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Understanding Gen Z's Declining Engagement with WE@RIT, a Woman in Engineering Program

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Kathy has served as Director of Women in Engineering at RIT (WE@RIT) since 2015, and brings a rich array of life experiences to the position. After graduating with a bachelor's degree in Public Affairs from a women's college where she learned first-hand the value of a female-centric support network, Kathy made her way to Silicon Valley. There she studied CMOS Mask Layout Design which eventually led her to a position in IT for a semiconductor IP start-up. Fast forward through coast-to-coast moves to Boston, San Diego and finally Rochester, Kathy spent many years in the fitness industry while raising her daughter, wearing every hat from personal trainer and cycling instructor to owner and director of Cycledelic Indoor Cycling Studio. Kathy draws upon these many diverse career and life experiences while directing WE@RIT.

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Introduction

Around 2016-2017 we began noticing sharp declines in current student engagement with our women in engineering program, WE@RIT, within Rochester Institute of Technology's Kate Gleason College of Engineering. The program itself was launched in the early 2000's during the Millennial era, and the programming playbook was one of large, one-off events spearheaded by one full-time Director, and a handful of student employees. That formula seemed successful for engaging current students right up through 2016-2017. Then, almost overnight, a switch was flipped. No-show rates for current student events increased year-over-year and now hover at 50% or more; emails go largely unread; a preeminent overnight recruitment program for high school seniors was forced to change format to an evening program because of a decreasing number of first-year student volunteers willing to host prospects; and relationships with our sponsors and alumnae have suffered as a result of these engagement declines.

In the spring of 2020, we embarked upon a four-pronged approach to better understand the engagement declines we were seeing. The first prong of the approach was a review of literature to better understand this current cohort of students, followed by the second prong of a needs assessment survey distributed to all undergraduate women in our college of engineering. The results of these first two approaches were reported upon separately [1]. The survey left us with several unanswered questions that required further examination to better understand the decline in current student engagement with our program. Specifically, we needed to understand how our historically events-driven organization could offer academic support (the top concern across every year and engineering major) without duplicating existing services; and also why, when asked to rank their top concerns as women studying engineering, the environment for women within the engineering college consistently ranked at the bottom of student concerns across every year and engineering major. We also needed a better understanding of how the students experienced the program structure of our women in engineering program and if it could be improved to better reflect the needs of this new student cohort. Finally, we wanted to know how prevalent these declining engagement trends were on campus and what, if any, steps could be taken to improve them. This paper focuses on focus groups held with undergraduate women in engineering students, and contextual interviews held with other campus programs, clubs and organizations. First, we present a summary of what we learned about this new cohort of students as well as the key survey findings that informed the content of the focus groups and contextual interviews.

Meeting Generation Z

Generation Z began arriving on college campuses in the fall of 2013 and presently accounts for all traditional-aged college students on campuses [2]. The generational changeover from Millennials to Gen Z has been far more abrupt than most generational transitions which typically progress along a continuum, with characteristics becoming more pronounced over time [3]. Not so with Gen Z. Psychology professor Jean M. Twenge from San Diego State University warns that "the changeover from Millennials is one of the most pronounced ever" [4].

As a cohort, Gen Z is relational, driven, anxious, pragmatic and risk-averse [5]. They have grown up to choruses of "be careful;" born around 9/11 and its aftermath; taught from their formative years about the dangers lurking online; bearing witness to the Great Recession of 2007-2009 and the world-wide devastation caused by climate change; aware of the ever-rising cost of college attendance; and now emerging into a global pandemic. Gen Z is risk-averse and pragmatic in large part due to this social shaping. Furthermore, unlike any generation before them they are digital natives, growing up with screens in their hands. They are the first generational product of the inescapable 24/7 news cycle [3], [6], [7], [8].

They are also the most diverse generation in history, and are uniquely we-centric, cutting against our culture's high value placed on individualism [6], [7]. Their digital connection to one another, combined with their lifelong exposure to crisis after crisis has shaped them into big-picture thinkers with compassionate hearts [5]. Though it is tempting to assume this cohort would be more involved in volunteerism and engagement on campus, the reality is they are far less likely than the Millennials before them to volunteer and engage in extra-curriculars. The one-off events and experiences that were so popular with Millennials are often seen as superfluous to much of Gen Z, whose members would rather use their entrepreneurial, we-centric mindsets to address root problems at their source [5]. Furthermore, one-off events do not offer authentic relationships to be built over time, a major source of gratification to Gen Z students [5], [7].

From a college degree, Gen Z students expect value and outcome. They view degrees as job preparation, and desire application and preparation that will deliver them into a well-paying, secure job [3], [6]. Gen Z students are driven to succeed academically towards this end [5], [6]. They are profoundly afraid of failure, both for its potential economic setbacks, but also for what they perceive as letting down those they hold in high regard [5], [6], [9].

Gen Z students are highly relational, valuing authenticity and face-to-face interactions that allow them to form relationships with others who hold similar values [5]. Though they are digital natives who carefully curate multiple online personas, they prefer face-to-face interactions and experiences over virtual ones [3], [5]. A particular cruelty facing Gen Z is that though these face-to-face interactions are preferred, many cohort members feel unprepared for cultivating them and are arriving to college less socially mature and with fewer life experiences than previous generations [4]. Nonetheless, interpersonal relationships are not only one of the strongest motivators for Gen Z, they are one of their biggest sources of personal happiness [5].

Key Survey Findings Requiring Focus Group Follow Up

We drew upon this background research on Gen Z in part to draft a needs assessment survey for undergraduate women in the college of engineering. The goal of the survey was to understand how students were engaging with our program, to determine what students see as their top concerns and programmatic needs as women studying engineering, what entices their participation in women in engineering programming, and how our program should most effectively communicate with these students going forward. Our needs assessment survey was administered over two weeks beginning in late January 2020 to all women undergraduate

engineering students. After omitting partial responses, 257 responses were included for data analysis, providing a response rate of 39.4% [1]. The full accounting of responses was previously reported by the author and resulted in several areas requiring further qualitative follow-up in student focus groups.

When asked in the survey "What has been your biggest reason for not participating in WE@RIT events," some element of time/schedule accounted for the reason that 61% of the respondents had not participated with our program. We wanted to use student focus groups to better understand what was behind this perceived lack of time.

When asked to rank their top concerns as women studying engineering, succeeding academically in their engineering curriculum was the top concern across all years and majors; the environment for women in our engineering college was consistently ranked at or near the bottom. This same question was repeated in the fall of 2020 with COVID-19 included in the description for the item "self-care issues." The items ranked at the top and the bottom of the results remained unchanged across the years and majors, even with a global pandemic upending higher education. We wanted to use student focus groups to gain some clarity in why those items at the top and bottom fell as they did.

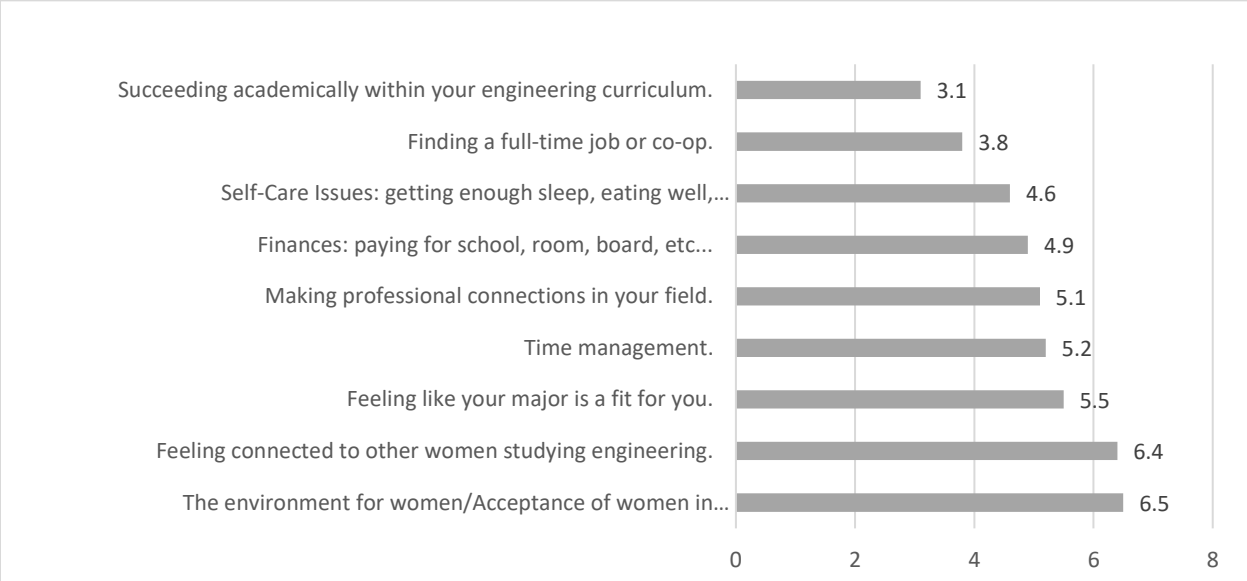

Figure 1: Top Student Concerns Ranked: Aggregate Mean, All Majors & Years, Spring 2020 *(n = 248); Ranked from High (closer to 1) to Low (closer to 9)*

The survey then asked respondents to assign a score from 0 to 100 to a list of twelve program categories commonly found within women in engineering programs around the country. A score of 0 meant that no program resources should be devoted to that category, whereas a score of 100 meant that any necessary resources should be devoted toward ensuring the success of that program category. The responses ranged from 0 to 100 on each item. The mean for each program category is displayed graphically in Fig. 2.

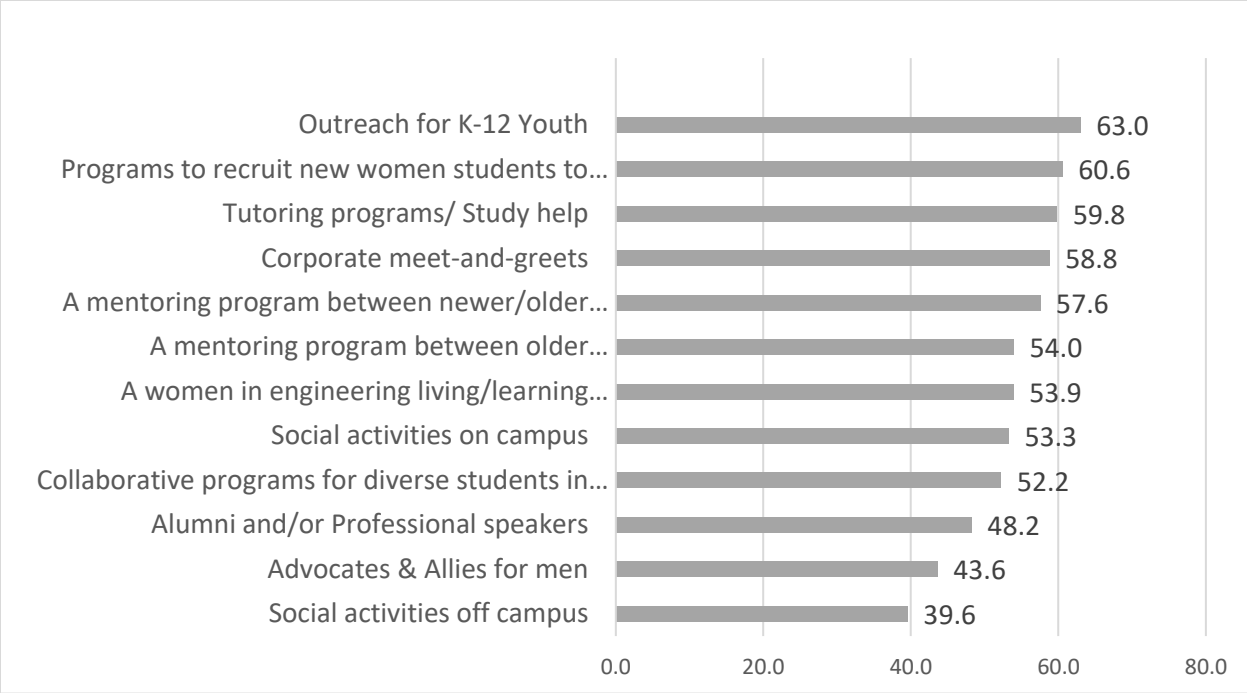

Figure 2: Program Areas Rated: All Years & Majors
(n=240); Respondents assigned a score to each program category between 0 (should not offer) and 100 (should definitely offer)

The scope of our needs assessment survey was current student engagement in current student programming. Though K-12 Outreach and New Student Recruitment programs are outside of the survey scope, we included them as items in this question to see whether perhaps Gen Z's we-centeredness would come through in the results. As seen in Fig. 2, the case can be made that it does. Neither of these program categories have current students as the target beneficiaries, but current Gen Z students nonetheless rated these program categories above all potential programming benefitting themselves.

Following K-12 Outreach and New Student Recruitment, our women in engineering program does not offer programming in the next five program categories that current students ranked as most important to them. Most perplexing was how students might expect our program to offer tutoring/study help, specifically, and how we might redesign the program to better correlate program areas to respondent's top concerns as engineering students generally. As a historically events-driven program we wanted to use focus groups to better understand how we could adapt and respond to this new cohort of students.

When we asked students about their preferred method of communication, email emerged by far as the preferred method. Yet, students are increasingly ignoring and not responding to our email communications. From background research we also know that Gen Z students are highly relational, have a general disdain for email, and much prefer shorter bursts of communication via social media platforms or messaging apps [5]. We hoped that student focus groups might shed

some light on practices our program might employ to market our offerings to these students more effectively.

Focus Group Methodology

This study followed an explanatory sequential mixed methods design, initiated quantitatively by the needs assessment survey, then followed by student focus groups and contextual interviews with a sampling of campus clubs, programs and organizations in order to qualitatively explain and better understand the survey results [10].

The full results of the survey were previously reported on, with key highlights informing the content of student focus groups detailed above [1]. Focus group participants were recruited using the survey instrument. For consideration for focus group inclusion, respondents could choose to forego anonymity and give their contact information within the survey instrument or maintain anonymity by following up with a separate email to our program with their contact information. All information was stored in a central spreadsheet. Included with student responses was their availability for three predetermined focus group sessions. The spreadsheet was sub-divided by availability, and then a random number generator was used to select eight focus group participants within each time slot. Ultimately, the goal was to have 6-8 students participate in each focus group with a cross-section of student year-level and major.

The focus groups were held in an engineering conference room across three different weeks and two different days of the week in late February and early March of 2020, prior to campus closures stemming from the COVID-19 pandemic. All focus groups ran for two hours in the evening. A light dinner was served to participants at the beginning of each session while the moderator welcomed participants, introduced everyone in the room (focus group participants and women in engineering program staff), reviewed ground rules, and reviewed the purpose of the focus group. Each focus group was recorded, and notes were taken by a scribe. Each focus group had at least one, and up to three student no-shows or late cancellations.

The focus group questions considered the top (and bottom) concerns, the top program areas, target audience, program structure, engagement, and communication methods. The exit question asked the participants to consider what had been discussed within the group and to state how the women in engineering program could best meet the needs of current students going forward.

Following discussion from the exit question, the moderator verbally reviewed the items emerging as the biggest themes and asked each group for their agreement, disagreement, or additions to them. Only when all members of each focus group agreed with the items did the focus group conclude.

Following each focus group, the moderator's notes and scribe notes were collected and organized into themes. The recordings were used primarily for clarification and to ensure that the themes were accurate in their representation of the discussion. Exit question responses were compared to emerging themes and themes further refined. The findings follow.

Focus Group Findings and Discussion

The purpose of the focus groups was to clarify survey results including the top and bottom concerns of women studying engineering, program areas that the women in engineering program should focus on, and engagement concerns being experienced by the program and how program structure, marketing and communication might change to engage students more effectively. Put more broadly, we sought to connect the areas of greatest student need to programming opportunities while improving student engagement. To set the stage, each focus group opened with a discussion surrounding student agreement or disagreement with what emerged as the top three and bottom two concerns for women studying engineering. To review, the top three concerns emerging across all years and majors were #1: succeeding academically within engineering curriculum; #2: finding a full-time job or co-op; #3: self-care issues. The bottom two concerns emerging across all years and majors were #8: feeling connected to other women studying engineering; #9: the environment for women/acceptance of women in the college of engineering.

Each focus group ultimately agreed with the top three concerns but only as it related to studying engineering in general, and not relating to anything the women in engineering program is specifically doing or not doing. According to Generation Z researchers Seemiller & Grace, among the top issues on the minds of Generation Z students are "education, employment, and racial equality" [6]. Not surprisingly, today's prospective students are most likely to cite preparation for a job as the number one reason they are considering a college education[3]. Coming of age during the economic recession of 2008, Generation Z is pragmatic and seeks value in a degree that they see as critical to landing a job down the road. A real concern for these students is the ability to afford a college degree, which is not surprising given the fact that the cost of college rose by more than 80% between 2003 and 2013 [6]. The stakes are higher for Generation Z; put another way, they simply cannot afford to experiment and explore academically and cocurricularly as generations before them did in college. As a risk-averse and debt-averse cohort facing soaring costs in higher education, they much prefer a pared-down college experience than one with frills they do not see as necessary toward the degree they are earning or the job they hope it leads to. Whereas Millennials fancied physical amenities from suite-style living to rock-climbing walls and lazy rivers, Generation Z is demanding services that support them toward graduation: primarily in academic support and tutoring, career development, and mental health/wellness [3]. Indeed, the top three concerns found in our 2020 needs assessment survey mirror these national Generation Z expectations for campus services exactly.

The topic of the environment for women in the college of engineering was given separate treatment and considered in detail within each group. Questions were then posed about program areas, target audience, program structure, engagement, and methods of communication. Following are the five biggest themes emerging from the three focus group sessions.

Focus Group Theme #1: There is broad student support for a formal mentoring program between older and newer students, preferably matched by major.

Both of our new student programs feature a mentoring component led by current students. Several focus group participants suggested an expansion to this existing infrastructure as a possibility. Most participants agreed that a mentor pairing should be facilitated by major, and though we do try our best to make pairings by major in our new student programs, this does not always work out to be the case due to an imbalance in the number of mentees versus available mentors in some majors. Existing mentoring programs taking place within the Mechanical and Computer engineering departments were cited as positive examples, however, several participants noted that it can be easy for mentoring to cross over into tutoring and that it is important not to conflate the two.

> Mentoring should not cross over to be tutoring. That's not fair, especially to the mentor. Keep them as separate things. -1st year Industrial & Systems Engineering student

Likewise, a fifth-year student who has extensive experience with mentoring applications shared some structural concerns in making such programs successful, including the aforementioned imbalance as well as the hit-or-miss chemistry the occurs between pairs.

> "There's a mentoring sweet-spot; a ratio to be considered. There's always seemingly more mentees than mentors." -5th year Chemical Engineering student

The groups ultimately agreed that there is great promise in a formal mentoring program for personal growth and prolonged community-building for the women in engineering program, but that making such a program successful will require thoughtful consideration and ongoing cultivation. One group proposed that a pilot program that can be built upon may be the best way forward.

Focus Group Theme #2: There is a need for a physical lounge for study and socialization.

The number one concern emerging from the survey was succeeding academically within an engineering curriculum. The program area for current students deemed most important for the women in engineering program to invest in was tutoring or study help. The women in engineering program is historically events-driven and has never engaged in direct academic support. What does tutoring or study help mean for the women in engineering program? According to all three focus groups, it means a physical lounge for study and socialization. Accessing academic support was not seen as a problem to these students; rather, having a physical place to go to study with other women and build community is what is lacking: the need is for physical environment, not actual services.

> "I agree that it's the environment and community that is more important than the actual tutoring; it seems most of the majors seem to have that thing (tutoring) covered, and it's probably even easier to do it through the majors because they have people that know the material… but I think that an environment would be helpful." -1st year Mechanical Engineering student

A 3rd year Mechanical Engineering student shared that she feels like the women in engineering program is just random events every now and then with nothing connecting them in between. All agreed that a physical space to study and socialize would help in creating much-needed community. It would also help with advertising upcoming events, engaging sponsors and alumni, and bringing more student voice into the programming. The only concern brought up was fear of alienating white men. The group is concerned about other groups feeling excluded, when their aim is to build community among women and potentially other diverse groups as well.

Each focus group brought up the existing engineering lounge, specifically what about it did not meet their needs. This led to a lively discussion on how the space is marketed (a place for all engineering students to gather and study) versus how it is used. Many participants offered that it is known informally as a "mechanical engineering space," with a strong presence by a specific engineering living community. Most of the focus group participants noted that they did not feel welcome in that lounge, and several reported going out of their way, even walking outside, to avoid walking through it. These focus group discussions brought to light that there is more to space than pure function; there is also the space's existing culture to consider, and that is not something easily changed.

Generation Z represents the most diverse cohort of students to ever attend college. They have grown up with anti-bullying messaging and are more tolerant of differences than previous cohorts [3] [5] [11]. They are more likely to have diverse peer sets, and they view racial equality as one of the most important issues facing society. Not surprisingly, when focus group participants were presented with the possibility of a physical lounge space being shared with the minorities in engineering program, most focus group participants were open and enthusiastic to the idea. Participants were especially enthusiastic to build community among underrepresented minority groups within engineering, and to hold some joint programming in addition to the opportunity for informal socialization. A few students noted that the women in engineering program has largely been categorized as a white women's program, and a lounge might be an opportunity for personal growth as well as program growth. Also noted was that having the lounge open for both groups would make it less about any one group and more about a diversity and growth mindset among students utilizing it.

Though there was not disagreement in having a diversity lounge as opposed to a lounge specifically for the women in engineering program, a few students expressed concern that each group still needs its own identity, and that this identity should be treated with the utmost respect. Likewise, a diversity lounge should not be perceived as altering the need for a women or minorities in engineering program, but rather build a foundation of commonalities between the two groups. Though many things experienced by all underrepresented minorities are in fact similar, there are still many things that are not, and this needs to be respected. The other area of concern shared by participants was the potential alienation of white male students. Already, participants report having to defend the existence of the women in engineering program as well as the Society of Women Engineers; students worry that a diversity lounge could create backlash from the majority group and that such backlash should be carefully considered. Students were supportive of the diversity lounge being one that united any and all engineering students around a pro-diversity mindset, including white men, but did note that there needs to be a balance

between having a safe space for underrepresented minorities and building a pro-diversity mindset within the greater engineering community.

> "Open to everybody, but who is actually going to use that room? Leave a building specifically to be in that room? It'll be the people around it and using it that create its culture. So open to everyone, and the people supporting diversity form its culture." -4th year Mechanical Engineering student

Focus Group Theme #3: Develop a student advisory board to plan and implement current student programs.

In all three focus groups, students voiced support for a student advisory board to help plan and implement programming for current students. Historically, the only mechanism for student voice in programming has been via the women in engineering program student staff.

A 4th year Industrial & Systems Engineering student noted (and a 3rd year Mechanical Engineering student concurred) that the voice of the student in a club is different from the voice of the student in a program. Clubs are by their nature more democratic. Programs are not set up to be as democratic for numerous reasons. It is important to recognize that not everything in a program can involve the voice of the students and there is probably good reason for that. However, programming for current students can certainly benefit from more student voices and doing so helps in building community.

Participants also noted that having a group of students to help plan and implement current student programming would also serve to improve the program's community building efforts.

> "Having a panel of students would help not only in adding more activities, but also help in creating more of a physical presence. Right now, the women in engineering program feels like this thing that is there but not really. Having involvement from a student committee or panel could really enhance the presence of the women in engineering program and help get people involved with it." -1st year Biomedical Engineering student

> "It seems like the women in engineering program is an organization that plans events, and then the events happen, and then it goes along and there's another event. If it felt like it was more ongoing, and a way to develop community, that would be good." -1st year Mechanical Engineering student

Finally, participants noted that having students help plan current student programming serves as an excellent leadership opportunity.

> "Looking back at all of my experiences with the women in engineering program, the ones that stand out to me are the leadership opportunities WE@RIT has given me, and also the opportunities to outreach to incoming or prospective students as well. Up until my third year, my leadership opportunities were all women in engineering stuff." -5th year Chemical Engineering student

Focus Group Theme #4: Academic stress is most likely to account for event no-shows; Friend networks are most likely to account for event participation.

When asked for input on the engagement declines being experienced by the women in engineering program, focus group participants had suggestions for how to decrease the number of no-shows, and how to improve marketing and communications from the women in engineering program. Focus groups concurred that academic stress is the main driver of no-showing, but also that friend networks play an important part in attendance.

No-show rates have increased dramatically over the past three years. The engineering curriculum has not changed nearly as much. Participants agreed that academic stress is the main driver for no-shows and late cancels. In fact, several scheduled focus group participants late cancelled just prior to their scheduled focus group citing academic demands.

> "The guilt of taking an hour out of their night could be a driver in not showing. It would be interesting data to collect… why students no-show. It could also be a way to make sure they're ok." -2nd year Chemical Engineering student

Participants agreed that following up after a student no-shows could be a good way of expressing genuine concern, gathering information as to why students no-show, and potentially making students aware of the importance of following through.

> "There's an attitude of "oh, maybe I'll go. What's it to them if I do or don't?" Following up would underscore that it does matter and maybe help students in planning their time better in the future." -5th year Industrial & Systems Engineering student

While any program or event's content was viewed as important in developing interest to attend, perhaps equally if not more important is whether a student's friends plan to attend.

> "What motivates me to go to events is if my friends are going. It's harder to cancel no matter how stressed you are if you know your friends are going. Peer pressure is a good thing in this situation." -3rd year Mechanical Engineering student

Of course, that peer pressure is a double-edged sword if a student's friends decide not to attend. Focus group participants largely agreed that the women in engineering program should utilize peer/friend groups to help in marketing. One example given was for the student advisory board members to help in getting the word out using their own social media channels, but perhaps there are other ways in which the program could adeptly leverage peer groups of participating students. There was discussion on what is seen as appropriate social media marketing from a campus program versus an individual student, with agreement that Snapchat is an appropriate medium for individual students to use but not so much for official program use. Students agreed that Snapchat is largely seen as "their" place to communicate with each other, unfiltered, and without the prying eyes of campus programs, representatives, or officials. Most focus group participants reported using Snapchat and Instagram as their main methods of social media communication, with older focus group participants also citing Facebook. Though these students heavily use Snapchat for informal communication, consensus was that Snapchat as a marketing

method should be reserved for individual students to use, whereas Instagram and Facebook were seen as appropriate modes for marketing originating from the program itself.

One focus group suggested implementing a two-stage registration process to decrease the number of no-shows at events, and when shared with the other two focus group this approach was widely embraced by participants. In this process, a student would register online for an event or program as per usual, but would also be required to pick up a physical ticket in the women in engineering office over a span of days right before final counts are due. The event would then be planned based on the number of tickets picked up, greatly reducing waste (especially food waste), as well as more accurately managing attendance expectations, especially when stakeholders are involved in the programming.

> "Some people sign up for something because it makes them feel good about signing up for it; and then they don't end up doing it. They have every good intention to attend, but then something comes up, and it's really hard to differentiate between oh, I said yes to this first but I think this other thing might be more important and I'm not sure which one I'm going to choose." -1st year Biomedical Engineering student

Somewhat surprisingly, email emerged as the preferred method of communication for students receiving women in engineering communications in the needs assessment survey. Focus group participants shared that perhaps it is because email is the easiest thing for students to ignore, whereas text messages and phone calls are more intrusive. Many participants suggested using Outlook calendar invites for important events that students sign up for, and several suggested that a central women in engineering Slack workspace could be helpful in marketing events and reminding the community about them in a general sense. Participants agreed that text reminders about events are highly effective but should be reserved for high profile events or those involving program stakeholders.

Focus Group Theme #5: Women in engineering program participants have a strong engineering identity.

A particular area requiring follow up from the survey was determining why the environment for women in the college of engineering emerged as the area of least concern across almost every year and major. Though focus group participants frequently cited having to defend the existence of the women in engineering program or SWE to their male counterparts, they also largely report a positive experience within the engineering college. A few noted that perhaps the reason that the environment for women within the college emerged as the area of least concern is that we are already doing well in this area. Many pointed to the women in engineering program itself as such an example. One student noted that she hardly notices the gender imbalance, and another offered that she can always find other women if she wants to.

Yet, many focus group participants reported experiencing sexist comments and gendered treatment predominantly in group projects and labs within the college of engineering (ideas ignored or only taken seriously if repeated by a male student; women assumed to be group scribe; work questioned or doubted by male students), as well as while on co-op assignments. Nevertheless, they describe the environment within the college of engineering as positive and

supportive overall. What to make of this seeming disconnect? Does engineering identity play a role?

Across most years and majors, the survey results for top concerns of women studying engineering at KGCOE showed the environment for/acceptance of women in KGCOE at or near the bottom. According to research, the persistence of women working in engineering fields can be attributed to engineering self-efficacy, and also to a feeling of belonging to the profession; that is, engineering identity [13]. Women working as engineers in industry generally enjoy the challenges and novelty of engineering, especially the problem-solving nature of the profession. Women who opt out of engineering tend to not have such a strong engineering identity, doubting that engineering was the right fit for them to begin with [14], [15]. It could be the case that we are seeing this strong sense of engineering identity come out in our survey results of women engineering students: their concerns are far more aligned with succeeding as an engineer than they are their identity as women. This is not to say that their experiences as women are not important; indeed, they are. Rather, perhaps it is their identity as engineers and drive to do well in engineering that are a larger part of their lived experience than is being a "woman engineer."

To better understand the engineering identity of focus group participants, the moderator asked each participant if they identified as "an engineer," or as "a woman engineer." Eleven focus group participants identified as "engineers;" six identified as "women engineers;" and one said it depends.

Depends:

> "In a perfect world there wouldn't be a need for this question. As someone in an engineering environment, I don't want that difference in title. But when I'm having a conversation outside of a technical environment, it can be almost prideful, because it shows how much harder I've worked to be where I am. So, it's a weird balance." -2nd year Mechanical Engineering student

Woman Engineer:

> "I've always felt like a woman engineer; I've never felt like an engineer. In mechanical engineering there are so many more male counterparts, and I was reminded of that unfortunately a lot, quite frequently: that I was a woman, and not an engineer. Ever since my co-op experience, it became quite clear that I was a woman engineer." -4th year Mechanical Engineering transfer student

> A 4th year Computer Engineering student sees herself as a woman engineer because she is keenly aware of how much discrimination she is likely to face in the job market, from pay disparity to harassment.

> A 3rd year Mechanical Engineering student felt it important to identify as a woman engineer because she sees herself as playing a role in helping to even out the playing field. She sees herself as a role model for those yet to come through the engineering ranks.

Engineer:

> "Up until this past fall I would have associated myself more as a woman engineer, because as a woman I chose to take on this major and go on this track, but when I was at SWE conference this past fall, there was a speaker who said that she had this great achievement, and someone referred to her and her as a "great female engineer." And she replied with "the fact that I'm a woman has nothing to do with my achievement." That totally flip-flopped my interpretation of what it means to be a woman engineer versus an engineer." -5th year Chemical Engineering student
>
> "I call myself an engineer. That's what I identify with and I don't feel a need to qualify it." -1st year Mechanical Engineering student
>
> "Referring to yourself as a woman engineer keeps you in a separate bucket." -5th year Industrial & Systems Engineering student
>
> "The fact that I'm a woman doesn't change the fact that I'm taking these engineering classes, or that I'm working hard toward this degree. It doesn't impact my education and what I'm trying to do." -1st year Biomedical Engineering student
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> A 1st year Mechanical Engineering student views herself as an engineer. It is a source of pride to her to be a woman engineer, but she does not want to be treated differently because of that label. She just wants to be an engineer.

When focus group participants answered this question, they did so with conviction. The pride they feel in being students of engineering came through in almost every answer, in their tone, in their body language and especially in their faces. It was clear that most of these women see engineering as part of their identity. Yes, they may be asked to be the group scribe in a lab; or perhaps their idea was discounted until it was later proposed by a male peer; and yes, most have had to defend the existence of the women in engineering program; but regardless, they *are* engineers, and this identity is a huge source of pride.

Contextual Interview Methodology

In January 2020, invitations were extended to several campus clubs, programs, and organizations for a one-on-one interview. The purpose of these interviews was to gauge what, if any, student engagement trends were occurring within the greater campus community, and to determine potential commonalities among entities doing well with current student engagement, as well as those suffering declines. Follow-up messages were sent to non-respondents. The participating entities included one within the student affairs division (the Center for Recreational Sports) and six within the academic affairs division (ECCO, the minorities in engineering program within the Kate Gleason College of Engineering; the University Honors Program; Hot Wheelz, a student electric-solar vehicle team; the National Society of Black Engineers (NSBE); the Society of Women Engineers (SWE); and WiC, the women in computing program within the Golisano College of Computing and Information Sciences).

The questions asked of the participating entities were kept open-ended and pertained to current student engagement trends within the entity overall, as well as first-year student engagement

specifically. Discussion was framed so that each entity considered changes over time, and how present engagement compared to engagement as recently as five years ago or less. Entities also reported on their program structures, the amount of student voice integrated into their structure and decision-making processes, how they communicated with students, perks of being a part of the entity, and where they met, if applicable.

Contextual Interview Findings and Discussion

The purpose of the contextual interviews was to determine what, if any, current student engagement trends were being seen on campus outside of the women in engineering program. Furthermore, we wanted to see whether any conclusions might be drawn from programs, clubs or organizations faring better with engagement versus those faring poorly. Invitations were extended to numerous entities within the Student Affairs and Academic Affairs organizations, with seven ultimately participating: one in Student Affairs, and six in Academic Affairs. Following are the major themes emerging from these interviews.

Theme #1: Current student engagement is not an isolated problem and is often worse among newer students.

Of the seven responding organizations, six are experiencing worsening problems with current student engagement.

> "Since 2018 it's been like pulling teeth to get students to engage and volunteer for programming." – Director of minorities in engineering program

Four organizations noted that it is becoming increasingly difficult to engage first year students specifically and that historically this was not the case. In the honors program, first year students are for the first time ever blatantly ignoring email communications from the program level in large numbers and requesting to be removed from the program's email distribution list altogether. The women's performance vehicle team has noticed that the number of its "core" members has remained steady over the years at 20-25 students, but each year fewer are first year students. NSBE leadership agrees that engaging the first years specifically has been growing more difficult over time. SWE's president reports that while there seems to be initial eagerness among the first years, that excitement does not necessarily translate to stepping into leadership positions once it becomes less a possibility and more a reality. Likewise, SWE's annual overnight program had the same number of volunteers this past year, but recruiting for those volunteers took much longer, requiring more asks.

Theme #2: Students have an increasingly linear focus on academics.

More than anything else, interviewees noted that current student attention seems to be increasingly directed toward their academics. The head of the intramural and recreational sports program has noted a dwindling number of what he calls "superstars;" students with numerous touchpoints on campus: jobs, multiple clubs, and top grades. These superstars are now a rarity, with most of his student workers preferring to work the minimum number of hours, doing as little extra as possible. It has been necessary for him to hire more staff. For example, five years

ago 38-40 lifeguards were hired to cover all shifts, whereas now closer to 58-60 must be hired to cover the same number of hours. He has found that student staff are by and large content to remain at the entry level, not seeing the benefit of taking on additional responsibilities for the wage they are paid. More time working and added responsibility means a potential drain on their academics. In general, he has found that students are increasingly assessing opportunities through the lens of academic or professional development, and what they view as not supporting those growth areas is deemed not worthy of their time.

According to an honors program administrator, students seem to be arriving on campus over-scheduled and over-burdened, meaning they are burned out before they even begin classes. When the semester begins, they then have even more things vying for their attention and begin to withdraw from things not deemed necessary. SWE's President reports that there is no longer much interest in collaboration with groups outside of campus, such as other local SWE chapters. Students would prefer to stay on campus and do homework than attend a networking event they see questionable value in.

The 5th year project manager for the women's performance vehicle team reports that she sees the average stress among first year engineering students as the same as when she was a first year, but notes that it is being acted upon differently. When she was a first year, she reports that she and her fellow first years would sit around and talk about how stressed they were and then stay for a few more hours in the machine shop. Now, first year students seem to be sticking to a firmer schedule, committing to leave the shop by 10pm, for example, to go work on homework. What she calls "super hustle mode," where team members commit to all kinds of hours in the shop while simultaneously achieving good grades (similar to the "superstars" formerly employed at the Center for Recreational Sports) is growing more rare.

Theme #3: Incorporating student voice into programming is important in gaining student buy-in; it also helps with marketing.

The organizations suffering the worst current student engagement trends tended to be top-down programs without a mechanism in place for the integration of current student voice. Those organizations faring better tended to have integrated, and in some cases democratic mechanisms in place to capture the current student voice.

Of all the organizations interviewed, the only one not suffering engagement declines of any kind was the women in computing program. The women in computing program structure is far different than that of women in engineering. Women in computing is run by committee and comprised of members, with the Director interacting with the nine student committee heads. Each committee has 8-10 active members; one committee head (logistics) is a paid, part-time student staff position. Compare that to women in engineering that has one Director, and a rotating part-time student staff of anywhere from 5-10 students. The women in computing program holds weekly general membership meetings as well, which helps in building overall community.

The honors program reports that overall engagement (aside from first years) has remained consistent, in large part due to the structure of the program. Like women in computing, there are

student-led committees that form an honors council. Committees are led by 2nd-4th year students who typically populate their committees with fist-years from their pre-orientation mentor groups.

Women in computing, honors, and NSBE all report utilizing their student leaders' school email accounts and private social media accounts to help spread word about programming. For honors, it is primarily students sending emails to other students, with approximately one email coming from the program staff each semester. An honors program administrator reports that students are far more likely to read communications from other students (and far less likely to ask to be removed from distribution lists). NSBE's secretary concurs, adding that club officers often use their personal Snapchat stories to share club flyers. As individuals they have more followers than a club account does. Likewise, almost all of women in computing communications to current students come from other current students, not from program staff.

Theme #4: Organizations with a clear academic or professional benefit tend to have better current student engagement.

The head of intramural and recreational sports reports that increases in forfeitures caused by insufficient team members showing up for games is at epidemic levels at this campus as well as at campuses regionally and nationally. In fact, it has become the focus of local and national recreational sports conferences over the last two to three years. After drilling down into the data, he noted that the highest rate of forfeitures on this campus were always on Sundays, most likely because students view Sunday as their study and homework day. Intramural and recreational sports are an extracurricular perk to attending college, but it is also one more thing vying for students' time. With free sign ups and no "skin in the game," it is easy to not show up to focus on studying instead.

On the other hand, overall membership in the women's performance vehicle team is holding steady, even if the level of that involvement looks different than it used to. Unlike most other performance teams, the women's team encourages first year students to do design work on the vehicle. While it does mean the design is not as advanced as it could be, it also means that all team members, including first years, get hands-on experience with the car's design. Performance team members are highly sought after by co-op employers, especially when they can articulate their team role and engineering contributions. Being on a performance team certainly gives students an advantage through such industry connections, and this is likely one of the reasons why the team's membership has held steady over the years. It should also be noted that our engineering program requires students to complete one year of co-op to graduate.

Women in computing bestows coveted perks upon its committee heads, who are given 24/7 access to the organization's dedicated lounge space, priority registration for employer events, and priority registration for conference attendance.

Theme #5: Structure is important; but so is dedicated physical space.

The honors program, the women in computing program and the women's performance vehicle team have in common a dedicated physical space for their membership. Such space allows for the organic growth of community. Honors describes their lounge as a place of "vibrant student

energy that younger students feel drawn to, even if they don't actively participate in it all the time." Women in computing's lounge is used for academic support, student socialization and program planning by committees and committee heads. The women's performance vehicle team room is almost always abuzz with vehicle design, team meetings and team members simply hanging out.

Conclusion

Conducting qualitative focus groups and contextual interviews was invaluable in providing clarity and nuance to the needs assessment survey that the women in engineering program conducted in the spring of 2020. Among the biggest takeaways were that academic support does not always take the form of services; sometimes it takes the form of a physical space where collaboration and community are built. Also, that students are responding differently to academic stress now than they were even four years ago. Students are now more likely to withdraw into academic studies when faced with competing interests for their time, with cocurricular and extracurricular events that show a clear academic or professional gain being the ones that curry the most favor with students. Other key takeaways are that capturing the student voice in program planning and implementation is significant in gaining student buy-in; and the opportunity for building ongoing relationships with peers is important to students. Students are more likely to attend events if their friends are attending and leveraging these students' social networks looks to be a savvy marketing strategy for improving program attendance.

Though these findings represent the undergraduate women students at just one engineering college, they are nonetheless mirroring trends associated with Gen Z nationally. Gen Z students are pragmatic, risk-averse, and driven to succeed. They place a high value on authenticity and face-to-face relationships. We are certainly seeing these traits emerge from our survey, our focus groups, and contextual interviews. These results will be used to inform necessary program changes for our women in engineering program, including the addition of a peer mentoring program, a student advisory board for planning and implementing current student events, and beginning work toward a joint engineering diversity lounge with the minorities in engineering program.

This study represents a starting point in better understanding the co-curricular engagement of Gen Z students: what is working and why; what is not working and why. To better understand these trends and draw firmer conclusions, it would be helpful to expand contextual interviews beyond this one campus to include programs, organizations, and clubs from a broader array of schools nationwide. As we have learned directing our own women in engineering program, what worked well for one cohort (in our case, Millennials) does not necessarily translate to the next cohort (Gen Z). Are other schools experiencing this same phenomenon and in what ways? Though distinct commonalities emerged on our campus, it would be interesting to see if these same trends emerge beyond it, and what conclusions could be contributed toward best practices in women and minority in engineering programs nationally.

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