

Being Female and an Engineering Student in Qatar: Successes, Challenges, and Recommendations

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Introduction

Within the context of socio-economic transformations in the Arab Gulf and the development of knowledge-based economies in the region, this faculty-student collaborative study investigates the experiences of female engineering students in Qatar at Texas A&M University at Qatar (TAMUQ). This project looks at personal experiences and institutional strengths and challenges—at university and industry levels, so as to present recommendations on how to better support, encourage, and prepare our female students for working in engineering-related careers. By examining TAMUQ students' experiences within engineering, this research aims to contribute to the scholarly literature pertaining to women in Science, Technology, Engineering and Mathematics (STEM) in the Middle East, and particularly in the Gulf region.

This mixed-method study draws on data collected in spring 2017. It includes anonymous online surveys completed by TAMUQ's female students. Additionally, it draws on a series of focus groups with female students in order to examine the participants' perspectives on their academic and social experiences in relation to the university's institutional strengths and challenges in supporting female students for working in engineering-related careers.

Literature Review

The topic of female participation, or lack thereof, in STEM fields has been researched mostly in Western contexts. While there are recurring challenges throughout the world, more research is needed when it comes to understanding the role and presence of women in different contexts. The Middle East, in general, and the Gulf region, in particular, represent an exciting opportunity from this perspective. On the one hand, the scarcity of previously conducted research on this topic has opened a niche for this type of work. On the other hand, studying the region's rapid socio-economic transformations may shed some light regarding the vital role of women in non-Western contexts, particularly when it comes to encouraging participation in traditionally male-dominated fields.

Attracting “every young mind to engineering” is, for UNESCO, closely related to achieving the Millennium Development Goals, particularly within the developing world where “attracting more women to fields in which they are underrepresented must be a part of the solution” (UNESCO, 2013). There are nevertheless various challenges associated with female participation in STEM. Worldwide, factors such as stereotypes, lack of role models and underrepresentation in leadership positions, gender bias, and the climate of STEM departments in universities continue to deter women's progress in the industry (Hill, Corbett, & St. Rose, 2010; McCullough, 2011). By the same token, McLoughlin (2005) has identified ‘spotlighting’—the singling out of women, whether overtly, tacitly, or with the intention to help them—as a direct or indirect cause of gender-bias difficulties.

Gender bias can be common in everyday interactions within the workplace often pushing women out of STEM (Williams, 2015). Within universities, gender discrimination against female

students and female faculty members, and underrepresentation amongst faculty members have also been examined as important challenges (Hopkins, 1999; Robnett, 2015; Sheltzer & Smith, 2014). Both male and female faculty have been shown to exhibit a bias against female undergraduate students, moreover, often evaluating them as less competent, qualified, and hireable, and thus offer them less support and mentorship (Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012). While this bias is often unintentional or implicit, it poses a great challenge related to pervasive cultural stereotypes with implications for prejudice recognition and reduction, as well as the development of STEM diversity interventions (Moss-Racusin, Molenda & Cramer, 2015).

Within the Middle East and North Africa (MENA) region, there has been little research concerning women and engineering. The percentage of women studying STEM fields is nevertheless comparable to, and sometimes higher than in more developed countries (UNESCO, 2013). Engineering as a field enjoys a high social status in the Middle East attracting male and female students alike (Baytiyeh, 2013; Iversen 2016). In the Middle East, however, STEM enrollment is higher among women than men (al-Wazir, 2016). Baytiyeh (2013) looks at Lebanon as a case study to investigate the status of women engineers in the Middle East. The author's findings reveal that a genuine interest in the field and the potential for professional growth appear to be the main motivating factors influencing the participants' decisions to study engineering. Similar findings were reported in the United Arab Emirates (UAE) (Aswad, Vidican, & Samulewicz, 2011).

The main challenge identified in the existing literature is that of retention after graduation given that only one in five female graduates in STEM sectors works in their field after graduating (Mannan, 2016). As one author puts it, "it's not that women aren't going into STEM fields; it's that they're not staying there—this is often seen in the MENA region [...] women need to come together and support their presence in STEM fields" (Kantor, 2016). In terms of perceptions regarding essential skills for a successful career in engineering, Baytiyeh (2013) argues that women engineers are not sufficiently prepared for "transforming knowledge into product," which is linked to lack of self-confidence within a male-dominated field (p. 403).

Furthermore, lack of attention and supporting policies (UNESCO, 2013), challenges in the workplace related to sociocultural barriers (Durrani, 2015), discrimination, exclusion from certain kinds of work, and restrictions on their mobility (Iversen, 2016) have been examined as deterring aspects for women in STEM. In many cases, women also feel pressured to leave their STEM careers to raise a family (Kantor, 2016). Furthermore, Qayyum (2012) writes of 'invisible barriers,' related to sociological/psychological constraints. The author argues that local public policy platforms are needed so as to ensure that women engineers have a space to put their STEM skills into action within the workplace (Qayyum, 2012).

Gulf Context

Within the Arab Gulf region alone, women comprise 60% of engineering students in universities, double the percentage of female engineering students in the U.S. and Europe (Durrani, 2015). Unfortunately, this does not translate to the same percentages in the workforce after graduation. For example, in Qatar, women make up less than 12% of the workforce (Yahia, 2012).

Participation of women in the workforce, and particularly related to STEM fields, have nevertheless been seen as closely related to economic productivity and competitiveness (Fawwaz, 2014). Some research has revealed conflict between women's increasing ability to pursue higher education and traditional social norms prioritizing domestic life (Mitchell, Paschyn, Mir, Pike, & Kane, 2015).

Research conducted in the UAE has raised the issue of understanding the effect of culture and society on individuals and the economy. Aswad, Vidican, and Samulewicz (2011) call for adapting policies to local contexts, raising awareness about STEM, and overcoming negative stereotypes of engineering. Moreover, Fawwaz (2014) concluded that employment expectations, together with family connections, and mentorship and support systems, play a fundamental role in the education and career path of women. Integrating women into the labor market in the UAE has nevertheless become an important element of the country's policy. A 2015 UAE Government Summit announced initiatives aimed at promoting the role of women in STEM, particularly with the creation of the UAE Gender Balance Council and through direct collaborations with the Women in Engineering Committee (Margheri, 2016).

Despite these efforts, Alhasani (2013) has identified cultural norms, stereotyping, and the issue of working in a male-dominated industry as fundamental challenges for women entering the engineering workplace. One respondent in Aswad, Vidican, and Samulewicz (2011) indicated that the "national customs and traditions of the Arab countries strongly discourage a female from pursuing her goals in the engineering department" (p. 566). In contrast, a study investigating attitudes towards gender bias among professional female engineers in Kuwait showed that respondents conveyed feelings of equality with, or in some case superiority to, their male counterparts –with the exception of opportunities with upper management (Koushki, Al-Sanad, & Larkin, 1999).

With the exception of Sulaiman and AlMuftah (2015), there are no studies focusing on Qatari female engineers. Their study was based in Qatar University (QU), where there is an under-representation of female students in engineering majors. QU's first engineering majors open to female students started with computer and industrial engineering in 2001, followed by chemical engineering in 2004, and electrical engineering in 2008 (Karlin, 2008). The secondary data used in Sulaiman and AlMuftah shows that while retention of QU female engineering students is high, QU needs to focus on attracting more females to enroll in engineering programs and "providing an environment that gives women confidence" (p. 515). Their study explains that despite various socio-cultural obstacles, Qatari women are better educated than men and that they have been moving into professional work. The authors argue that economic development and access to education are important drivers changing the position of Qatari women.

In 2013, Qatar hosted the Women in Engineering Forum of the Gulf Cooperation Council (GCC). The Chairwoman of the Women in Engineering Standing Committee urged GCC women to pursue careers in engineering. The Chairman of the Committee, moreover, stated his commitment to support "women in our conservative society and the participation of professional societies such as the WIE and IEEE, [which] has enabled [women] to attain positions which previously were restricted to men." (Salama, 2013).

TAMUQ, the context of our study, opened its doors in 2003 becoming the second university in the country to offer engineering degrees. Currently, approximately 60% of the university's student body is female. However, out of the 67 faculty members in engineering and science, only 6 are female. Previous institutional efforts include the signing of a memorandum of understanding with the Qatari Businesswomen Association to support female students through the delivery of a set of programs, projects, and internships meant to empower female students (Texas A&M University at Qatar, 2015).

Some of the literature dealing with women engineers has presented a series of examples and recommendations. Baytiyeh (2013) suggests that universities should consider implementing training in management and leadership to bridge the gap between the university and the workplace. Mentors and role models have also been seen as a possible answer for the gender disparities in STEM (Kantor, 2016). Having role models from similar backgrounds can inspire female students by making "success seem that much more realistic and achievable and therefore pushes women to work even harder" (al-Wazir, 2016).

In the UAE, the Petroleum Institute's Women in Science and Engineering Program was created to address a "strategic need to increase the number of Emirati women filling technical positions in its petroleum industry" (Alhasani, 2013, p. 9). This institute represents an integrated community of students and alumnae who provide each other with encouragement and support. Along with role models, social-psychological interventions and self-affirmation have been identified as strategies to increase female participation in STEM fields (Nnachi & Okpube, 2015).

Other recommendations include encouraging positive peer connections (Robnett, 2015), internships, career services, and alumni relations (Fawwaz, 2014), and reducing cultural barriers preventing women from entering the engineering workforce (Sulaiman & AlMuftah, 2015). More policy-related recommendations have also included implementing gender quotas within employment nationalization policies and the equalization of salary benefits (Mitchell, Paschyn, Mir, Pike, & Kane, 2015). It is in this context that we will examine the experiences of TAMUQ's female students. We will focus on institutional strengths and challenges in the Qatari context so as to integrate and develop specific recommendations aimed at supporting our female students as they continue their studies and integrate into the job market.

Methodology

In order to capture current student perspectives on the successes and challenges of being a TAMUQ female engineering student, the first part of our data collection included a series of focus groups (see questions in Appendix A) with 6-8 current female students participating in each session. The questions revolved around why our students chose engineering and whether they are still satisfied with their choice, TAMUQ institutional strengths and weaknesses in terms of supporting our female students, experiences with professors and peers, and perceptions about challenges women face from society and industry in Qatar. The focus groups were transcribed verbatim and coded independently by three members of our research team who immersed themselves in the data and looked for themes that seemed meaningful and significant to the participants. Based on the findings of the focus groups, we then designed an anonymous survey

to be sent to current TAMUQ female students (see Appendix B). 100 responses were recorded out of the 231 female engineering students, which resulted in a 43.29% response rate (see Appendix C). The majority of the students who responded were Qatari (57%).

Focus Group Findings

Why our students chose engineering?

In terms of why our students chose to study engineering, there were two main themes. Many mentioned a “passion” for fields such as mathematics or chemistry since a young age. Participants also discussed feeling the need “to prove” or “to show” something:

Example 1:

It’s like you want to do something different, to prove to everyone that you’re capable of doing something that they won’t normally consider or they wouldn’t have thought I can go to an engineering field. So, it’s something like this.

Example 2:

For me, all my brothers are studying business, so I wanted to show them that, like it doesn’t matter I am a male or a female, to be an engineer, it’s about your passion and what, what you are good at...the first reaction from my father was, “what you would do if you are an electrical engineer?” But then when I talked to him and when he knew that I really wanted this field, then he started to support me.

The above quotes may indicate students consciously choosing a field that is traditionally male-dominated, or one that is different from what other family members have studied. One student mentioned that it was “weird” or “unusual” to be the only engineer in her family.

Additionally, most of the participants’ families expressed preference towards their daughters studying in fields other than engineering, particularly when it came to petroleum engineering. Their family members worried that as females, the participants would not be able to get jobs when they graduated and would thus, waste their education, or would be around only men in the field:

Example 1:

Yeah, but my dad didn’t want me to study petroleum because his friend is in the petroleum field and he’s like, “no, we don’t accept girls in that field. And a lot of CVs come each and every day, but we just reject them.”

Example 2:

Yeah, it was like, you’ll just study and waste time and effort for nothing. You won’t be able to work, or it was like you’ll keep your degree with you. You want to use it.

Example 3:

I don't think my dad knows about the whole, being in the field yet. (laughter) So, I mean, of course I think he'll have his reservations, like if ... he'll probably tell me, "no, work here, don't work here. I don't like this country, work here." I feel he would be very involved in my career, so we'll cross that bridge when we get there... Oh, when he asked me about, he asked me what exactly I want to do as an engineer, so I told him I'm interested in petroleum. And immediately he went to, oh, you're going to be working long hours, you're a woman, and you'll be in the field around so many boys and that's what he was thinking about. And then he told me, but if you feel like you can't do it, I, I'm okay with it. So, I was (Laughter) ... what? Yeah, but he always drops these little hints, yeah.

Despite participants' families not being overly enthusiastic about their choice to study engineering, the participants all felt that their families were supportive of their decision in the end, but may still strongly guide their future career decisions.

Successes at TAMUQ

When we asked participants what they thought TAMUQ was doing well as an institution to support and encourage its female students, the number one thing that participants mentioned was that females outnumbered males at the institution:

I think because we have a relatively large female student population, the presence of having female peers around you kind of gives you support and motivation too.

Having so many female peers provides support and encourages participants. They also discussed how they felt most of their professors are balanced in terms of encouraging both male and female participation in class, and that they have a chapter of the Society of Women Engineers (SWE) at TAMUQ.

Challenges at TAMUQ

Although participants expressed high satisfaction with their overall experience at TAMUQ and did not regret their choice to study engineering, they brought up multiple institutional challenges including:

1. lack of physical spaces where [Qatari] females can feel comfortable
2. gender bias from both professors and male peers
3. fewer research opportunities and trainings for females
4. not enough interaction with alumnae
5. lack of participation and an agenda promoting advocacy of female students in the Society of Women Engineers organization.

1. Lack of Physical Spaces

Qatar remains a very gender-segregated culture. Qatari females, which make up the majority of the female student population at TAMUQ, complained that the student lounges tended to be male-dominated areas and they do not feel comfortable hanging out in them. They are not able to relax on the couches and take off their *abaya* (a robe-like garment which covers the whole body except the head, feet, and hands) or *shayla* (a head covering).

Example 1:

Since like most Qatari females are not comfortable to sit in this, these areas, so we don't find a place.

Example 2:

Guys are laying down everywhere, they're shouting, it doesn't feel comfortable to join.

It is important to note that our participants view the lack of physical spaces for women as having greater consequences than just not having a place to relax in-between classes. The participants talked about how, as a result of not having a space, they often choose to go home in-between classes:

I feel like because we don't have a place to stay, like after we finish our classes, we just go home. We don't stay here. Like boys stay here, like until 8:00 or 9:00 p.m. They finish their studies here; they do everything here. But for me personally, I just leave after my class is finished.

Not having a space of their own means that participants miss out on important opportunities to network with colleagues and professors, to collaborate on team projects, and to participate in campus events.

2. Gender bias from both professors and male peers

When it comes to gender bias from professors, participants discussed how some of their professors expect less of them than their male peers. They ask them easier questions or are more lenient with them if they do not know the answer. The female students feel more pressure to prove themselves and their intelligence in comparison to their male counterparts.

Example 1:

Actually, in the classrooms, I don't think it's completely fair. Like it's still that the professors kind of, they expect boys to do, to know everything, that kind of thing. Like they don't really have that confidence, like they don't really trust the girls. To be honest, they feel that, like you have to prove yourself in order for them to support you and trust you. Like they, they would go for boys, to be honest. That's what I see.

Example 2:

For example, if it's a physics course, there is a hard problem and he is, he is expecting the boys to answer it. For example, "you, what do you think?" He's only picking the boys, and he's more interested in knowing what they think, and he wants them to answer the question right, but he, it doesn't feel that he...just the girls ...they can participate in these courses, okay with that, but he doesn't expect them to know the right answer.

Additionally, participants discussed how they feel that their male peers do not respect them as equals, and perceive them as less intelligent. For example, the males give them easier tasks during group work/projects and talk to them in condescending ways. The participants also feel that their male peers are intimidated if they really speak their minds. Males also usually dominate during group work, even if there are more females than males in the group:

Example 1:

I had a group with a guy and he would do everything by himself as long as I don't ask to do something. He wouldn't ask me, he wouldn't call me, he wouldn't take my opinion or anything...like the guys in the class, too, they think that they're better than anyone else, especially girls.

Example 2:

I feel like sometimes when they're helping you [male classmates], they're judging, like you're just a girl, it's normal you didn't understand this. So, they try, yeah, they try to like dumb it down for you. And it's offensive. I feel like they do it unconsciously.

Example 3:

In one of my engineering classes, we were divided into teams and so it was two girls and one boy and the girl and I did all the work, but then when it came to choosing a group leader, he said, "I'm the group leader because I'm the man (laughs) in the group." (laughter) And he didn't do anything at all. He kept making, doing the wrong work and we had to clean up after him.

Participants also described how their male classmates do not take them seriously because they perceive the females as "having it easier" due to attitudes toward gender roles in Qatar:

And sometimes when we complain like school and stuff, and some, like it happened to me, male classmates would go, "you guys have it easy anyway. If it doesn't work out for you, you can just drop out and get married."

The attitude that women can study or work, but it is not a duty as it is for men, is common in Qatar.

3. Fewer research opportunities and trainings for females

Several participants mentioned that opportunities to participate in research projects or internships are often more geared toward male students:

I applied for a research project here in Texas A&M and I had to do a course before I got accepted in the research, and after finishing the course, I had to fill out documents. I had to sign a paper that I am a male and above 18 for the acceptance. I don't know how to say it, but it was like if you're, if you're not a male, your form is going to get viewed differently. Like it will have another criteria and that what they really want is males above 18. And when I asked what I should do, they told me just to put that I am an 18, female girl and it's going to get viewed by another kind of committee.

As discussed in the quote above, the female candidate appears to be the exception, not the norm for some of the application processes and it was unclear to participants how they would be viewed.

4. Not enough interaction with alumnae

The participants felt that they do not have enough interaction with alumnae and this is discouraging to them. They want to hear more about alumnae experiences and what happens to them after graduation, particularly how they manage their work-life balance.

Example 1:

I feel that we don't hear from the female graduates that graduated from Texas A&M. We don't hear from them. Like they just graduate and disappear.

Example 2:

...because I don't know anything about the ones who graduate, so I feel that if they came back and just talk to us about their experiences after they graduated, it would be helpful for us.

Example 3:

To be honest, it makes you think, like you want a family but then how will you balance that? They've put it in your head that it's going to be so hard to balance but then there are people doing it; there are female engineers doing it; there are female doctors doing it. But we may need those people to actually come and tell us, look, we've done it, it's hard, it's not easy, but we're doing it and you can, too.

Participants talked about how male alumni come to campus all the time as they are friends with current male students and thus, male students have a much greater opportunity than female students to network and make connections and hear about industry life.

1. Lack of participation and an agenda promoting advocacy of female students in the Society of Women Engineers organization.

Although the participants mentioned the Society of Women Engineers organization as a positive aspect for females at TAMUQ, they also discussed how the Society of Women Engineers is not viewed as an important organization within TAMUQ and they always have to remind professors and students what it is. They struggle to make the organization visible not only among their male peers but also female students. The participation in the organization is low and it has tended to focus only on social events as opposed to advocating for women.

Cultural / industry challenges

Beyond just the setting of TAMUQ, the participants discussed a number of perceived cultural, societal, and industrial challenges that female engineers face in Qatar and the wider Gulf region. These included:

1. Companies not accepting female employees
2. Companies not sponsoring females to study engineering
3. Gender bias and disparity in the workplace
4. Cultural expectations about women

1. Companies not accepting female employees

The participants believe that many companies in Qatar do not want to hire female employees because they perceive women as not being willing to work out in the field or they do not see them as dependable employees because they may leave if they feel too much pressure or get married or have children:

Example 1:

I have an experience at the jobs fair too. Before I joined chemical engineering, I wanted to ask about the job, like I wanted to prove to my dad that, no, they do want females but unfortunately, like we were just approaching the company, me and my friend, we just wanted to ask about the nature of the work, and how females work in the company and it was like, no, we don't want females. This was before we started talking or asking them anything.

Example 2:

Well, I know someone who used to study here and he has a sister. She graduated as an electrical engineer. She worked in the field, but she said that many people think of women, that they don't want to work in the field and stuff, like they want office jobs. That's why they don't consider their females as much as men.

Example 3:

They think that if, when they take the males ... they prefer males because they think if they took the females they're going to like, it won't be as guaranteed to work later as if it was for the males because they think that the females will drop out at like any obstacle they face, or they'll get married, or they'll stop or get pregnant, get baby.

2. Companies not sponsoring females to study engineering

Participants also expressed that it was shocking to find out that some companies in Qatar will not even sponsor female students:

Example 1:

I asked my father's cousin to, to have like a scholarship but he told me, we don't accept girls for all majors like electrical and chemical. So like I was shocked.

Example 2:

... it's just so unfair. Because like if I'm mechanical and I want to go on and work there, that means that they didn't, they didn't give me the chance to go and work there. And even it that place is a good place or whatever. I mean, like here, the society, it makes it harder for a female to be successful.

3. Gender bias and disparity in the workplace

Although many participants had not interacted with alumnae, those that had, mentioned stories of gender bias and disparity in the workplace. One participant said that she heard that many females face sexism during internships and that they are not given as challenging of assignments as males:

Yeah, but then I still have that fear of a career because I've talked to some of my friends who graduated and they did internships and they tell me the amount of sexism they face during internships, not even after graduation. She says it's harder than what she had to go through in engineering school, that proving yourself and that you can do it is tough. Like the work she is given, she is not given like hard work, you know, she is a girl or like she says when she first went to do her internship, no one took her seriously because she's a girl and, like her male friends made more friends faster with people in the office. They were more approaching to them, but for the girl they were a bit reserved. They didn't want to approach her, or they didn't want to offend her or they didn't want to give her a lot of work, but for the boys they sort of give challenges. They challenge them to do the work.

Notably, this participant also provides another example of how female employees are at a disadvantage when it comes to networking in comparison to male colleagues.

4. Cultural expectations about women

As mentioned earlier, the dominant attitude in the region is that while a woman may certainly receive an education and work, her primary duties are to her husband and children. Additionally, participants discussed how being *too* educated or in *too* high of a work position can actually be detrimental to finding a marriage partner:

Example 1:

If we're going to talk about marriage (laughter), yeah, some families, they don't like, they don't like the female to have like a better position than the male [...] Yeah. So, like, no, we don't want this girl because she's better than our son.

Example 2:

I mean, like they know when you're so educated, you won't settle for a guy (laughs) less than that, so...and then they're intimidated because now you'll go to university, you'll meet someone there, probably not of the same like background as you, so you're bringing shame to the family.

Example 3:

Yeah, for example, in my culture in Palestine, they prefer the girl getting married rather than like studying, be like, her parents like paying the fees and like, you know, so like it's, they like study, for example, business, or accounting or...they'll like just sit at home and then get married and have kids.

Moreover, participants mentioned that society views it odd that a woman would want to be an engineer because they associate it with petroleum engineering and working in the field—a job that is dirty and you have to wear “men's clothes.”

My friend thinks that engineering women will wear helmets, men clothes, the orange ones (ha).

Survey Findings (see Appendix C for graphs)

What do you hope to do directly after you graduate?

When asked about their plans post-graduation, the majority of respondents stated that they are planning to continue their paths in engineering; 74% of the respondents are planning to work in an engineering-related field, and 41% to go to graduate school and continue studying engineering. This large percentage supports the focus group data in terms of students being overall satisfied with their choice of studies and their desire to continue along this path.

What are some of the challenges you may have faced/are facing related to being a female engineering student at TAMUQ?

The main challenges that respondents selected in terms of being a female engineering student at TAMUQ were similar to those discussed in the focus groups. These include the lack of a “women-only space,” gender bias, lack of sponsorships, and lack of internships and networking opportunities. Respondents do not necessarily feel comfortable while in the university, in comparison with their male peers; they believe they need more female-only space.

What are some of the challenges you think you might face related to being a female engineer in the workplace?

Since most of the students have not yet been exposed to a professional engineering environment, we asked about perceptions of future challenges. The largest response was gender bias from colleagues and superiors. The respondents also fear that their salary will be lower than that of their male colleagues. Another, but equally important fear is balancing their work with having a family.

On a scale from 1 to 5 (1 being “I strongly disagree” and 5 being “I strongly agree”), do you think there is gender bias at TAMUQ from Professors? From peers?

When asked about gender bias, the majority of respondents did not rate it as particularly prevalent in the university, although this sometimes contradicted their answers on other questions and the focus group findings. Respondents feel it is more prevalent among male peers than from their professors.

How do think the university could address this challenge?

When asked for suggestions on how the university could address gender bias, most of the respondents mentioned having regular discussions with faculty and staff to raise more awareness about the issue and awareness events by student organizations. They also expressed wanting more support by establishing a women’s center in the university.

In what ways can TAMUQ better support its female students?

In terms of what the university can do to supports its female students, the majority of respondents want the university to host regular talks and events with women working in industry and encourage more female students to join co-curricular activities. Most of the respondent comments related to wanting more support as well as awareness about the issues that females face. They also suggested that the TAMUQ could hire or appoint a female representative to deal specifically with enrollment, retention, support, and preparation of it female students.

Do you know about SWE?

Lastly, students were asked whether they know about the Society of Women Engineers (SWE) organization at TAMUQ. 59% responded negatively. Additionally, the majority of respondents

are not members, stating that time was a major component of that decision. Other also mentioned that they do not see any involvement by SWE around campus. In regards to the students who are members, they joined because they wanted to be part of an organization that is led by females to help other females feel confident, and for their opinions to be more appreciated.

Discussion and Recommendations

Findings from the focus groups and surveys revealed numerous factors affecting female engineering students at TAMUQ. From the moment the participants chose to study engineering, they faced various socio-cultural constraints related to choosing a male-dominated field. Students indicated interest in the field and a need to “prove” something to their families as motivating factors behind their decision.

Due to the university’s demographics of almost 60% female students, it is important to understand some of the institutional strengths and weaknesses in terms of supporting female students. When asked about institutional successes in terms of the university supporting its female students, there were some positive views towards professors and students were overall satisfied with the university and their choice of studies. The primary success, however, seems to be the enrollment of a large number of female students contributing to an unofficial support system through female peers. In terms of challenges, participants indicated the lack of a women-only physical space and with that lost opportunities for networking, gender bias from both professors and male peers, less research opportunities and trainings for females, lack of support and mentorship, particularly in terms of female role models and interaction with alumnae, and the lack of participation and advocacy for women in the Society of Women Engineers as the main aspects affecting them within TAMUQ. These institutional challenges are compounded by industry-wide practices in Qatar that are detrimental for women engineers. Participants, in this respect, indicated perceptions of companies not accepting female employees and not sponsoring females to study engineering, a prevalence of gender bias and disparity, and cultural expectations affecting women in the workplace.

The fact that participants’ perceptions indicate considerably more challenges than successes can be examined in light of a prevailing culture of gender bias and sexism towards women. Similar to findings reported in Alhasani (2013), Aswad, Vidican and Samulewicz (2011), and Fawwaz (2014), it is possible to see mentorship and support systems, cultural norms, and stereotyping as crucial factors affecting women engineers in the region. Internally, TAMUQ needs to ensure consistency and fairness across genders, in terms of the space, support, and opportunities it provides to its students. It needs to better prepare its female students to navigate those ‘invisible barriers’ (Qayyum, 2012) and have strategies to assert themselves in male-dominated work settings. At the same time, industry-wide challenges need to be addressed to ensure women are able to use the skills they have gained from their engineering degree. It is in this context that we want to provide a series of recommendations based on the experiences of our participants.

In both the focus groups and in meetings with our faculty-student research team, a number of recommendations were suggested. These included:

- Designating space for a women's only lounge with desks and sofas that encourage female students to feel comfortable staying on campus, and to have an opportunity to network, to collaborate, and complete school work
- Creating opportunities for more interaction, including informal conversations, with alumnae
- Inviting more women working in industry to give lectures and workshops
- Organizing a special lecture series focused on women in STEM
- Hiring more female professors so that students have more role models
- Liaising with industry to encourage equal sponsorship opportunities and more equal hiring and retention practices
- Collaborating with the Women's Faculty Forum at TAMUQ in terms of events and advocacy
- Giving more visibility and power (budget) for the Society of Women Engineers
- Encouraging greater participation in the Society of Women Engineers and conducting activities that go beyond just social events to advocate for women and promote awareness of challenges facing women in STEM fields
- Providing more opportunities for students to discuss incidents of gender bias or sexism on campus in a safe space
- Providing funding for faculty and students to conduct further research on issues facing women in engineering in Qatar (such as this present study) and develop viable solutions

Conclusion

Although this study is limited in scope, it helps shed light on challenges faced by female engineering students in a non-Western context, such as the perceived detrimental consequences of not having segregated space or particular attitudes about gender roles and marriage in Qatar. It also supports findings from previous studies about challenges that women in STEM face worldwide, such as stereotypes, gender bias, and lack of role models. We hope to conduct further research on the experiences of TAMUQ alumnae. We also hope to conduct research on a wider scale with more engineering programs in Qatar and across the region.

Concomitant to analyzing institutional and regional efforts and challenges pertaining to female engineering students entering the workforce, this project was also concerned with our own research process. As members of the TAMUQ community and residents of the State of Qatar, most of the members of our research team are also part of the researched group. We feel that one of the benefits of conducting this type of research with students is that they are now able to better articulate their experiences as female engineering students and are more cognizant of issues facing women in STEM. Most of the students on our research team and in the focus groups had never before verbalized their thoughts on these issues and did not even possess a strong understanding of terms like "gender bias." This may explain why students completing the survey were less likely to acknowledge gender bias at the university than those participating in the focus groups. Our hope is that these students will go on to be strong advocates for females on campus and be more confident and prepared to navigate challenges they may face during their time at TAMUQ and once they integrate into the job market. We believe this kind of self-reflexive needs analysis research, if supported and conducted in more educational and workplace settings, can be of great value in improving the status of women in STEM fields worldwide.

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Appendix A: Focus Group Questions

Icebreaker: What attracted you to studying engineering?

1. How did your family and friends react to your decision to study engineering?
2. In what ways does TAMUQ offer a supportive environment to its female students?
3. What challenges have you faced, if any, as a female engineering student at TAMUQ?
4. Can you think of an experience where you felt you were treated differently than your male classmates at TAMUQ?
5. Are you still satisfied with your decision to study engineering? Discuss why or why not
6. How could TAMUQ better support its female students?
7. What do you think are some common perceptions of women working in engineering fields in Qatar/the Gulf region?
8. What kind of socio-cultural limitations do you think you might face as a female pursuing a career in engineering here in Qatar/the Gulf region?
9. How could some of those limitations be overcome?

Wind down: Is there anything else this discussion has made you think about that you would like to share with us regarding your experience as a female engineering student here at TAMUQ?

Appendix B: Anonymous Online Survey for TAMUQ's female students

1. Class:
2. Major at TAMUQ:
3. Nationality:
4. What do you hope to do after you graduate?

Go to graduate school (study engineering)

Go to graduate school (study something different)

Work in an engineering-related field

Work in a different field

Start a family

Take a break

Other:

5. After graduating from TAMUQ, do you feel you will be prepared to work in your field?

Yes

No

Please explain

6. What are some of the challenges you may have faced / are facing related to being a female engineering student at TAMUQ? (select all that apply)

Lack of a female-only space in the university

Lack of mentorship

Gender bias from your peers

Gender bias from your professors

Lack of support from your family

Lack of sponsorship opportunities

Lack of internships and networking opportunities

Lack of student organizations

Other:

7. What are some of the challenges you think you could face related to being a female engineer in the workplace? (select all that apply)

Gender bias from my colleagues

Gender bias from my superiors

I will not have enough responsibilities

I will not receive adequate training / mentorship

I will be unable to travel

My salary will be lower than that of my male colleagues

I will not feel well prepared for my job

I will work in a different field

Other:

8. On a scale from 1 to 5 (5 being the highest), do you think there is a gender bias at TAMUQ?

From your professors 1 2 3 4 5

From your peers 1 2 3 4 5

9. If you selected 3 or more for the question above, how do think the university could address this challenge? (select all the apply)

Events organized by the administration

Events organized by student organizations

Establishing a women's center

Create a TAMUQ system to report all incidents

Counseling

Regular discussions with faculty and staff

Other:

10. In what ways can TAMUQ better support its female students? (select all that apply)

More internship opportunities

Create a female-only space within the university

Encourage female students to join co-curricular activities

Host regular talks and events with female alumni

Host regular talks and events with women working in the industry

Create more female student organizations

Other:

11. Do you know about the Society of Women Engineers (SWE)?

Yes

No

12. If yes, are you a member?

Yes

No

Why or why not?

13. What are some of the tools you employ to assert your opinions and viewpoints as a woman engineering student within a male dominated field?

14. Is there anything else you would like to share with us regarding your experience as a female engineer at TAMUQ and beyond?

Appendix C: Results of Anonymous Online Survey for TAMUQ's students

Figure 1.1: Student Classification

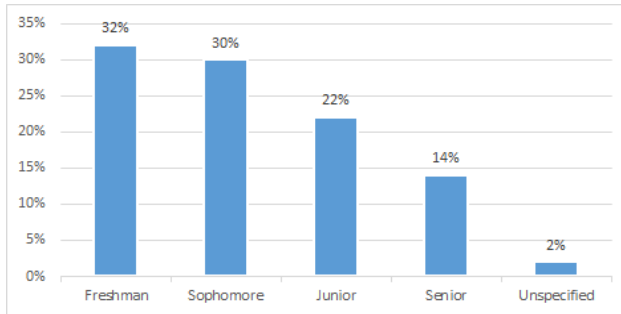


Figure 1.2: Student Majors Distribution

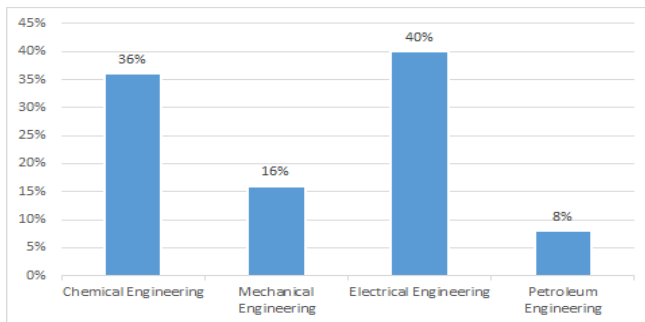


Figure 1.3: What do you hope to do directly after you graduate?

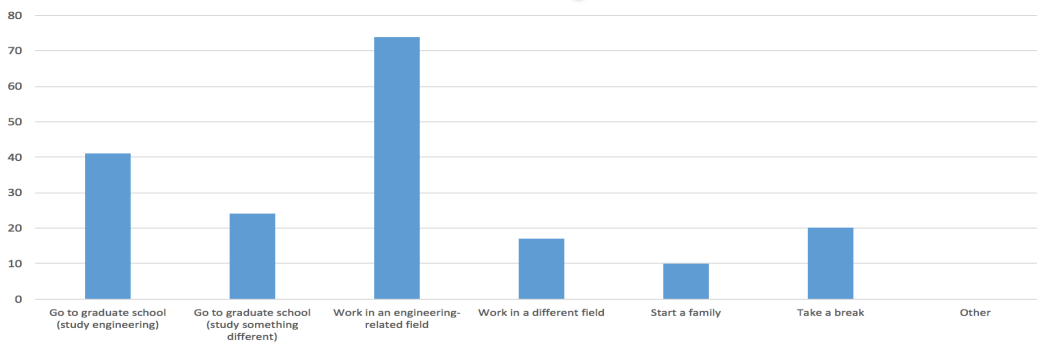


Figure 1.4: After graduating from TAMUQ, do you feel that you will be prepared to work in your field?

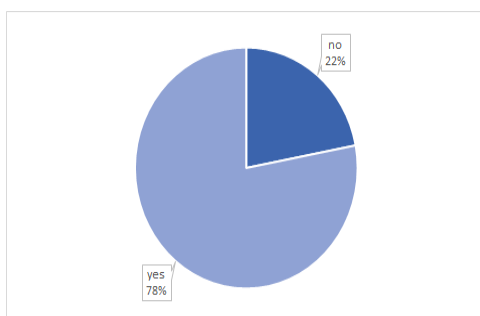


Figure 1.5: What are some of the challenges you may have faced/are facing related to being an engineering student at TAMUQ?

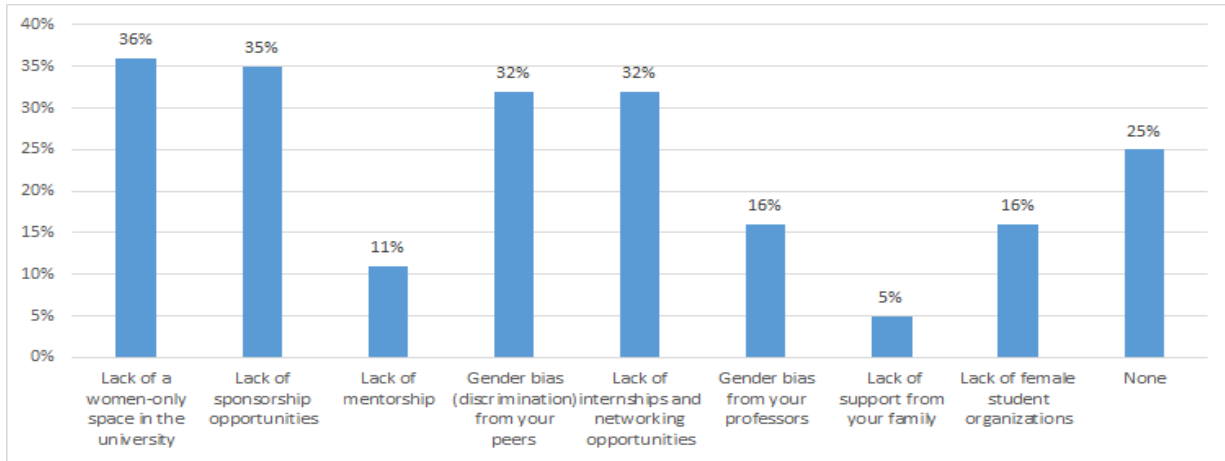


Figure 1.6: What are some of the challenges you think you might face related to being a female engineer in the workplace?

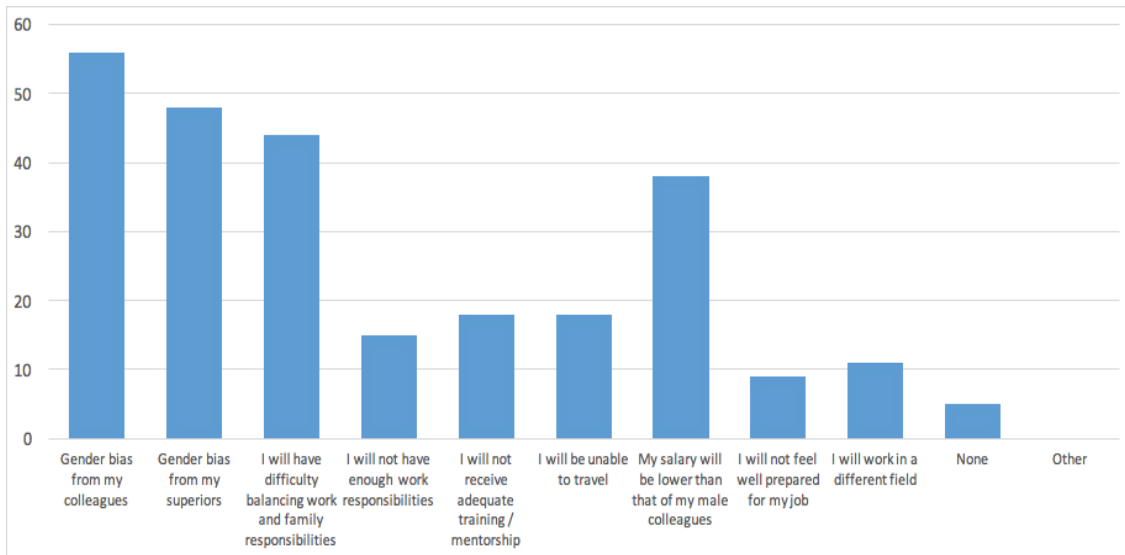


Figure 1.7: On a scale from 1 to 5 (1 being “I strongly disagree” and 5 being “I strongly agree”), do you think there is gender bias at TAMUQ? (from professors)

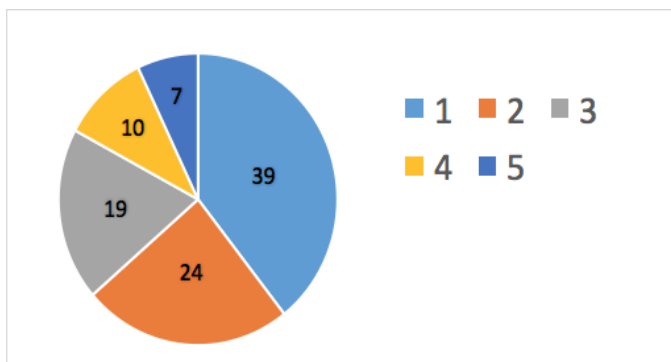


Figure 1.8: On a scale from 1 to 5 (1 being “I strongly disagree” and 5 being “I strongly agree”), do you think there is gender bias at TAMUQ? (from peers)

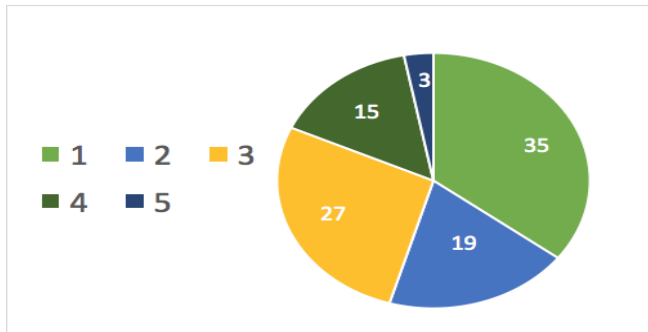


Figure 1.9: How do think the university could address this challenge?

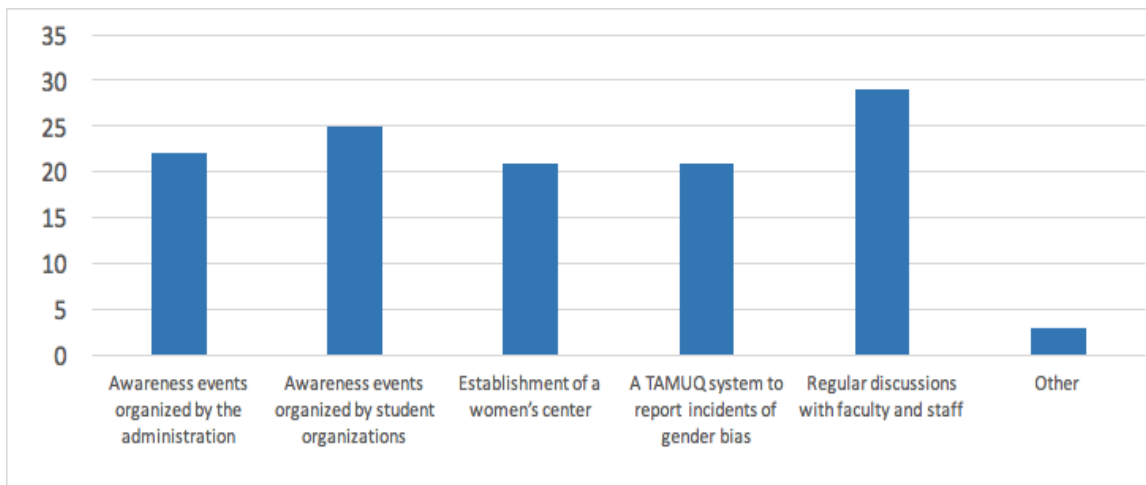


Figure 2.0: In what ways can TAMUQ better support its female students?

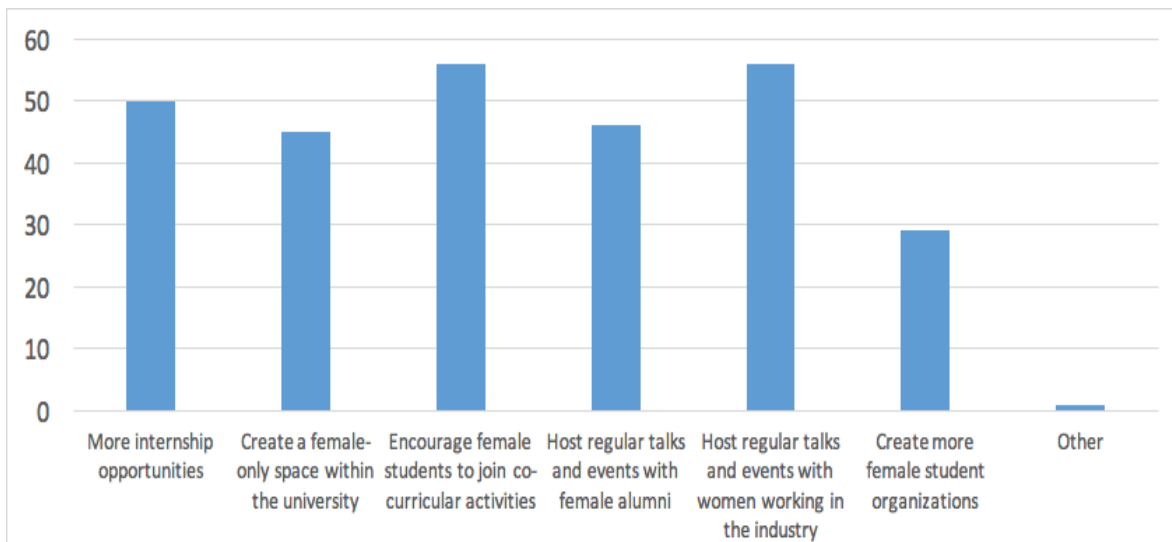


Figure 2.1: Do you know about SWE?

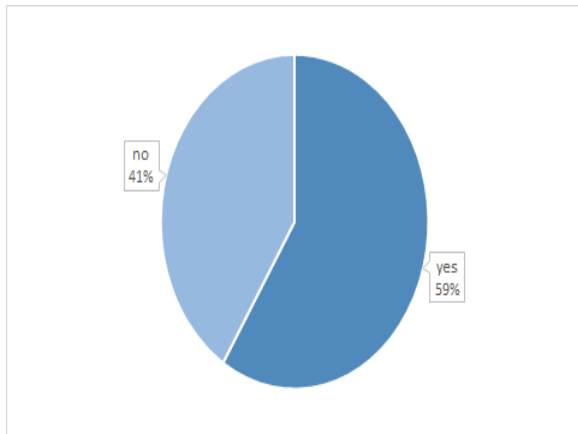


Figure 2.2: Are you a member?

