The Impact of COVID-19 on Women Engineers in Academia

Dr. Roberta Rincon, Society of Women Engineers

Dr. Roberta Rincon is the Associate Director of Research with the Society of Women Engineers, where she oversees the organization’s research activities around issues impacting girls and women from elementary through college and into the engineering workforce. Before joining SWE, Roberta was a Senior Research and Policy Analyst at The University of Texas System, where she focused on student success and faculty teaching and research award programs across nine academic institutions. Roberta received her B.S. in Civil Engineering from The University of Texas at Austin, an MBA and an M.S. in Information Management from Arizona State University, and a Ph.D. in Educational Policy and Planning from UT Austin.
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Introduction

COVID-19 has upended the lives and livelihoods of millions of Americans, introducing an historic level of uncertainty in our everyday lives. While it is unclear what the impact will be on diversity in the engineering and technology sectors, we are beginning to see concerning signs. The U.S. Bureau of Labor Statistics recently reported that the higher education workforce has shrunk by at least 7% since February 2020 – a drop not seen in the over 60 years that the agency has tracked such data [1]. The National Student Clearinghouse Research Center indicates that fall 2020 undergraduate enrollment was down 2.5% over a year ago, with most students taking courses remotely [2]. A recent survey of undergraduates found that they reported struggling with motivation and missed receiving instructor feedback and collaborating with other students, which can be challenging in a virtual space [3].

In the U.S. workforce, women held more jobs than men a year ago [4]. Since the pandemic hit in March 2020, women have suffered higher job losses than for men, and much of this loss has been experienced by Black women and Latinas [5]. While engineers and other STEM professionals are generally considered less vulnerable because they are highly educated and more likely to be able to pivot to a remote work setting, there are still numerous challenges facing women in STEM— and unique challenges for those in academic environments. In addition to dealing with the uncertainty that the pandemic has introduced into their personal lives (increased care burden, uncertainty in job security), engineering faculty have also been expected to be more flexible, be more understanding and empathetic, and improve communication with students [6].

The Society of Women Engineers (SWE) conducted a survey of engineering students and professionals in the summer of 2020 to understand the impact of the pandemic on their education and career. While SWE continues to study the impact on gender equity in engineering and technology, this paper focuses on the responses received from women engineering students and academic professionals from the summer survey.

Methodology

Data for this study was collected using an online Qualtrics survey. The survey link was emailed to engineers over the age of 18 who were members of the professional association conducting the study. Data collection took place between June 3, 2020 and June 15, 2020. Responses were received from students in engineering programs and those working in a variety of industries, including academia. The majority of respondents were from the United States, with 5% based outside of the U.S. Over 1,700 women and queer/non-binary engineers and engineering college students responded to the survey. Of these, 54 were academic professionals, 44 were
undergraduate and graduate students holding academic positions (including research and teaching assistantships), and 350 were students not employed in academic positions (see Table 1).

<table>
<thead>
<tr>
<th>Type</th>
<th># of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>College/University Academic Administrator</td>
<td>3</td>
</tr>
<tr>
<td>Tenured or Tenure-Track Faculty</td>
<td>19</td>
</tr>
<tr>
<td>Non-Tenured Faculty</td>
<td>23</td>
</tr>
<tr>
<td>Academic Position, Other</td>
<td>9</td>
</tr>
<tr>
<td>Student Worker (includes research assistants and teaching assistants)</td>
<td>44</td>
</tr>
<tr>
<td>Graduate Student (not working)</td>
<td>56</td>
</tr>
<tr>
<td>Undergraduate Student (not working)</td>
<td>294</td>
</tr>
</tbody>
</table>

Descriptive statistics are the primary focus of this analysis, though chi-square tests were conducted to better understand whether there was a relationship between certain variables.

**Findings and Discussion**

**Academic Professionals**

In response to SWE’s survey, 33% of women engineers in academia (not including student workers) expressed concern about the possibility of losing their job and 76% were concerned about their ability to find another job if they were to lose their job. Among students working in academia, about half were concerned about the possibility of losing their job which, given the budget constraints that many colleges have been experiencing during this period, is an understandable concern.

When asked about employers’ responses to the COVID-19 pandemic, participants indicated that academic employers had addressed the budgetary impacts of the pandemic in a variety of ways, with the implementation of a hiring freeze and reduction/elimination of travel budgets the most common response (Figure 1). When comparing responses across the general sample of 1,700+ survey respondents, every employer response option had a higher percentage of academic professionals indicating that their employers had adopted the option versus the general sample, highlighting the significant financial strain that higher education institutions have experienced during this crisis. However, academic professionals expressed general satisfaction with their
employers’ responses to addressing COVID-19 concerns for employees, with over 80% indicating that the communication had been adequate and that they approved of how their employer had responded.

**Figure 1: Employer Response to COVID-19**

In addition to the impact on employment, salaries, and benefits, about 29% of engineering faculty and administrators indicated that their employers required them to work more hours per week than they had before COVID-19. This was the case for both tenured and non-tenured faculty. However, the majority of responses from academic professionals, including student workers, was that their employers allowed them to adopt a more flexible work schedule and to work remotely.

Faculty with children – particularly school-age children – are finding it challenging to balance care responsibilities with teaching and research. One recent study found that faculty with children, both men and women, were losing more research time due to COVID-19 than their childless counterparts, with women losing an average of 1.5 hours of research time per day compared to 1.0 hours per day for men [7]. Faculty without children, however, are also losing valuable research time, but less than their colleagues with children - approximately 30 minutes of lost research time per day. Another study of engineers in academia found that women more often described the personal challenges that they and their family faced during COVID-19, while men described their experience of having more free time [6].

In our survey, half of academic professionals reported being dissatisfied with work-family balance during COVID-19. This was much higher than responses seen by engineers in other sectors. While only 15% of academic professionals indicated that they had children and 6% had adult dependents, academic women professionals reported more of an equal sharing of the care burden with their partners for children (Figure 2). This was a different pattern than was seen among engineers in
other sectors, where women reported shouldering a larger care burden than their partners for childcare and educational support. Adult care, on the other hand, primarily falls to women, whether they work in academia or another sector.

![Figure 2: Share of Family Responsibilities](image)

The growing household and care burden for both students and professionals has led a number of researchers to focus on the impact this is having on mental health. One global study found that 27% of women reported an increase in challenges associated with mental illness compared to 10% of men, primarily due to the increase in unpaid labor in their household [8]. Among graduate students, many of whom have teaching responsibilities, a 2020 survey found that two-thirds reported low well-being, with about one-third suffering from moderate-to-high levels of anxiety and depression [9].

**Students**

When this survey was conducted, college students were experiencing a great deal of uncertainty with regards to plans for the upcoming fall semester – but they remained optimistic about the possibility of taking classes on campus. When we asked students whether they planned to return to campus to take face-to-face classes, 76% indicated that they planned to do so (Figure 3). However, there was an expectation that face-to-face classes would be scaled back due to the pandemic, with 59% of students reporting that they planned to take online classes, hinting at the expectation of a hybrid model for course-taking in the fall. Interestingly, some students indicated plans to take a gap year or gap semester to wait out the return of a traditional college experience.
Unfortunately, it became clear as the fall semester approached that most colleges would primarily be conducting classes remotely. Even as students moved into on-campus housing, many found that their classes would not be meeting face-to-face very often, if at all. A subsequent survey of college students in Fall 2020 found that only 1 in 4 students were able to return to on-campus classes.

Of even greater concern has been the pandemic’s impact on women’s graduation and employment plans. Almost half of college students who responded to our survey indicated that they were worried that the pandemic would delay their graduation date. Education researchers have noticed this concern among college students across the country, and there are particular concerns about the impact on vulnerable student populations. The Strada Education Network recently found that half of Latino students and 42% of Black students had canceled or changed education plans compared to 26% of white students [10]. Our survey responses align with this, with 57% of students of color expressing concern about the impact of the pandemic on their graduation plans compared to 41% of white students.

A number of students who had internships or jobs lined up for summer or fall 2020 found that their offers were negatively impacted by COVID-19. Among our survey respondents, 32% who had received an offer for a summer position had the offer rescinded or postponed. Of those who graduated in spring 2020, 24% had their job offers rescinded or postponed. Unfortunately, employers have had to make hard decisions during this crisis, and recent graduates with little work experience are among a high-risk group when organizations decide to cut staff.

As discussed earlier, most students were taking college courses online this past fall, so many spent the semester away from campus. As a result, students reported that, on average, the amount of time they spent on household chores had increased significantly from prior to the pandemic – and students of color reported spending more time doing household chores than their white peers.
(Figure 4). This increased burden coupled with financial concerns related to employment and internship losses may help explain why so many students of color have had to modify their education plans.

Figure 4: Hours per Week Student Spent on Household Chores

Conclusion and Future Research

The COVID-19 pandemic has significantly impacted everyone around the world in some form or fashion, but early indications are that this pandemic may have long-term impacts on our progress towards gender and racial equity and inclusion in STEM education and the academic workforce. Women in academia are seeing an impact on their research, including delays and derailments – and this has been a particular concern for early career scholars and doctoral students [11]. Teaching has become more challenging and more demanding. Women are experiencing increased care burdens, and this is impacting their ability to maintain work-life balance. Concerns are being raised with regards to women possibly self-selecting to remove themselves from the workforce due to the challenges they face balancing their home and work responsibilities.

To help ease the burden that women are facing, employers must continue to monitor and mitigate the impact of their decisions on gender equity during this time. Institutions can ensure that employees have the resources that they need to effectively work remotely or in a hybrid format, including required technology and continued access to training and development opportunities. Employers can also provide resources to encourage work-life balance, such as mental health services and support. This holds true for all employees, including working parents, employees living alone, and student workers. Employers should also maintain due diligence to mitigate bias in workplace decisions, including hiring and promotion decisions. Many of these decisions are
being made virtually, and they can be easily influenced by biases without proper checks and policies in place.

The COVID-19 pandemic has had such a dramatic impact on global economies and our progress towards gender equity. While it is too early to really understand the full impact that this pandemic has had on our efforts to achieve gender equity in STEM, organizations continue to survey and study the experiences of students and individuals in the STEM workforce. A fuller picture will emerge over time.
References


