esteem and perceptions of self-efficacy. Research finds that women in STEM have much lower evaluations of self and perceptions of self-efficacy (Hilts et al.), with female students evaluating their own abilities in a negative light and underplaying their knowledge. A University of Pittsburgh study finds that in physics classes, female students with A's have similar self-efficacy in physics as male students with C's in introductory courses (Marshman et al.). Even with higher performance in the same course, the self-evaluations of female students were substantially lower than their male counterparts.

Female students' lower perceptions of their own abilities are well documented in other studies as well (Reuben et al.). In a randomized study, subjects were first asked to perform arithmetic tasks and then assigned as either employers or candidates for potential job interviews. Each employer was assigned a pair of candidates and asked to "hire" an employee from the pair to perform a second arithmetic task. The researchers focused on pairs with one male and one female candidate to see if the employers' selection and prediction of perfor-

mance would be influenced by the candidates' gender (Reuben et al.). Based on the results, both women and men employers were two times more likely to hire a male employee to perform the second arithmetic task, often despite actual performance results. The study also considered the candidates' self-reported score prediction for the second task and found that male candidates tended to boast about their performance by engaging in "cheap talk": overestimating and exaggerating their own performance.

Female candidates underreported their performance. Here, it can be highlighted that not only male candidates were more willing to inflate predictions of their own future performance, but that employers had more favorable predictions of the male candidates' future performance and continued to rely on their biased preference for male candidates even when objective performance results favored female candidates (Reuben et al.).

In addition to differences in self-efficacy and self-perception of abilities in STEM, research also documents that women in STEM are treated differently by others, including their professors. A double-blind study was conducted with 127 biology, chemistry, and physics professors to explore faculty members' possible gender bias toward students. Professors were tasked with evaluating applications of science students, assigned as either male (63) or female (64), to a science lab manager position. Professors rated the students' competence and employability, deserved salary, and the amount of mentoring that they were willing to dedicate to the applicants. The study concludes that professors viewed female candidates as less competent, less hirable, and deserving of a lower salary and less mentorship. The researchers also measured the professors' liking of the female students to test possible correlation between liking and perception of employability. They found that the professors' liking of the female students was not positively correlated with their perception of the female students' employability. Although the results of gender biases were modest, the subtle biases held by professors accumulate and translate into "large real-world disadvantages in the judgment and treatment of female science students" (Moss-Racusin et al.).

These gender differences are felt especially by female students working with male professors. In a survey-based study of 109 female undergraduate and graduate students, Powless and team find that especially male professors' negative and unfair elevations of female students have long-term effects. Due to such low negative views and evaluations, they are less likely to mentor them. This often results in isolation of women in STEM and affects women's sense of belonging in the field (Rainey et al.). Because of these perceptions of barriers

and unequal treatment, women in STEM report having to work twice as hard to get the same amount of recognition as men (O'Connell and McKinnon).

That is why many studies point to the importance of mentorship, especially by women. An eight-year study of 150 undergraduate female STEM students at the University of Massachusetts Amherst finds that same-sex peer mentorship has positive effects on confidence, motivation, graduate intention, and emotional health of students. For example, female participants assigned to male mentors or no mentors declined in confidence and motivation in engineering skills and courses, whereas those assigned to female mentors were associated with reduced decline in confidence and motivation, increased participation in internships, increased graduation rate, higher aspirations for further engineering education, and greater reported emotional well-being. The impact of quality peer mentorship is notable for groups underrepresented in STEM, such as female students in male dominated STEM majors, who benefit personally and professionally from having a network of peers who share their marginalized identity (Wu et al.).

However, despite the need and benefits of mentorship, research finds that both men and women are more likely to mentor men (Saffie-Robertson). In fact, because women in STEM are represented in lower numbers, women in power positions in such fields might be more likely to distance themselves from female students to avoid tokenism. Women in STEM face the pressure of conforming to the male-dominated field by limiting their friendships with other women (Bergsieker et al.).

Overall, this results in women students getting less attention and mentorship from both male and female professors, resulting in feelings of isolation and lower confidence (Sterling). With fewer female STEM students, networking and connecting with others is also an issue. Due to this isolation, they are less likely to be connected to their peers and less likely to network. In this paper, we explore the role of a transdisciplinary, collaborative internship program and its effects on female students. Based on the prior research, we would hypothesize that internship programs like these provide mentorship opportunities besides helping female students connect and network both with mentors and friends. In this paper, we test the efficacy of this potential intervention: do internship programs potentially help female students?

## Green Teams

The PSEG Institute for Sustainability Studies (PSEG ISS) at Montclair State University started a 10-week, paid internship program called the Green Teams in 2016 and has been offering it every summer since then. Green Teams is a unique, transdisciplinary internship program that provides college students with the opportunity to work on issues of sustainability. In this program, a diverse group of advanced undergraduate students are selected nationally through a competitive application and interview process, and then assigned to groups of five, with each group serving a host organization. The groups are interdisciplinary: students come from a wide range of disciplines including natural sciences, social sciences, business administration, economics and engineering. They also come from a wide range of backgrounds, universities and geographic areas. The host organizations consist of nonprofit organizations, corporations, municipalities and many others. Each group works on a concrete question of sustainability for the organization and offers solutions to help the organizations with their sustainability goals.

Throughout this full-time internship, PSEG ISS provides interns with training and workshops on various sustainability topics, methodological workshops on issues of sustainability, professional development, communication as well as team building activities. Each team works together with their organizations to achieve their deliverables. At the end of the program, the teams provide their host organization with a comprehensive written report of their work, as well as give a TED-talk style presentation of their work to a broader audience. Throughout the process, the students are provided a stipend and housing to ensure equitable participation.

The Green Teams program is particularly unique for several reasons. Firstly, it combines both academic and experiential learning. The students receive short instruction on a wide range of topics throughout the summer, including environmental sustainability, green accounting, return on investment (ROI), databases, geographic information systems (GIS), professional communications, resume development, diversity, equity inclusion and micro aggressions, methodological instructions on making surveys, and using Qualtrics for data analysis on R. These topics cover the three pillars of sustainability: economic, environmental and equity. Additionally, the program also covers science communication, professional development as well as leadership skills.

Secondly, the students are grouped together in teams and paired with corporations and internship sites. Students collaborate with students from different backgrounds and disciplines in their interdisciplinary groups of five. The design of the internship helps the students get mentorship from both academic and corporate mentors. The team design also allows the students to network with peers from different disciplines and perspectives.

## Data

The data for this study comes from three-summer cycles of internship from 2021, 2022, and 2023. As a part of a National Science Foundation NSF-funded, five-year project, participating students are surveyed before and after their participation in the program about their views of sustainability, science, and careers.

The Survey of Undergraduate Research Experiences (SURE) survey instrument, developed and validated by Grinnell University (Lopatto) was used in the Green Teams pre and post surveys. The SURE survey is designed to evaluate participants' self-identified learning gains and perceptions of program components. For the purposes of the study, we will only focus on the aspect of self-identified learning gains from the SURE survey. The SURE survey contains a list of 21 statements related to knowledge of the science field, from "ability to integrate theory and practice" to "understanding of the research process in your field". Participants were asked to rate their learning gains by choosing one of five statements with which they most identify. The five statements are "No gain or very small gain", "Small gain", "Moderate gain", "Large gain", and "Very large gain". There was also the option of "Not applicable". SURE surveys were supplemented with 13 demographic questions that inquired about gender, race, ethnicity, academic major, and financial status.

The Green Teams pre-survey was administered within the first week of the program to establish base-level findings. Respondents were instructed to complete the survey through an anonymous Qualtrics link. Before the survey was conducted, participants were reminded that their response to the survey was appreciated, it was not required and that they reserved the right to skip any questions and all their responses were kept confidential. The Green Teams post-survey was administered the day after final presentations, on the last day of the internship, with similar instructions. Participants' answers were collected by the survey administrator and entered anonymously into an Excel

spreadsheet. No one else had access to the students' information to ensure ethical treatment of the data. Researchers then transferred the spreadsheet to R, a programming platform. Code was used to place participants into their appropriate groupings for each graph to assess each grouping. Individuals who did not complete both the pre-survey and post-survey, or had conflicting or unclear answers in regards to the specific groupings, were omitted from the analysis. Graphs were produced showing the averages of each statement rating.

The statements were translated into numbers, mimicking the style of a Likert scale. "No gain or very small gain" represented a 1, while "Very large gain" represented a 5. "Not applicable" responses were not counted toward the analysis.

## Findings and Analysis

Based on the three cycles of Green Team internships, we have a total of 156 participants. Table 1 shows descriptive characteristics of the participants. The students reflect diversity based on gender, age, ethnic background and income.

*Table 1: Descriptive Characteristics of Participants*

| | Female | Male | Total |
|---|---|---|---|
| Cohort Year | | | |
| 2021 | 33 | 23 | 56 |
| 2022 | 37 | 13 | 50 |
| 2023 | 30 | 20 | 50 |
| Age Range | | | |
| 18–19 | 20 | 9 | 29 |
| 20–21 | 61 | 33 | 94 |
| 22–23 | 8 | 9 | 17 |
| 24–25 | 4 | 1 | 5 |

| Age Range | Female | Male | Total |
|---|---|---|---|
| 26+ | 6 | 4 | 10 |
| Prefer not to answer | 1 | 0 | 1 |
| Undergraduate Academic Level | | | |
| 1 | 3 | 4 | 7 |
| 2 | 18 | 7 | 25 |
| 3 | 45 | 24 | 69 |
| 4 | 30 | 13 | 43 |
| 5–6 | 1 | 6 | 7 |
| Other (Includes graduate level) | 3 | 2 | 5 |
| Pell Grant Recipient | | | |
| I don't know | 7 | 2 | 9 |
| No | 62 | 32 | 94 |
| Yes | 31 | 22 | 53 |
| Ethnicity | | | |
| Hispanic, Latino/a/x, or Other Spanish-Speaking Culture or Origin | 32 | 12 | 44 |
| Non-Hispanic | 63 | 41 | 104 |
| Prefer not to answer | 5 | 3 | 8 |
| Total | 100 | 56 | 156 |

Based on three years of pre and post data collection, we find important gender differences in how the internship was experienced. While the benefits of internships are valuable for all students, we find that female students report higher learning gains at the end of the internship. This is not to say male students do not benefit from the internship. But rather, we find that female students benefit differently from the internship experience. There was an 11% increase of female students who felt that they could do well in science courses

after the internship experience vs a 7.14% increase for male students, but the post-survey for female students is still below the pre-survey for male students. This finding is supported by the literature. Marshman, for example, finds that female students have lower self-efficacy and lower confidence in their own STEM knowledge despite their actual class performance or actual mastery of the material. From a self-confidence perspective, the internship could have an additional benefit for female students in boosting their confidence.

The gendered benefits are not only limited to higher learning gains, but also to differential impacts of having mentors. In our survey results, higher percentages of female students responded positively with 4 or 5 ratings than male students on the positive impacts that their peer mentors had on their research experience with differences of 3.86% and 6.79% respectively. Although our survey does not inquire about the gender of the peer mentors to confirm same-sex mentor-mentee matches, it signals that the mentor and mentee relationship on an interpersonal level can have a lasting impact on the mentee (Wu et al.). The design of Green Teams allows for both corporate mentors as well as peer mentors and academic mentors. The literature documents that women in STEM receive fewer mentorship opportunities, so given the lack of opportunities in the field, the internship would be more beneficial for female students, who might otherwise have fewer mentors.

In terms of specific skills acquired during the internship, our survey asked about a battery of 21 specific items. Some of these items include specific skills in scientific inquiry such as analyzing data, ethical conduct, giving oral presentations, lab techniques; some measure understanding how science careers work such as clarification of the scientific path, understanding how scientists work, potential to teach science; and some measure self-reports such as self-confidence, feeling like part of a community and feeling ready for research. As figure 8 shows, in every category, female students showed higher learning gains.

While female students reported higher learning gain averages than their counterparts in all categories, t-tests found that both groups had significantly higher learning gains in "Becoming part of a learning community", "Self-confidence" and "Potential to be a Teacher of Science" in particular. These categories are especially important because they show that the internship is building the confidence of female students significantly more and helping female students belong to be a part of the science community. This increased sense of belonging is also reflected in how female students see their potential to be a science teacher.

*Fig. 8: Learning Gains by Gender*

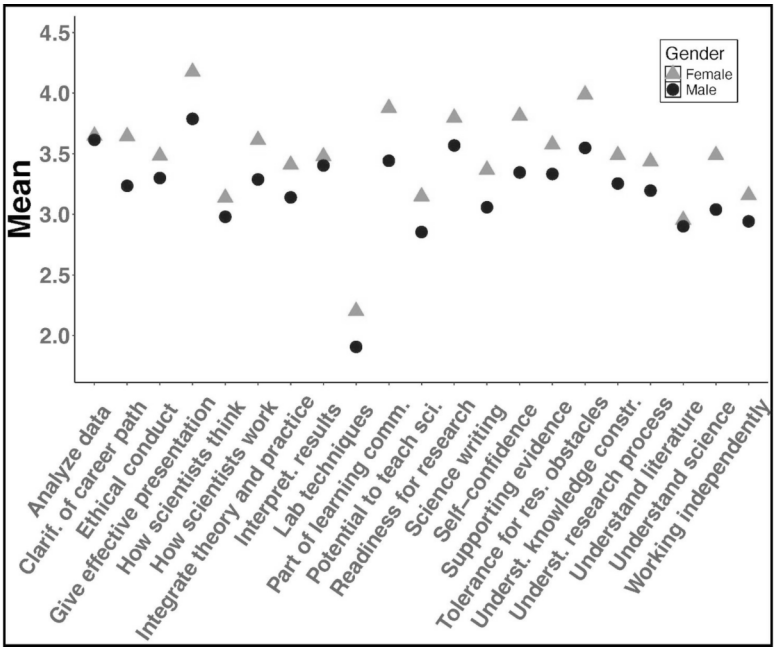


*Fig. 9: Learning Gains by Gender*

| Question | Overall Mean +-SE | Underrepresented Ethnicity Mean +-SE | Female Mean +-SE | Underrepresented Race Mean +-SE |
|---|---|---|---|---|
| Learning Community | 3.76+-0.011 | 3.85+-0.13 | 4.1+-0.17 | 3.71+-0.26 |
| Self-confidence | 3.68+-0.010 | 3.79+-0.12 | 4+-0.18 | 3.48+-0.25 |
| Potential to be Science Teacher | 3.17+-0.012 | 3.23+-0.14 | 3.43+-0.20 | 3.24+-0.22 |

## Discussion

Overall, based on a three-year data collection of pre and post surveys with participating students, we find that female students benefit more from the Green

Teams internship experience. Our findings show that they show higher learning gains in all self-reported categories and are more likely to show self-confidence and express higher levels of belonging in the field and profession.

These findings are important because they show significant effects in gender for belonging in STEM and self-confidence. The differential effects for female students are especially important because fewer female students feel like they belong in STEM majors or plan for STEM careers due to low representation, limited advancement and workplace issues (O'Connell and McKinnon). These structural barriers and negative perceptions limit female representation in STEM majors and careers. Sears, Jessup and Matthews show that experiences that focus on building identity help to diversify the pipeline. The Green Teams internship program, in particular, offers a unique opportunity for students of sustainability to engage in internship and collaborate in groups, with specific emphasis on issues of identity, diversity and inclusion. These identity focused discussions and focus on issues of diversity and inclusion could contribute to the female students' sense of belonging.

Hilts et al. find that confidence is a central component of achieving equity and inclusion for female STEM students. The Green Teams internship structure allows for confidence building, particularly for female students simply through increased focus on mentorship, which is often not available to female students. By having designated corporate and academic mentors, the internship program functions to build confidence.

The Green Teams Program also encourages a collaborative and interdisciplinary team-based approach to internship. Working in groups allows students to express their own values and contribute to the group, learn about the values of others, and find belonging in academic and professional settings. This particular design could also be important in building confidence. As opposed to working alone or being isolated, the team design allows the students to see their particular contribution to the group. Seeing the direct effects of their contribution and its effects to the final deliverables would potentially help build confidence. Additionally, the group design would help the students connect with other peers, expanding the networks of students, which can also increase confidence.

## Limitations

While our findings point to higher learning gains and benefits for female students, these differences are based on self-reports through the participants' survey responses. Our data does not measure whether the participants did, in fact, increase their knowledge of science, but rather we measure their perceptions of how the internship impacted their knowledge of science. The self-report structure of the data does not allow us to parse out whether female students actually learned more, or whether their perceptions of self-reports are higher. We would argue that the gain is important regardless. A substantial portion of inequality in STEM comes from women's lower evaluations of self-efficacy and self confidence in their knowledge rather than differences in actual knowledge. Differences in confidence and self-efficacy are central contributors to gender inequality. Therefore, exploring these differences and identifying mechanisms to overcome systematic differences can help pave the way for equitable STEM participation for women and men.

## Conclusion and Future

This paper focuses on the role of interdisciplinary internship experiences in understanding access and representation in STEM. Prior research shows that an important component of gender inequality in STEM comes from the lower self-perceptions of female students compared to their male counterparts. Moreover, issues of self-efficacy, self-confidence and self-esteem in science impact women's persistence in STEM majors and careers. Additionally, prior research documents gender differences in mentorship: where female students report having fewer mentorship opportunities. Our findings show that internships such as the Green Teams Program have important effects on female students. While positive internship effects are present for both male and female students, our pre and post survey findings suggest, internship experiences are invaluable for female students because the provide females with the opportunity to interact, learn from, and identify with others in the field. Female students report feeling more confident and gaining more from their internship experience. It is important to note that based on our data, we are not able to tell specifically the cause of this higher learning gain. It is possible that women benefited more from this experience and had higher learning gains simply because they had an internship since men are more

likely to receive these benefits in the field as they prior research documents. It can also be because of the interdisciplinary nature of the internship that they gained a sense of agency and expertise in the field and were able to see their contributions in relation to others in the group. It could also be due to the group nature of the internship that they benefited from the interactive aspect of the experience or a combination of these factors. To identify these causes of these gendered effects, the next step would be to explore these potential factors through more qualitative data collection techniques with interviews and focus groups.

While our dataset currently focuses on gender, further studies can explore potential inequalities among STEM students based on differences in race and ethnicity. We plan to collect more data in future cycles of the program. As a part of our ongoing NSF-funded project, we are planning on replicating the same pre-post surveys with the new internship cohort in the 2024 cycle to increase our sample size. In addition to the quantitative data, we will be collecting qualitative data – particularly interviews in focus groups – to better understand the mechanisms through which female students benefit. We would like to take further steps to complement the trends that we spotted with qualitative interviews to gain a better sense of the mechanisms and lived experiences of internship experiences from the perspectives of the female students.

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## References

Bergsieker, Hilary B., Matthew O. Wilmot, Emily N. Cyr and Charnel B. Grey. "A Threat in The Network- STEM Women in Less Powerful Network Positions Avoid Integrating Stereotypically Feminine Peers." *Group Processes & Intergroup Relations*, vol. 24, no. 3, 2021, pp. 321–349. DOI: 10.1177/1368430219888274.

Brue, Krystal L. "Work-Life Balance for Women in STEM Leadership." *Journal of Leadership Education*, vol. 18, no. 2, 2019, pp. 32–45. DOI: 10.12806/V18/I2/R3.

Derricks, Veronica and Denise Sekaquaptewa. "They're Comparing Me to Her-Social Comparison Perceptions Reduce Belonging and STEM Engagement Among Women with Token Status." *Psychology of Women Quarterly*, vol. 45, 2021, pp. 325–350.

Dunlap, Sarah T., Joan M. Barth and Kelsey Chappetta. "Gender Roles in the Romantic Relationships of Women in STEM and Female-Dominated Majors- A Study of Heterosexual Couples." *Gender Issues*, vol. 36, no. 2, 2019, pp. 113–135.

Grinnell College. *SURE III Survey. Undergraduate Research Experience Surveys*. https://sure.sites.grinnell.edu/sure-iii/. 2018. Accessed 28 August 28 2024.

Hilts, Alexis, Rachel Part Bernacki, Matthew L. Bernacki. "The Roles of Social Influences on Student Competence, Relatedness, Achievement, And Retention in STEM. Science Education." *Science Education*, vol. 102, no. 4, 2018, pp. 744–770. https://doi.org/10.1002/sce.21449.

Koch, Amanda J., Paul R. Sackett, Nathan R. Kuncel, Jeffrey A. Dahlke and Adam Betty S. "Why women STEM Majors are Less Likely than Men to Persist in Completing a STEM Degree: More than the Individual." *Personality and Individual Differences*, vol. 190, 2022.

Marshman, Emily M., Z. Yasemin Kalender, Timothy Nokes-Malach, Christian Schunn and Singh Chandralekha. "Female Students with A's Have Similar Physics Self-Efficacy as Male Students with C's in Introductory Courses: A Cause For Alarm?" *American Physical Society*, 2018.

Moss-Racusin, Corinne A., John F. Dovidio, Victoria L. Brescoll, Mark J. Graham and Jo Handelsman. "Science Faculty's Subtle Gender Biases Favor Male Students." *Proceedings of the National Academy of Sciences (PNAS)*. vol. 109, no. 41, 2012, pp. 16474–16479.

O'Connell, Christine and Merryn McKinnon. "Perceptions of Barriers to Career Progression for Academic Women in STEM. Societies", vol. 11, no. 2, 2021, pp. 27. https://doi.org/10.3390/soc11020027.

Powless, M. D., Kerrie G. Wilkins-Yel, Yue Li, Poh L. Lau, Jacks Cheng, Y. Joel Wong and Maureen Biggers. "[He] Gave Me a 30-Minute Lecture on How I Was a Shitty Grad Student: Examining How Male Faculty Can Eradicate Systemic Oppression and Support Women in STEM." *Journal of Diversity in Higher Education*, vol. 17, no. 1, 2024, pp. 81–95. https://doi.org/10.1037/dhe0000393.

Ramsey, Laura R. "A Strong Teacher Identity May Buffer Woman-Scientist Identity Interference-Preliminary Evidence from a Teaching-Intensive University." *Gender Issues,* vol. 38, no. 1, 2021, pp. 65–78.

Reuben, Ernesto, Paola Sapienza and Luigi Zingales. "How Stereotypes Impair Women's Careers in Science." *Proceedings of the National Academy of Sciences (PNAS)*, vol. 111, no. 12, 2014, pp. 4403–4408. http://www.pnas.org/cgi/doi/10.1073/pnas.1314788111.

Saffie-Robertson, Ma. Carolina. "It's Not You, It's Me- An Exploration of Mentoring Experiences for Women in STEM." *Sex Roles.* vol. 83, no. 9/10, 2020, pp. 566–579.

Stoet, Gijsbert, and David C. Geary. "The Gender-Equality Paradox in Science, Technology, Engineering, and Mathematics Education." *Psychological Science,* vol. 29, no. 4, 2028, pp. 581–593.

Swafford, Marshall and Ryan Anderson. "Addressing the Gender Gap- Women's Perceived Barriers to Pursuing STEM Careers." *Journal of Research in Technical Careers*, vol. 4, no.1, 2020, pp. 61–74.

Whalen, Donald F. and Mack C. II. Shelley. "Academic Success for STEM and Non-STEM Majors." *Journal of STEM Education: Innovations and Research*, vol. 11, no. 1–2, 2010, pp. 45–60.

Weisgram, Erica S. and Amanda Diekman. "Family-Friendly STEM: Perspectives on Recruiting and Retaining Women in STEM Fields." *International Journal of Gender, Science and Technology,* vol. 8, no. 1, 2015, pp. 38–45.

Wu, Deborah J., Thiem, Kelsey C. and Nilanjana Dasgupta. "Female Peer Mentors Early in College Have Lasting Positive Impacts on Female Engineering Students that Persist Beyond Graduation." *Nature Communications,* vol. 13, no. 6837, 2022. https://doi.org/10.1038/s41467-022-34508-x.