Exploring the experiences of female engineering students at an undergraduate evangelical religious institution in the United States

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Abstract

The National Science Foundation (2022) reports that women earn roughly a quarter of the engineering degrees conferred at American universities while the Society of Women Engineers (2020) reports more than 32% of women declaring a science, technology, engineering, or mathematics (STEM) major at American universities change programmes. At evangelical universities in the United States, the additional factor of religious views of gender roles may play a part in the recruitment and retention of female engineering students. This study aims to further academic knowledge as to the experience of students in a gender minority at a type of university that is under-researched. This is a qualitative research study situated within an interpretivist research paradigm, using Connell's theory of gender regimes and gender order (2005) to investigate the experiences of female undergraduate engineering majors at an evangelical university in the United States. Nine female engineering students and three staff members from the same university took part in semi-structured interviews via Zoom. Using Braun and Clarke's thematic analysis (2006), themes surrounding self-identifying as an engineer, finding belonging at university, and viewing professors as mentors are discussed. Interestingly, the students and staff display a variety of understandings regarding the intersection of religious views and gender in career prospects. These findings indicate an opportunity for universities to create a sense of belonging within the university but also within departments to better support a diverse and inclusive student body. They also demonstrate the importance, even within a seemingly homogenous university such as an evangelical campus, to be aware of the multiple interpretations of understandings and experiences related to gender, religion, and engineering.

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Author's Declaration

I declare that, except where explicit reference is made to the contribution of others, this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

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Chapter 1: Introduction

In 1981, Sally Hacker wrote:

> In Western society, it is a technological rather than a religious ideology which justifies the existing order. In the everyday lives of engineering/management, and in the early lives of leaders in elite engineering education, we see reflections of man/woman and mind/body dualisms, related to strong notions about hierarchy in the world of work (pp. 350).

Hacker studied the dualisms present within the field of engineering and particularly within the university setting. Forty years later and we still see female participation far lower than male participation in every field of engineering, earning roughly a quarter of engineering degrees conferred at universities in the United States (National Science Foundation, 2022). As we shall see, engineering is viewed as a 'masculine' field, and aspires to be rational and meritocratic to its core, prizing individual intelligence and technical ability (Faulkner, 2000). While strides have been made to diversify the workforce, female engineers are still a minority with 16% of employed female scientists and engineers working directly in the field compared to 35% of men (NSF, 2021). It is no surprise, then, that female engineering students are also a minority in undergraduate engineering programmes in the United States.

The Society of Women Engineers (SWE) reports that women's intentions to pursue a major in engineering, mathematics, or computer science rose from 4.4% to 7.1% from 2009 to 2019. However, the intentions of prospective male students to major in these subjects rose from 21.7% to 26.7% during the same time frame, outpacing the rise in women's intentions. Of those female students who do declare a science, technology, engineering, or mathematics (STEM) major, more than 32% change programmes (SWE, 2020). Of the women who earn a bachelor's degree in engineering, the majority are white, and the top disciplines within engineering that they choose are environmental, biomedical, and biological/agricultural engineering (Meiksins, Layne, Beddoes & Deters, 2020). This has encouraged the idea that women prefer specializations which are socially based and offer an opportunity to give back to society in some way. Disciplines like environmental engineering (as mentioned above), which aims to have a positive impact on our physical world, and biomedical, which is related to

the health and wellbeing of humans, seem to have more obvious social applications than disciplines such as welding or electrical engineering which are primarily industrial. These are some of the many gendered assumptions relating to the field and to whom its study is best suited.

These conceptions as to gender differences in engineering are an illustration of the inequity in the field, and one factor perhaps contributing to this is the influence of cultural beliefs on the roles, careers, and occupations seen as appropriate according to gender. The dominant religious ideas in a specific culture can play a large part in constructing and legitimizing these beliefs. In the western world, including the United States, Christianity has had a powerful social and cultural influence. In the United States, evangelicalism in particular has blurred the lines between religion and politics. Dzubinski (2016) defines the term in this way

> Evangelicalism is typically defined as a specific set of theological beliefs; thus, someone who holds to the literal truth and authority of the Bible, the virgin birth of Jesus, salvation only through faith in Jesus' death, burial, and resurrection, a transformed life, and sharing this message with others would typically be considered an evangelical (pp. 282-283).

Believing in the importance of teaching the evangelical worldview, there are evangelical Christian colleges and universities across the nation blending education with belief system.

Having attended one such institution as a psychology major in the College of Education and later working at my alma mater, their operations are personal to me. I remember well the 'jokes' made as a student that the university only began a programme in education so the engineering majors could find wives. There was no subtlety to the assumption that engineers were male (and also that education majors were female). I will be open in this research regarding my own religious belief. While I grew up in Southern California in a Christian home, went to church regularly and attended Christian schools, I did not consider myself an evangelical. In the terms provided here, I would have been more of a mainline Protestant. And while my family would be considered conservative by California standards, I realized when I went to university in Texas that there seemed to be other understandings of what a 'conservative Christian' meant. I experienced a

bit of culture shock there as political and religious views seemed to be entwined, and particularly remember the surprise of seeing a truck drive past flying the Confederate flag. I do not remember my parents ever commenting on my future goals in terms of my gender. In fact, my father took pleasure in pointing out any and every time I did better than a boy in something at school. However, at my university there was an underlying assumption that women were primarily there to find a husband, as implied in the 'joke' I often heard.

Years after I graduated, I returned to the university as the Director of Alumni and Parent Relations. My chief duty was to 'engage' alumni with their alma mater with the by-product of increasing alumni donations and enrolment. During my career as a staff member, I saw that female students still regularly made stereotypically gendered programme choices. I was also now in a position which provided opportunities to speak with many male engineering alumni as this was the largest College within our university and therefore had the most alumni. In my role as part of the alumni relations and fundraising team, I attended national engineering conventions and even had alumni offer to teach me to weld in order to both display my commitment to the engineering alumni as well as create a picture of diversity in the field. Some of these alumni would question the number of female students in the programme and how the university could increase that percentage.

These comments piqued my curiosity as to whether the conservative nature of the evangelical belief system regarding gender roles was in fact counteracting a desire to increase diversity across campus programmes. Having studied psychology as an undergraduate, it could at times be difficult, through this research, to maintain a more sociological approach. Initially, I found myself favouring theories and articles more related to stereotype bias and less to sociological gender theory. This demonstrated a predisposition to fall into a more positivist experimental approach reflecting my past study in psychology. In realising the experiences of the students I interviewed for this study would inherently be different from those at the university I attended, I chose to take an interpretivist approach to this research. That did require a shift in my thinking, in my paradigm, but one which challenged me and added to this study by creating more questions to pursue. Could the inaccurate (in my opinion) views

of gender roles held by some at the university be working against the mission many say they hold of diversifying the programme? The comments I heard as a student regarding gender and programme choice have stayed with me for two decades. Now, as a professional in higher education, I am able to more actively approach the subject. I currently work in the graduate school at a state university where, again, diversity and inclusion are important emphases in the recruitment and retention of students. To be transparent, I have deeply held religious beliefs and do not aim to undermine the importance of religious faith. I do, however, in the course of this research, hope to critically assess the experiences of women in evangelical university engineering programmes. This assessment could help inform faculty, administration, and staff members, like myself, in supporting these women as they pursue their personal and professional goals and supporting engineering programmes in diversity and inclusivity.

For this study, I interviewed female undergraduate engineering majors at an evangelical university to hear their personal experiences negotiating multiple aspects of identity relating to gender and career/vocation. Questions revolved around how interest in engineering developed, university and major choice, classroom dynamics, and career prospects. University staff were also interviewed with similar questions asked in order to provide another perspective of the dynamics of gender within the programme. While previous research has addressed the statistics mentioned earlier, questioning the gender inequity in engineering and specifically engineering programmes, this research will add the under-researched element of religious views and how they intersect with gender in students' experience. While religion and science have had a complicated relationship for centuries, the interplay of religion and gender has also been a significant factor in culture around the world. As I outline further in chapter 2, religious beliefs often include ideas of appropriate/ideal gender roles and influence how one's identity is understood. For some, this could create tension if one's interests and aspirations do not easily fit with dominant or hegemonic conceptions of gender according to the religious views one holds.

This study focuses on one iteration of one religious institution in one country but lends its observations to the larger dynamic of religious views of gender roles. It will seek to create options for universities, particularly private religious universities such as the one studied, to support female engineering students in the pursuit of their degrees. The research is of benefit to the recruitment and retention of these students as well as the expansion of diversity within engineering programmes at these institutions. Casad et al. (2019) consider it 'critical' for universities to address the environment within their STEM programmes for these very reasons. The study also aims to further academic knowledge as to the experience of students in a gender minority at a type of university that is under-researched. This will be innovative in exploring the intersection of gender and other forms of identity such as faith identity, which is under-researched when investigating issues of gender and participation in STEM disciplines, such as engineering.

Research Questions

Having had conversations with male engineering alumni concerning their perspective of the needed increase of female students in the program, I wanted to learn more about the women choosing to study engineering at evangelical universities. I wondered if the religious views the university professed were in fact promoting an essentialist view of gender which might keep the female student who chose to attend such a university from studying engineering where she would be in the minority. I also wondered how the women who did choose to study engineering in this environment navigate their religious views and their career prospects, which could possibly lie in tension with each other. The offense I felt at having heard male students say the education program existed to provide wives for engineering majors was and is still real. My reaction then, and now, was to support women in the study of whatever they choose, especially if it is a program like engineering where male students may hold a majority. Therefore, my overarching research question is: what can be learned from the experiences of female engineering students at an undergraduate evangelical religious institution in the United States? Throughout the course of this study, I will additionally seek to answer the following sub-questions:

1) How do female engineering students in the evangelical setting perceive gender roles and their own/others' gendered identities?
2) Do these perceptions play a part in the sense of belonging or appropriateness in the engineering studies of these women?
3) What are the experiences of these students in terms of retention and course change, and do those experiences relate to their gender perspectives?
4) What are the students' views of current policy and practice in their programme and in what ways have these made a difference in their university experience?
5) What are the implications of this study to policy in evangelical institutions and the role of gender in engineering programmes more broadly?

I will now give a brief introduction to evangelical universities in the United States before summarizing the chapters to come.

Evangelical Universities in the United States

In a 2014 Religious Landscape Survey conducted by the Pew Research Center, roughly 25% of the population of the United States identified as evangelical Protestants. This is in comparison with 'mainline' Protestant Christians and Catholics. In fact, the percentage of mainline Protestants and Catholics fell between 2007 and 2014 while the percentage of evangelical Protestants barely diminished, and the actual number of adherents grew by two million. Looking at the ethnic makeup of this group, roughly 20% of the US adult population is a white evangelical Protestant. An additional 6% of adults are evangelical but members of other ethnic groups, Hispanics being the largest of these groups (Masci, 2015).

As reported in academic year 2018-2019, there were 2,300 four-year universities granting bachelor's or higher degrees in the United States (National Center for Education Statistics, 2020). Of those 2,300, 720 were public institutions and 1,300 were non-profit private institutions. The non-profit private universities

would include both religious institutions as well as such well-known schools as Harvard University and Yale University, with just over 300 universities classified as ‘faith-related’ accounting for 85,000 students. Not all ‘faith-related’ institutions would be evangelical as this would include universities and seminaries for all religions, but they are often the first that come to mind. One such evangelical university, Liberty University, which claims to be the largest in the world, made headlines in 2016 when then-Presidential candidate Donald Trump spoke to students. The choice of university was important as it served as a vehicle for the candidate to speak to the evangelical community and give an early look into his courtship of religious voters (Vitali, 2016). In this way, the evangelical university served as a literal podium within the greater evangelical community and made a statement on behalf of evangelicals in support of the candidate to those outside the community.

Within evangelical universities, the religious ideology mentioned by Hacker is a driving force. One example of the power of religious institutions is the Council for Christian Colleges and Universities (CCCU), the largest association for Christian universities within the United States with more than 135 institutions as members (About, 2020). While the word ‘evangelical’ is not included in the mission of the Council as it serves multiple denominations, the literal true and authoritative nature of the Bible is considered foundational. The CCCU is also unique in that it serves as a resource within Washington, DC to lobby for the political concerns of its member institutions. This reflects the influence religion has in American politics as well as the importance of higher education in the nation (as seen in the Donald Trump speech mentioned above), and the CCCU does not even account for all the Christian institutions in the country.

Faith-based institutions are private in nature, not receiving state funds, and often receiving federal funds primarily in the form of loans provided to their students which have a higher repayment rate than loans taken by students at other institutions (Economic Impact, 2020). In the predominately neoliberal higher education culture of the United States, tuition dollars are of greatest importance with competition between universities for students. This market dynamic has led to an increase in cutting edge programmes, including

engineering (Truscott, 2019). Of the institutions in the CCCU, 40% offer a bachelor's degree in some form of engineering. However, many of the statistics tracked by the CCCU revolve around faith and character building (About, 2020). These are seen as just as important as the academic lessons taught within the schools. Before I started the research for this study, my previous experience led me to suspect that for women studying engineering within these institutions, the tensions between religion and science, masculinity and femininity, work and home, are everyday issues. Balancing identities of 'woman' and 'engineer' can be difficult, as we shall see, but adding 'Christian' complicates things further.

This tension becomes a concern for private universities when it could influence student recruitment and retention in their programmes. In a practical sense, these institutions must be concerned with recruitment and retention in order to survive, particularly in uncertain economic times. In a field such as engineering, private schools have the added burden of explaining how their programme is worth the additional tuition cost when compared with larger public research universities. Academic year 2020-2021 (the time period of the research interviews) tuition at one private Christian engineering university in Texas was $31,740 per year, while a public research university charges $6,334 for a Texas resident and $21,491 for a non-resident per year. This financial difference is significant and can often be the basis for choosing which university to attend.

In addition, like public institutions, private universities look to diversify their student populations. Regardless of type of school, this concern for diversity is federally mandated, as part of the Education Amendment of 1972 is aimed specifically at curtailing discrimination based on sex or gender in higher education institutions. Known as Title IX (2018), this federal civil rights law states that sex cannot be used as a means of exclusion from any academic programme which receives federal funding. Since even private universities accept federal student loans, this policy protects female students from direct sex discrimination in terms of entry to and experience in engineering programmes. Not adhering to this anti-discrimination commitment could lead to a withdrawal of federal funding. It also means universities can face legal action from students who feel they have been discriminated against. Therefore, private

universities must prioritize the concerns of their students and pay attention to patterns of movement within their programmes. As I will argue, the experiences and views of female engineering students are important for universities to consider.

Structure of the Dissertation

This dissertation is structured in the following way. The first chapter after this introduction contains a literature review of relevant studies surrounding three lenses through which to view gender inequality in engineering. The first lens is complementarianism as seen through evangelicalism, specifically focusing on the relationships between evangelicalism and science, gender, and higher education. The views of gender inequality as a need to 'fix' women and gender inequality as a need to fix the system will also be discussed. Following that, the third chapter will lay out the methodology for this research as well as the theoretical framework for the study. The selection of participants and use of Connell's (2005) concept of gender regimes and Braun and Clarke's (2006) thematic analysis are included. The fourth chapter provides data analysis of the participant interviews, both student and staff. Ideas reflected in these interviews include influences in choosing engineering, student relationships with professors, student relationships with peers, group project dynamics, the lens of the professors, and the religious culture of the university. The fifth chapter provides discussion of the findings as they relate back to literature previously reviewed, including areas of agreement and areas which expand on the literature. Finally, I will conclude with responses to my research questions and thoughts about how my research can contribute to developments within universities and in research.

Chapter 2: Gender, Engineering and Religion in the United States, A Review of the Literature

Understanding the gender inequity in engineering disciplines can be complex. In this chapter, I will discuss three theories which have been put forward to explain potential gender differences. One line of thought argues that men and women are born with inherent biological differences, and this is why there is disparity (Dzubinski, 2016; Diefendorf, 2019). This thinking includes the evangelical complementarian view (The Council on Biblical Manhood and Womanhood, 2022) that differences exist and are biologically innate, but men and women's differing roles in terms of thinking, working, and religious participation complement each other. Another line of thought says that women would be equal and treated equally if they altered themselves or their behaviours to fit into the roles they wish to have (Faulkner, 2007; Rhoton, 2011; Hatmaker, 2013). In essence, this is placing responsibility for inequity on women who could achieve equality if they just tried harder. Finally, there is the view that inequality is a result of the social construction of gender and the social influence of hegemonic masculinity to maintain the status quo (Zucker & Bay-Cheng, 2010; Francis, 2017). These different ideas can be identified through the various arguments in the literature that I'll be discussing in this chapter.

In this review of relevant past research, I will first explore gender inequality and the theory of complementarianism through evangelicalism. This will be done by discussing the theory of complementarianism in American evangelicalism, evangelicalism and gender in higher education and STEM, and non-Christian views supporting the notion of biological gender differences. Then I will explore the concept of 'fixing' women in order to achieve gender equality, and how that concept is demonstrated in the study of STEM subjects. Next, I will look at gender inequality through social constructionist feminism and a focus on changing the systems, including universities, rather than changing individual women. Finally, I will discuss concepts within American higher education fundraising including gender and giving, giving in STEM subjects, and alumni giving. Together, these issues will set the landscape for my research regarding the experiences of female undergraduate students in engineering programmes at

an evangelical university and how those experiences are and ought to be important to the university and its future.

Gender Differences as Biological Differences

Evangelical Complementarianism

'Second wave' feminist ideas spread through the United States in the 1960s and 1970s. Schuster (2017) defines this second wave as

> a feminist ideology that developed in the west since the late 1960s and is mainly concerned with structural disadvantages of women living in a patriarchy. The central aim is the liberation of women through, for instance, achieving equal rights, opportunities and political representation; challenging traditional gender roles; and raising awareness for women's reproductive and sexual self-determination (pp. 648).

In challenging 'traditional' social structures and gender roles, it is no surprise that evangelical Christians found themselves in need of a response. In 1987, a group of evangelical leaders met to discuss drafting a set of core beliefs and in 1988 'The Danvers Statement' was published (The Council on Biblical Manhood and Womanhood, 2022). Among other things, the statement aimed to address 'the increasing promotion given to feminist egalitarianism with accompanying distortions or neglect of the glad harmony portrayed in Scripture between the loving, humble leadership of redeemed husbands and the intelligent, willing support of that leadership by redeemed wives'. (The concept of 'redeemed' refers to the belief that the individual has been saved from their sins through the death and resurrection of Jesus Christ.) Here, a dichotomy is set between the way feminist discourse is constructing the relationship between genders and the way the Bible has laid out the relationship between genders, specifically in marriage. The agreed response has ten points, including

> In the family, husbands should forsake harsh or selfish leadership and grow in love and care for their wives; wives should forsake resistance to their husbands' authority and grow in willing, joyful submission to their husbands' leadership…In the church, redemption in Christ gives men and women an equal share in the blessings of salvation; nevertheless, some governing and teaching roles within the church are restricted to men (cbmw.org, 2022).

The quintessential ideas of complementarianism are conveyed in these words. Husbands are seen as the leaders of the family, wives are to submit to their

authority, and there are certain roles (quoted as governing and teaching roles above) only men can play within the church. In practice, individuals may emphasize love and joy over the authority and submission mentioned, but the hierarchy remains explicit.

Navigating these evangelical views regarding gender can be complicated within churches. In her two-year ethnographic study of members of an evangelical church in the Pacific Northwest of the United States, Diefendorf (2019) lists the two basic ideas inherent in the evangelical responses to feminism as gender essentialism (believing God created men and women with essential gender differences) and headship (believing God has given men authority over the household and church). While these are given as responses to feminism in particular, they are really responses to questions of gender in general. Diefendorf argued that three responses to feminism can be found: 'creating an evangelical feminism, seeking a middle ground, or rejecting feminism' (pp. 1005). In conversations, her participants utilized ideas from all three of these responses while also all accepting basic feminist ideas such as gender equality. Those more inclined to embrace feminism did so by citing ways in which Biblical ideas could be seen through a feminist lens. Those seeking a middle ground were more open to gender roles outside the traditional idea of male headship. Those who rejected feminism cited their opposition to liberal political ideas equated with feminism, directly mentioning Gloria Steinem (as a symbol of upending the social gender order), opposition to the practice of abortion, and what they argued to be the essentially different roles of men and women. Overall, the responses demonstrate the many ways evangelicals interpret gender roles and the biological differences they see as underpinning these roles.

Investigating the idea of headship leads to questions regarding women in leadership roles in any capacity. Dzubinski (2016) conducted semi-structured interviews with two American women in positions of leadership at missionary organizations to learn about their experiences. One participant was the president of an international mission college and the other served on the executive team of a church-planting organization. In hearing their stories and conducting a constant comparative analysis, she concluded that even agencies professing equality may have unspoken assumptions and stereotypes regarding

religion and gender. Navigating these stereotypes even when – or especially when – organizations do not believe they exist can be an extra stressor for women attempting to contribute to a cause.

If evangelical settings tend to have more favourable opinions of men in terms of leadership, one can assume this has a positive impact on men's wellbeing within evangelicalism. In researching benevolent sexism (the idea that women are weaker and therefore need to be protected and provided for by men), Horrell et al. (2019) surveyed 43 American men self-identifying as evangelical across a range of ages. Interestingly, after being statistically analysed using SPSS, results indicated that men may feel restricted by traditional gender roles in that they are unable to live out individual characteristics and potentials due to the expectations of roles placed on them, leading to lower eudaimonic (the researchers' term for self-actualizing) wellbeing. This did not mean there was no evidence of benevolent sexism, but it did suggest that paternal power may not equal fulfilment on a deeper level. It is worth noting that while much focus is on the effects of gender role ideology on women, the effects for men should not be assumed to be uniformly positive.

Additionally, while this research focuses on evangelical Christianity, it is not the only major world religion nor is it the only of these religions to specify different roles for genders. In their research with female Muslim STEM students, Kargarmoakhar and Ross (2019) say

> All the Muslim female students mentioned they chose CS (computer science) because they believed it is a more feminine field compared to other fields like electrical and mechanical engineering. They believed CS is a feminine field because it is an indoor job which does not require field work, and there is no need to work far from home. Though, in the US the femininity border is different and students believe math related fields are masculine. To conclude, we understand there is also feminine and masculine type of fields in Muslim majority countries as well as United States. However, the borders of femininity and masculinity are different for Muslim and non- Muslim female students (pp. 5-6).

This is particularly interesting as many American universities include computer science with other STEM subjects and, arguably, students at Christian universities relate to the subject as such. The distinction of a possible work from home job does not seem to appear in discussion made about 'appropriately'

gendered careers for women in Christian communities in the United States (see the work of Lidzy, 2005 and Tangenberg, 2013 in the next section). Computer science is based on logic and therefore in American Christian discourse is included as a more masculine gendered position (see page 29). This demonstrates how conservative religions may not all interpret appropriate work for genders in the same way.

Evangelicalism and Gender in Higher Education and STEM

These views of gender and roles are also important to examine within the evangelical university. In the Eliason et al. (2017) study of evangelical views of gender in American higher education, they argue for the differentiation of gender role beliefs and religious beliefs about gender. Through surveying 340 female students at an evangelical university, the researchers found that gender role beliefs and religious beliefs about gender are related but that gender role beliefs could be more culturally influenced in terms of outcomes than religiously influenced, specifically when viewing the topics of body shame, career aspirations, and sexism. Students who held to more traditional, hierarchical evangelical Christian gender roles demonstrated more negative affect than those who held a more egalitarian Christian view of gender roles.

In a study of how one religious educational institution handles the dynamic, Swartz (2018) found an American seminary representing a conservative evangelical section of a mainstream denomination to articulate both anti-feminist and egalitarian ideas in combination. In an ethnographic study of 33 students and five faculty members at the seminary, data suggested there was a sense of equality where religious aspects are concerned. For example, students were asked to use gender-inclusive language and did not question the spiritual leading of others. However, this does not transfer to identifying as a feminist. Those interviewed linked feminism with radicalism and saw it as politicized in ways they were not comfortable supporting. The combination of these ideas was concluded to be ‘a religious construction of women’s empowerment’ (pp. 9) which could transfer to other religious institutions.

The seminary study above reflected on the gender views of graduate students deep into their pursuit of academic and professional careers. Undergraduate students provide a different dynamic in their understanding of theology and roles. Many are still considering their future family and professional lives and are still developing their own worldviews. In a study of 15 participants at an evangelical university, students displayed a 'cognitive dissonance' in their views of gender roles in marriage, the church, and at work (Lidzy, 2005). While the surveyed students did not, in the view of the researcher, demonstrate ideas of gender roles in marriage or the church which had been influenced by feminism, they did believe men and women should be treated equally in the workplace. For example, the majority of women stated that the husband should be the 'spiritual' head of the family and 12 of the 15 participants said they had never attended a church with a woman in a preaching role. When speaking about work (implying work outside of the church), all participants said men and women should be treated equally and have equal roles. Lidzy does describe herself as an 'outsider' to this worldview and that must be noted. While the students may be able to hold views which seem incompatible to outsiders, the students themselves could feel their faith justifies the differences of beliefs in gender roles in the home, in the church, and in the workplace. Regardless, it would be naïve to presume to know how evangelical students feel about gender without further research and difficult to say that feminism has had no influence on those feelings.

In considering the mixed, perhaps even contradictory, messages women may receive as they study at conservative American religious campuses, Tangenberg (2013) suggests the importance of 'gender-sensitive' mentoring. Often experiencing a mix of complementarianism (the belief that men and women are biologically different and the emphasis of male headship in leading the home and marriage) and egalitarianism (the belief that men and women were created equal and are to submit to each other by allowing each to utilize their different strengths in the partnership), female students may feel both pressures to become the 'perfect' wife and mother and maintain high academic standards. While reviewing multiple options for structuring mentorship, Tangenberg lists recognizing the multiple cultural influences students may feel as well as the multiple aspects of the student's well-being in question. Outside of mentorship,

these same factors are important in hearing the voices of female students in these communities at large. There is no one, common experience, no one, common understanding of beliefs or belief systems.

In a longitudinal, qualitative study focusing on the narratives of four female students at a large American research university but who were involved in an evangelical university organization (Bryant, 2009), this diversity of thinking can be discerned. Bryant described this evangelical community as 'steeped in a complementarian gender ideology; that is, the culture embraced normative masculinity, essential gender differences, and separate roles and expectations for men and women with respect to leadership, modesty, and dating/marriage' (pp. 549). While each of the students interviewed interpreted their beliefs and involvement with the organization in different ways, the study concludes through narrative analysis that as women are able to express why they hold their beliefs and how those beliefs impact them, they are better able to make conscious choices and discuss the reality they would like.

A unique aspect to attending an evangelical university is the signing of something like a community covenant. This document lays out the behavioural expectations the university places on students and grounds for disciplinary action should a student exhibit a behaviour not in line with the university's stated beliefs. An example of one such covenant (not related to the university used in this research study) includes as part of inappropriate vices, 'sexual immorality, such as the use of pornography, pre-marital sex, and adultery' (LeTourneau University's Community Covenant, 2017). The goal of the covenant, which includes far more points than just that mentioned above, is stated as

> LeTourneau University's community leaders—trustees, administration, faculty, and staff—desire an academic faith community of people committed to Christian and biblical aspirations for human flourishing, marked by integrity, responsible freedom, and dynamic, Christ-like love; a place where the name of Jesus Christ is honored in all we do; a place where the Christian student can be nurtured in their faith; and a place where the non-Christian student and guest respect the Christian aspirations of this community while experiencing a safe and hospitable learning and living environment as a full community participant (pp. 4).

For those outside the evangelical community, this may seem invasive. But for those who are a part of this community, few of these points would be challenged, and many parents are actually relieved to see that their children will be held to such standards and accountable for the way their behaviour reflects upon the faith community. Does such a covenant lead to some students choosing not to attend such a university? In my experience, yes, but evangelical universities are unabashed in their desire to promote a lifestyle in line with a literal and conservative interpretation of the Bible. Having attended and then working at such a university, there are certain things which are assumed to be commonly accepted. As a psychology major, I was taught the difference between 'sex' and 'gender.' While it was not argued that interpretations of gender must reflect biological sex, there is an understanding within most of evangelical Christianity that this is the case. This understanding minimized discussion of the topic in most situations and classes.

Community covenants, such as the one mentioned here, and statements of faith are designed to as clearly as possible lay out the belief and behaviour expectations of the university. In most situations, those expectations for students and faculty and staff match. Universities may not require all students to be professing Christians, but they often require it of professing faculty and staff. The expectation is that if a student has a differing religious view, they respect the Christian viewpoint as well. Students who 'break' one of these rules will typically receive the same sort of disciplinary steps as any other broken university rule, beginning with discussions with staff. However, there is a stronger consequence for faculty and staff as they are seen as models of behaviour and, at some universities, even ministers. For employees at these universities, breaking the community covenant or rejecting an aspect of the statement of faith could result in the loss of employment. These standards of behaviour and morality will be reflected in some of the comments made by the professors interviewed when comparing their students to those at other universities.

Evangelicalism has become very closely related to conservative political interests within the United States. This has arguably contributed to a dichotomy

of religion and science. O'Brien and Noy (2020) studied this phenomenon saying, 'as right-leaning interests appealed to religious and traditional values, those on the left anchored their views to expert knowledge and scientific authority' (pp. 439). In their study, the researchers examined 30 waves of General Social Survey (GSS) data from 1973 to 2018. Comparing political identity with confidence in religion, science, both or neither, findings suggested a more politically divided country now than at any other period in the study. 'They (the findings) also indicate that the politicization of science and religion contributed to a belief that they provide not just alternative sources of cultural authority but opposing ones' (pp. 440). This cultural opposition of religion and science increases the tension for Christians seeking to understand how their faith interacts with scientific developments.

Within churches themselves, there are differing views of where authority lies when faith and science disagree. Chan and Ecklund (2016) conducted 77 interviews with members of two evangelical and two mainline American Protestant churches. They asked general questions about the interplay of faith and religion as well as questions about specific scientific (evolution) and religious (miracles) ideas. Analysis of the interviews suggests mainline Protestant churchgoers were more open to nonliteral readings of the Bible, leaving space for scientific developments and social interpretations of ideas. Evangelical churchgoers might also read the Bible in less literal ways but did not place as much authority in science. It is likely, based on my experience, that in a conservative evangelical setting, particularly a university, a more literal reading of the Bible would be encouraged. While Chan and Ecklund did not directly study this group, they do say 'research suggests that those with literal readings do not necessarily reject scientific authority, such as the scientific method, but may subsume it under their religious framework' (pp. 56). For example, there are those who believe the scientific method can be used to prove creationism (Toumey, 1994). This could outline how Christian college students studying science are able to negotiate what are considered in society to be opposing ideas.

Secular (Non-Christian) Views of Biological Gender Differences

While the previous sections focused on the evangelical Christian view that men and women are biologically different and this difference creates an inequality between the two, the viewpoint exists amongst secular (non-Christian) communities as well. The persistent gender gap within the sciences (see page 8) has given rise to a multitude of possible explanations, yet these explanations fall short of providing any useful path forward to shrink the gap. In studying 529 American students at a primarily low-socioeconomic status middle school, Hill et al. (2017) say 'if boys are seen as naturally or effortlessly brilliant, and science requires brilliance, then fixed mindsets about intelligence and essentialist mindsets about gender may lead to a science-gender bias favoring boys, and disfavoring girls (pp. 3)'. Even without a religious influence, there are those who view males as having a natural propensity towards math and sciences which could then lead to women being treated as less apt in these subjects. At the faculty level, Leslie et al. (2015) came to a similar conclusion. When surveying 1820 faculty members, postdoctoral fellows, and graduate students in 12 STEM disciplines and 18 social sciences/humanities disciplines, the researchers say, 'the more a field valued giftedness, the fewer the female Ph.Ds.' (pp. 262). As with the middle school students, academia is measuring those in STEM fields as having a higher level of intelligence and natural talents. These concepts are culturally constructed as more masculine, and this is demonstrated in fewer women holding the highest, terminal degrees in these subjects.

Carli et al. (2016) researched the prevalent gender stereotypes of scientists amongst undergraduate students. Participants envisioned successful scientists as having more personality traits in common with men than women (i.e. risk-taking and competitiveness), and fewer of the more negative traits associated with men (i.e. interested in things as opposed to people). Scientific fields with fewer women in them were least likely to be associated with feminine personality traits. The conclusion of the researchers was that changing the stereotypes of scientists could lead to an increase in diversity in the professions, and that perceptions of scientists will not change until this happens. It is interesting to consider if the best option is shifting stereotypes or rather working to eliminate them. No stereotype does justice to those working in a profession and it dilutes the contributions of the individuals themselves.

In another study, a single female student was interviewed as she moved through middle school (Carlone, Johnson & Scott, 2015). This student demonstrated a high aptitude and interest in science in her early years, then became ‘more concerned with figuring out what kind of girl to be’ as she got older (pp. 474). Seemingly, the pressures to conform to social ideas of femininity became more important to the student as time passed. The researchers also noted that the student was most interested in science when her female teacher also was. This points to the influence role models may place in the promotion of diversity in science.

On this topic, Steinke (2005) conducted a review of the portrayal of female scientists in movies. Believing these representations reflect the cultural and social norms that have been placed on women in science, twenty-three English language movies filmed between 1991 and 2001 and featuring female scientists in primary roles were reviewed using textual analysis. While admitting that the majority of films reinforce stereotypes of female scientists with some demonstrating the discrimination faced by women in the field, the author also says

> Portrayals of female scientists and engineers that show women as realistic professionals in prestigious positions may provide adolescent girls with positive role models, even when these portrayals emphasize their appearance and focus on romance. It is possible that portrayals of female scientists and engineers that show them as attractive and emphasize romance may be more memorable and salient role models that allow for better identification (pp. 53).

If the goal is simply to increase the numbers of women in science, perhaps this is a point worth considering. However, if women are to have a valued place in science and engineering, if they are to be seen as intelligent and capable workers, further objectifying them does not seem to be the best path. It is certainly important to consider the way women are portrayed in the media and the impact these portrayals have on young women. However, acquiescing to stereotypes could prove to limit women more than empower them.

Using data from a cross-sectional study of over 1300 Swiss secondary students, Makarova et al. (2019) investigated the intersection of gender stereotypes and career aspirations in STEM. The researchers found that women choosing to study STEM fields (specifically math, physics, or chemistry) at university viewed these

subjects as less masculine than those female students who chose to study other fields. Makarova et al. conclude 'masculine traits associated with science subjects at school constitute a major obstacle, particularly for young women's self-identification with science and for their aspirations to become researchers' (pp. 8-9). The findings here highlight the position of stereotypes in the decision-making process. Women who do not perceive hegemonic masculinity within STEM fields seem more likely to enter the fields than those women who do. The women's perception of how they will fit into the field – whether or not they suit the stereotype – is a key factor in even attempting the STEM subjects as majors.

One possible reason for women to be drawn to some scientific career paths rather than others is the diversity of coursework (Mann & DiPrete, 2013). Engineering programmes in the US tend to have rigid requirements which do not allow for elective choices. Female students are generally more apt to prefer courses in the humanities and social sciences which are difficult to fit into such a curriculum. Careers in medicine and law are professional pathways available to female science students which do allow for a variety of coursework. The conclusion presented by Mann and DiPrete is to alter coursework in engineering to follow the pattern of medicine with less specific training in undergraduate programmes and more concentrated engineering coursework in graduate school. This possibility is perhaps most interesting in that while it is framed as a solution for increasing the number of women in engineering, it would arguably benefit all students regardless of gender in providing a more diverse education.

Gender Differences as a Need to 'Fix' Women

While much of evangelicalism stresses the view of complementarianism in some form, other theories say a lack of equality is due to some issue within women themselves. Often the idea of gender equality is espoused (and that gender difference is socially constructed rather than innate), but the remedy for issues is for women to change. This could take the form of teaching self-esteem, altering their professional identity, trying harder to 'fit in' with their peers, or some other manner in which women are asked to be something other than what they are in order to advance themselves.

Looking specifically at women in science, Rhoton (2011) found that women tended to 'distance' themselves from what might be viewed as feminine practices. In interviewing thirty female science faculty members at an American university, the masculinity of STEM subjects surfaced. The women commented on putting off childbearing due to their careers and also discussed the gender-neutral and meritocratic nature of the STEM disciplines. This is summed up well when Rhoton says,

> By distancing themselves from women who perceive gendered barriers or who believe that they have been disadvantaged by gender discrimination, these respondents not only emphasize their difference from other women but also demonstrate their solidarity with the occupational culture. In doing so, they also deny the influence of gendered structural and cultural factors on women's success and focus on individual-level factors that shift responsibility for failure to individual women (pp. 712).

Here we can see this idea of a woman being blamed for holding herself back, with the answer being to change something about herself to find the success for which she is looking. Beddoes (2019) pointedly refers to this gender-neutrality as a 'myth'. In her study of American engineering professors, she found three key themes regarding the lack of gender diversity in engineering. Professors point to the small numbers of women in engineering and their own male gender as keeping them from understanding the diversity issue. They also believed differences in experience were about individuality, not gender. These thoughts point back to women themselves being the problem, not engineering as a whole.

In 2000, Faulkner conducted a grounded ethnographic study to investigate the gendered hierarchies and dualisms present in engineering. Under the assumption that the technical is culturally connected to a conception of the 'masculine' and the social more connected with the 'feminine', engineering arguably favours the technical style culturally associated with masculinity. This technical style prefers the abstract and objectivity whereas the feminine style favours more concrete interaction with the sciences. Faulkner describes the multiple tensions this creates, though, in that 'real' men and women do not fit so easily into these categories. In a follow-up study shadowing six engineers (Faulkner, 2007), this pressure on women in the engineering field was acutely evident. Termed 'gender inauthenticity' by Faulkner, women described their struggle to prove their worth as both engineers and women in differing aspects of their lives. Men working alongside them seemed to embrace their love of the technical aspects of their

job while the women felt less adept in the hands-on parts of their jobs and were considered to be more social beings. What is still unclear is how women in engineering might be ‘gender authentic’ while still being seen as capable engineers.

In an effort to better understand the identities of female engineers, Hatmaker (2013) interviewed 52 women working in the field in the United States. Through interactions with other employees, these women displayed a number of identity negotiation tactics. Some sought to ‘prove’ themselves, specifically their technical capabilities. Others attempted to project the image of an engineer by choosing to dress and appear in less feminine ways, including wearing less makeup and wearing trousers more often than skirts. Hatmaker suggests female engineers capitalize on the strengths of being a woman and apply it to the field rather than try to neutralize their gender. She understands that this could play into the ‘fix the women’ discourse, however, and concludes that ‘Women may find that they must work to demonstrate either that being a woman does not matter or that they are a competent professional, or both’ (pp. 394). This tension could explain the complex identities these women hold. Interestingly, other research has found that women in engineering are more likely to move into managerial positions and away from technical positions (Alegria, 2019; Cardador & Hill, 2018). While this may seem to be a promotion on one hand, it may be a search for an area of greater belonging with a taste of ‘leadership’ without leading in a technical manner.

One view on the development of professional identities is the role played by self-conceptions. In studying data from Massachusetts Institute of Technology (MIT) students, Cech (2015) concluded ‘if individuals do not recognize commonality between the characteristics in their professional identities and the identity traits valued by fellow students, professors, colleagues, or bosses, they may feel isolated or marginalized’ (pp. 70). Seeing a prevalence of masculinity in the form of leadership, technical prowess, and sheer numbers, women in engineering may feel that they do not fit in with the profession. This might not be seen as an issue with the woman herself except for the presence of the self-

conception aspect in the study. The seeming implication is that if the female engineer had a different – or better – self-concept, then there would not be an inequality problem.

Myers, Gallaher, and McCarragher (2019) prefer the term 'STEMinism' to describe the sort of feminism displayed specifically within STEM subjects. This thinking focuses on the individual, asking each woman to fix, or change, herself in order to better fit into the current STEM culture rather than look at larger, systemic issues. The idea of 'STEMinism' also applies to the 'pink-washing' of science used to recruit young girls. Rather than science itself appealing to girls, it is dressed up in a suitable amount of cuteness further encouraging young women to see their identity in such terms. Yet somehow the presence of even a few women in STEM and young girls showing interest in any sort of science, for those following this logic, means there is equity in the field. 'As a result, STEMinism promotes empowerment without a power analysis' (pp. 657). This 'pink-washing' might be most clearly seen in the popular children's block toy which created a new brand to specifically attract girls. The toys are labelled 'Friends' with 'feminine' themes like gardens and hair salons largely created in pink and purple blocks. It is unclear why the toy company would believe girls would not want to play with primary-coloured blocks as they believe boys prefer. This points towards a need to de-gender children's toys, a concept highlighted by Francis (2010) in her study of the role of toys in the production of social identities. There should be no need for gender roles to be imposed on children through their toys as they are creatively learning and growing. Having said this, it is important to note that change cannot happen only at the child level. While this is key, there must continue to be work in gender equity at an adult level to provide role models and create a sense of belonging particularly in the STEM disciplines.

Seron et al. (2018) specifically investigate this idea in engineering education, saying 'in its commitment to empirical science, technical thinking, merit, and individualism, engineering culture allocates what it sees as political issues, such as gender equality, to the realm of the social and subjective, therefore, off limits' (pp. 137). This could help explain the reluctance of women in engineering

to identify with a term such as feminism and the political connotations it brings with it. Likewise, it speaks to the second-class status of all things social and subjective, the very specializations women tend to occupy within the field. In their study of female engineering students at four American universities, the researchers reviewed student diaries to find several themes already discussed regarding the reluctance to seek preferential treatment through identifying with feminism. The students also display a tension between seeing their identities at times as based on biology and at other times based on social construction. Even interventions focusing on women can lead to their further marginalization by implying a need for special assistance in STEM (Diekman et al., 2019). This thought is evidenced in 'describing personal solutions to what may call for collective solutions' (Seron et al., 2018, pp. 146). This could be the best picture of women seeking to fix themselves to fit into the dominant culture rather than seeing the culture as in need of fixing. While the word 'feminism' may be politically charged, at its base, it is seeking a collective solution so that these female students would not feel compelled to find a personal one.

In following groups of students from four engineering schools, Seron et al. (2016) supported this idea that students must feel a sense of belonging to persist in their educational programme. By reviewing student's entry into the culture of engineering, initiation into the programme through classwork and projects, and experiences with internships, the researchers concluded that male students receive affirmation and encouragement in belonging to the engineering culture. However, female students 'confront obstacles and innuendos that leave them questioning whether engineering is the right field for them' (pp. 207). Once a student begins to question her belonging, it becomes that much easier to suggest a poor fit and something perhaps more appropriate – read feminine – for her. A lack of confidence can be seen as weakness in a masculine culture, so the options are fixing the confidence problem or leaving the programme.

Even in terms of leaving engineering – or failing to persist, as it may be called – gender differences are evident. Fouad et al. (2020) investigated these differences by surveying engineering alumni from thirty American universities. Results demonstrated women were more likely than men to leave the field 'for

reasons associated with comfort and status' (pp. 455). Female participants mentioned time with family and lack of opportunities for advancement when asked for reasons for leaving and not liking the culture as a reason for never entering employment in the field. This does not mean that men do not leave engineering, rather they were more likely to leave for reasons surrounding achievement. It is possible to interpret this difference in reasoning as weakness on the part of women. If they were more invested in the industry, more devoted to engineering, they perhaps would not leave for reasons such as family. However, this type of response could also shine light on an enduring patriarchy within the field which prefers individual achievement to family and culture concerns.

A variety of perspectives can also be found amongst those who work in higher education. In their study interviewing thirty male STEM faculty, Sattari and Sandefur (2019) summarize their findings by saying,

> The majority of our participants revealed gender-blind perspectives and argued that the egalitarian structure of academia does not allow gender to impact attainments in STEM in any significant way. However, a considerable number of them felt privileged compared to women and described subtle ways in which gender shapes opportunities (pp. 158).

These findings show the range of understanding amongst the male professors in terms of gender (in)equity in the STEM subjects. While some believed the programmes were equally difficult for all, others were able to acknowledge the extra difficulties faced by their female counterparts. Fewer were able to name those added difficulties in terms of their own privilege. The authors go on to say belief in meritocracy and institutional policies regarding gender can make the issue seem irrelevant in higher education. However, Jensen and Deemer (2019) relate how even subtle stereotyped behaviour from professors to female students lead them to feeling hostility in their academic environment. With a majority of professors in engineering programmes being male, the attitudes of any given professor could create a more or less equitable environment for female students and a more or less gender-neutral setting.

Gender Differences as a Need to Fix the System

Having discussed complementarian views of gender, and the ‘gender blind’ view leading to the need to fix women, a final viewpoint to acknowledge is that gender inequity demonstrates a need to fix the system. On a large scale, this references hegemonic masculinity in all its forms (see chapter 3 for a discussion of the concept of hegemonic masculinity). In this specific research, the focus is on the system of the university department.

Francis (2000) describes the choice of course in terms of dualism. She outlines a feminist poststructuralist perspective that sees a hierarchy in the studies themselves, of the sciences constructed as driven by rationality, seen as having a higher status and perhaps more difficult than the arts which are constructed as driven by emotion. These traits are socially constructed to represent the rationality and higher status of the ‘masculine’ over the ostensibly greater emotion of the ‘feminine’. In 2017, Francis specifically studied the conceptions surrounding physics and engineering, finding narratives which describe the gendering of the subjects and the view that the difficulty of the coursework lends itself to the masculine. Cleverness, or intellect, has been socially constructed to be more masculine in nature. Therefore, courses that are more difficult, which require one to be more clever, are constructed as masculine. This dualism is reflected in the evangelical complementarian view that genders are biologically different but work together. Courses are viewed as gendered, but this is not necessarily a problem for them.

The correlation between masculinity and the objectivity and rationality (or cleverness as Francis says) of science is not new (Keller, 1982). Indeed, the depiction of the Kantian male can be seen as the polar opposite of the emotional, subjective female. ‘The assumption that Western civilisation simply does regard woman as part of nature, not culture, and that this belief can essentially be taken for granted runs through much of the literature on women from Simone de Beauvoir onwards’ (Tomaselli, 1985). This nature vs. culture debate is seen in Gilligan (1982) as she sought to contrast this idea of the ‘educated man thinking for himself’ (pp. 211) with the relationship-orientation of women. In the heavily masculine field of engineering, it seems plausible that women may feel a need to demonstrate more masculine traits in order to be competitive on the job. Women are seen as something ‘other’ than men.

On the surface, believing the presence of more women in the workplace will combat the gendered stereotypes in male-dominated professions such as engineering sounds like a feminist goal. But identifying with feminism is in fact an unlikely prospect for many of these women. As Zucker (2004) discusses when studying female students at an American public university, women who have not studied feminism or experienced it in personal relationships are more likely to see it as associated with extremism and less likely to claim a feminist identity. This is known as the 'I'm not a feminist, but…' phenomenon. Women may feel strongly about equality within the workplace and support equal pay, but they are less comfortable openly identifying with a worldview favouring females. These impressions may be largely based on media-representations and stereotypes of their own, but they represent an impasse in social identity construction. The phenomenon may still reflect a fear of the appearance of special treatment. However, recognizing the need for equality within an occupation is still a step forward from believing the lack of representation is due to women not being 'enough' for the role.

In a more recent study, Zucker and Bay-Cheng (2010) suggested the terms 'feminist-minded' and 'feminist-identified' to explain the 'I'm not a feminist, but…' phenomenon. By surveying 276 female undergraduate students, the researchers note that those students who do not want to be labelled feminist may still hold to ideas of equality due to the more widespread beliefs about equality generally permeating American culture.

> Younger American women who were raised in the midst of a dominant neoliberal discourse may be more ideologically distinct from feminists (i.e. they arrive at support for gender equality because of their belief in competition and meritocracy) than older non-labelers who were not steeped in the same anticollectivist sentiment during their youth (pp. 1916).

This observation is particularly interesting in that it not only notes a difference in thinking due to age, but it also brings in a political/ideological component. In some literature (Leaper & Arias, 2011), the belief of equality within the workplace, such as pay, is seen as a symbol of feminist belief. Here, Zucker and Bay-Cheng suggest these beliefs may in fact be a result of pervasive neoliberal

thought. Particularly within American universities, where neoliberalism is the guiding force, female students, again particularly those within an already deeply meritocratic field such as engineering, may profess beliefs based more on American ideas of competition than the equal rights movement.

In viewing the ways in which female students relate to university culture, a sense of belonging is important as one enters the setting. Heron (2020) speaks to the importance of friendships by saying 'having friends is a significant aspect of feeling happy at university, and through happiness, confidence grows in a belief in an ability to learn and in a sense of belonging' (pp. 402). For Heron, happiness leads to confidence which leads to belonging. Establishing this belonging is one way in which the university system can be changed to positively impact feelings of gender inequity.

In a study of first-year engineering students at an American university, Pearson, Godwin, and Kirn (2018) found that female students beginning their study in engineering felt that they belonged, but they did so at significantly lower levels than male students. This is an interesting perspective as the data from the female students could be used to support the idea that women are comfortable in engineering if the statistics relating to the male students are not mentioned. While the authors choose to see a positive in engineering students beginning their studies feeling they belong, the authors also admit that a sense of belonging so early in a university career could apply to the engineering programme and/or the university experience as a whole. This encourages the need for further research. Female students have also been found to ask fewer questions in the classroom setting when taking STEM courses. 'Students who feel isolated are less likely to feel comfortable participating actively in class discussions. They may feel intimidated asking or answering questions and feel concerned about "looking dumb"' (Sankar, Gilmartin & Sobel, 2015, pp. 8). This could indirectly demonstrate a lack of belonging and potentially demonstrates a discomfort within the classroom setting. In a similar way, Tellhed et al.'s (2017) findings demonstrated that women have lower self-efficacy in STEM careers. This sense of self-efficacy could be linked to belonging, with a lack of one leading to a lack of both.

While peer-to-peer experiences play a large role in the feelings students have of belonging at university, their experiences with professors are also important. Positive relationships with professors contribute to student feelings of belonging in their university experience (Freeman et al., 2007; Ingraham et al., 2018). Along with availability outside the classroom, professors' academic care and pedagogy also contribute to a student's sense of belonging in the field and in the classroom (Tinto, 1997; Zumbrunn et al., 2014; Buskirk-Cohen & Plants, 2019). Students interact with professors on a daily basis, and there is a sense in which professors hold the power to the student's future career. In fact, that 'academic power and intellectual prestige' are a type of cultural capital which can often encourage a hierarchical separation between students and professors (Wacquant, 1990). Having a positive relationship with a professor would increase a student's sense that she not only belongs in her major, but that she has hope to belong in her future career as well.

Through analysing student interview data from a longitudinal assessment at a west coast American public university, Guzzardo et al. (2021) studied the importance of faculty in the student experience. They say

> Faculty can play a significant role in counterbalancing structural inequities and contextual challenges by building relationships with students, engaging them in learning, and serving as a conduit to helpful campus resources (pp. 43).

Here, the authors assume structural inequities. They are not researching whether or not such inequities exist. In fact, one of the themes they found in the course of their study was the trait of being inclusive in the classroom. This inclusivity and respect encouraged positive relationships with students. Ceci at al. (2011) include a word of caution regarding the relationships between faculty and students. They note that for female professors, the request to be used as representation on committees and the expectations of involvement with female students could create an unequal expectation of out of classroom commitments between male and female faculty members. For women in engineering, as a minority, an inclusive mindset held by a professor could create the sense of

belonging needed to persist in the coursework as long as this does not create further inequity for the female engineering professors.

Unlike the complementarian view of women or the gender neutral need to fix women, the view of gender inequity as a need to fix the system does not place blame on women for the disparity they experience. This view looks at the larger picture, at the systems put in place, and seeks to find ways to adjust current practices. When looking at the university environment, this means policies and practices may change which will not only benefit female students but could provide a more inclusive and supportive setting for all students.

Gender and Fundraising in American Higher Education

Having discussed three views on gender disparity in STEM, the obvious response is to ask why a university should be concerned. In the neoliberal world of higher education in America, finances are a top concern for university presidents and boards of trustees. Private universities, like the evangelical university researched in this study, rely on fundraising to support the mission – indeed to support the operating budget – of the institution. Where public universities receive state and federal dollars for support, oftentimes the only federal support received by private institutions are the loan dollars awarded to their students. Dollars raised from alumni are considered a sign of the health and productivity of the university, and this giving rate is used to rank university standing. *U.S. News and World Reports* says of their rankings 'The percentage of alumni giving serves as a proxy for how satisfied students are with the school. A higher average alumni giving rate scores better than a lower rate in the ranking model' (Morse & Brooks, 2020). In 2019, private universities reported a nearly five percent drop in alumni giving to their annual, or main, fundraising fund (Blackbaud, 2019). This demonstrates the importance of maintaining active alumni who are willing and able to support their alma mater financially.

There has been a recent movement within the university advancement world to move away from the pre-eminence of the alumni participation (giving) rate and

towards a focus on overall alumni affinity (Cooke Smith & Kaplan, 2021). The Council for Advancement and Support of Education (CASE) is a leader in researching the alumni relations and development realms of university life. In their Alumni Engagement Metrics Key Findings regarding a 2020 worldwide survey, CASE defined alumni affinity as having four distinct components: philanthropy, volunteerism, experiential engagement, and communication. It is true that alumni giving is an important part of a university's financial state, but it is also true that alumni can and will be involved in a variety of ways. Often those other forms of affinity are seen as steps towards increased financial giving. In this survey, institutions were broken down by geographical region, institution type, and whether the school is public or private. Private universities had higher rates of all modes of engagement. For the university utilized in this research, that means the goal and expectation would be higher rates of alumni engagement than their public counterparts, including within engineering alumni. An interesting additional note is that this survey was conducted during the worldwide COVID-19 pandemic. Typical experiential forms of engagement, such as attending homecoming events and reunions, were often cancelled for health and safety reasons. This brought about a renewed appreciation for developing a robust alumni communication plan and enhanced virtual engagement opportunities. The ways in which alumni can stay connected with their alma mater are as important now as they have ever been.

Gender and Giving

Before looking specifically at giving patterns according to gender, it is important to note the gender formation of fundraising itself. Traditionally a male field, women became increasingly part of the fundraising workplace in the United States by the 1990s (Dale, 2017). While more and more women are hired by non-profit development and advancement offices, they still make less money than their male counterparts and hold lower positions. 'Therefore, the day-to-day work of fundraisers and its similarity to stereotypically female work place women at a systematic disadvantage in the profession and enable men to maintain a disproportionate share of the most financially lucrative and executive-level positions' (pp.7). Here, Dale notes the traits of successful

fundraisers – good communication, compassion, relationship-building – which are often socially constructed as ‘female’ traits. These same strengths which might lead more women to the profession may also keep them in the subordinate positions within the office and organization. Being aware of the gender power dynamics within a university advancement or development office is a first step to considering the gender dynamics at work within alumni relations and giving.

When discussing fundraising and giving, gender behaviour is not consistent. ‘With increasing incomes, educational attainment, and control over wealth, women have never had so much control over philanthropic resources. Further, in both the U.S. and around the world, there has been a growing interest in investing in the rights and well-being of women and girls’ (Mesch et al., 2015). In their literature review of topics surrounding women in philanthropy, Mesch et al. acknowledged the inconsistencies arising from current research. However, their key findings include that single women are more likely to give than single men and a majority of married couples decide jointly how to give. This does seem to provide evidence of the increasing power of women in financially contributing to causes.

As women demonstrate more influence in giving, they also demonstrate a difference in where they give when compared to men. While men are more likely to give to sports and recreation, women are more likely to give in every other sector, including education (O’Connor et al., 2018). In describing the giving of high-net-worth female donors, ‘the general sense is that each donor has a unique experience aligning her philanthropy with her personal values’ (O’Connor et al., 2018, pp. 12). This sense of values reflects on the importance given to donations and organizations. The women polled do not give randomly but rather research and educate themselves on their options. This seems to indicate that as women gain influence in philanthropy, organizations must be prepared to demonstrate their need to women.

Giving and Evangelicalism

It may seem to be common knowledge that there is an aspect of financial giving included in practicing Christianity, often called tithing. Interestingly, Robert Wuthnow (2004) chooses to frame religious giving in terms of a social transaction in charting the history of what is known as 'Christian charity'. In doing so, he also links this charity to the formations of a broader society. He says,

> charitable giving has always been embedded in civil society— in institutions that forged relationships between givers and recipients, that guided individual behavior through the application of cultural norms and social pressure, and that encouraged people to give on the basis of social expectations, respect, honor, compliance, and recognition (pp. 8).

Using this lens, he concludes that more conservative Christian views encourage larger amounts in giving, being raised in a Christian household encourages more giving, and viewing religion as a private practice discourages giving. Wuthnow draws a clear line between religious practice and society, both influencing each other.

Like Wuthnow, Mundey, Davidson, and Herzog (2011) see a social dynamic in church giving. In fact, they see churches themselves as having distinct cultures based on their individual religious traditions, members, and congregational characteristics. They then see church giving as a way of sustaining their social group. While this social view of church might downplay the importance of faith to believers, it does still accurately describe the social atmosphere within congregations and the outsider's perspective of church functioning. In viewing giving within an evangelical church culture, it is seen as 'as an act of worship in which God is given back that which is rightfully His in the first place' (pp. 322). It is important to see that within evangelical culture, the money of an individual is ultimately seen as God's.

Vaidyanathan and Snell (2011) also looked at the differences within Christian denominations in their study, finding that evangelical Protestant Christians seemed to give more financially than mainline Protestants or Catholics. They echo Wuthnow on the impact of religious upbringing in learning to give and make this observation 'normative giving for EP (Evangelical Protestant) members entailed explicit religious or spiritual motivations, often with the implication that they would be letting God down if they did not give' (pp. 208). A distinction

is made where evangelicals are directly relating their financial giving to their relationship with God. It is personal.

Understanding this personal relationship and the idea that all money is God's to begin with is important to understanding how evangelicals would also choose to give to something like an educational institution. For alumni, it is not merely a question of giving back to their alma mater where they have happy memories. Rather, it is another way in which to give back to God, to continue His work, and to help educate others in their faith. The mission of the university is more than education, and that is what university fundraisers hope to tap into through their campaigns.

Giving in STEM

When investigating giving specifically to STEM subjects, it is important to remember that STEM covers science, technology, engineering, and mathematics. This means that giving to medical research and giving to engineering programmes are grouped together. Historically, philanthropic foundations used grants to promote the sciences. Between the two World Wars, these grants were used in an institution-building capacity to create American research hubs which could rival the older institutions of Europe (Kohler, 1985). Following World War II, many foundations began awarding grants to individuals instead of institutions. This is a practice still followed today by entities such as the National Science Foundation. This means that the grant also follows the recipient, not the institution. For Kohler, this dynamic was essentially changing the study of science. 'Science is an inherently communal activity, and its vitality depends upon an intensely interactive community' (pp. 13). Not only did he consider scientific research a community, but he praises the early use of funding in community development on a larger scale. I note this because Christians who do study science, and specifically those who choose engineering, often state the decision was based on wanting to help others and their communities. Kohler's comments are not religious in nature, but they do share the sentiment of science having a purpose for the greater good.

As stated above, the nature of philanthropy and science has changed over past generations. Even at the time Kohler was writing, much funding was done by private foundations of old family money or federal and state funding. Now, we see a new landscape of giving, influenced by a neoliberal view of higher education and science. Higher education has moved from a home of civil and civic discourse to another arm of the capitalist market economy, turning a university education into a monetary transaction and viewing education as a commodity to be leveraged (Giroux, 2002, 2009).

As such, 'science's modern-day patrons play a unique, significant, and underappreciated role in US scientific competitiveness' (Murray, 2013). Those who choose to donate to scientific research are able to set priorities for scientists. This means that government priorities may not always match the research taking place at top universities. In addition, those donors giving large gifts to STEM tend to be entrepreneurs (Nwakpuda, 2020). These are people who have made their money in business and are now investing it in further research and development. They set the tone for what will be done with what can amount to hundreds of millions of dollars. This same research (Nwakpuda, 2020) also seems to show that rural institutions are less likely to receive gifts than urban institutions. This could be due to the large concentration of entrepreneurs in urban settings. Donating to institutions far from your own location does not give a donor the satisfaction of seeing progress the way giving at home does. Thus, philanthropic dollars tend to be concentrated near metropolitan areas and at major research facilities.

Thinking specifically of how this relates to average universities, those not considered top tier research schools, many academic faculties are now moving into the field of fundraising for their own department. A study of multiple chairs and heads of departments at public research institutions found that these professors were often already in communication with their own alumni and were ready to participate in fundraising if trained and given time to do so (Gearhart et al., 2018). Within STEM university departments, there is a growing movement to

utilize advisory boards, often containing alumni, to help develop their departments financially (Buchanan et al., 2010). Part of competing for students in these subjects is maintaining state-of-the-art programming and equipment. Advisory boards made up of industry professionals know the cutting-edge procedures necessary for this. As a result, department faculty are finding themselves moving more into the world of university advancement by fundraising directly from their own contacts.

A 2010 survey of salaries for engineers shows a median salary of $87,000 (National Science Foundation). This creates a fundraising base with more to offer than that of other programmes, namely liberal arts programmes, within any university offering these programmes. There is a noted difference between men and women in the field with the median salary for women being just $75,000 compared to the male median of $89,000. While this goes to support the previously stated gender disparity within the field of engineering, in terms of fundraising, it still creates a female alumni population with a significant income. Fundraising from these alumni is now an area of focus.

Alumni Giving

Universities rely on the support of their alumni to continue their mission. While alumni may or may not be the major donors to the school, they represent the 'product' of the university and serve as examples of what the university has to offer. This demonstrates the importance of the university experience. As Drezner (2017) says 'relationships and organizational identity are based on experiences. Each alumnus or alumna experiences college differently' (pp. 185). In the case of my research, the experience regarding the mission of an evangelical university is vastly different from that of a secular institution, but also the experience of the female engineer is vastly different from the experience of a female with another major within the institution. Listening to those experiences is critical to understanding the future of these students as alumni.

For those working in university advancement, learning from these unique experiences transitions into learning how to address experiences to better cultivate alumni donors. Giving has increased as universities respond to and engage donors and alumni according to their social identities (Drezner, 2018). On a practical level, this means departments will adjust their communications and solicitations according to the identity of their target. For engineering alumni, this includes recognizing and cultivating the differing identities of the alumni. A male alumnus would not be communicated with in the same way as a female alumna from the same programme. To some degree, this is stereotyping based on gender. For example, male alumni might receive information concerning career opportunities, and female alumni might receive information about community service initiatives. Assuming all engineering alumni respond in the same manner to the same message is a thing of the past.

In a recent study focusing on young alumni giving, the Schuler Education Foundation joined forces with Ruffalo Noel Levitz and five private liberal arts colleges to survey more than 7,000 alumni over the course of three years. One of the key findings from this research involves the authenticity of student connections.

> Alumni who reported higher rates of student satisfaction and a good sense of current connection were four times more likely to volunteer or make philanthropic contributions to their alma mater. The research confirms what we have anecdotally known: stronger giving rates require stronger student experiences and post-graduation connection. Building life-long relationships starts with the student experience, which means all campus stakeholders must be invested in the mission of positive student engagement. The responsibility of improving alumni support cannot rest solely on the shoulders of annual giving, alumni relations, stewardship, or advancement teams. It involves a true campus-wide effort (The Schuler Education Foundation & Ruffalo Noel Levitz, 2021, pp. 7).

While this research was specifically conducted at liberal arts institutions, it still serves to confirm the necessity of acknowledging the experiences of students in any programme and how those experiences impact their future relationship with the university. Another key finding of this research was the preference of alumni to support current students. ‘In 2021, nearly 70 percent reported giving out of a desire to make a difference in the lives of current students’ (pp. 8). Young alumni like to see their donations of time and money having a positive influence

on students following their same paths. It would surely be hoped, in the case of female engineering students, that alumni would encourage more women to select and remain in the programme they themselves chose.

Conclusion

Listening to the lived experiences of female engineering students at an American, evangelical university necessitates an awareness of the complex relationships between religion, science, and gender. Evangelical Christianity tends to take a complementarian view of gender, believing men and women are inherently different and those differences are meant to complement each other. There is tension between Christianity and science within America, particularly within American politics, often seeing the two as antagonistic.

There has been much research surrounding the minority status of women in engineering, pointing to a need to 'fix' women. This research ranges from the propensity of women to focus their studies on areas of engineering which are more relational and nurturing, considered to more feminine, to an unspoken encouragement to behave in less feminine ways in order to fit in with the masculine majority. Women may fail to persist in their engineering programmes and express more concern with work/life balance upon graduation. Women who do pursue careers in engineering earn lower salaries than men and are more likely to take positions in management which are less technical. It is no surprise then that there are fewer female engineering students than male students and fewer female professors in these programmes.

An alternative viewpoint is that differences in gender equity ought to be fixed at a systems level. In the university setting, it means uncovering hegemonic masculinity within universities and specifically the engineering department. Even attempts to draw more women into STEM have led to the 'pink-washing' of the subjects. They are made to appear more attractive to girls by including more traditionally feminine trappings, such as the colour pink. Ideas for fixing the

system include supporting student belonging through peer-to-peer relationships as well as positive relationships with professors.

The experiences of students ought always to be important to university administration, but, in the current neoliberal climate, they are even more important to the university financial bottom line. As focus turns from academics to the financial, private universities rely on fundraising to fill gaps in their fiscal plan and alumni are their best source of donations. The better the experience a student has, the more likely she or he is to stay connected after graduation, the better the opportunity for said student to give back financially to their alma mater. As engineering alumni typically have higher salaries than many other majors, these students are primed for donations. Therefore, it behoves universities to create the best experience possible for these students.

Chapter 3: Theoretical Framework and Methodology

In this chapter, I will discuss social constructionism and Connell's theory of gender regimes and the gender order as the theoretical framework of this study. I will also layout my research paradigm and methodology in conducting the study, including participant selection and methods used. Then I will move into the credibility of the research, ethical considerations, and my reflexive position as the researcher. I'll close the chapter with the data analysis methods used.

'Gender is, above all, a pattern of social relations in which the positions of women and men are defined, the cultural meanings of being a man and a woman are negotiated, and their trajectories through life are mapped out' (Connell, 2006, pp. 839). I have approached the concepts of gender, religion, and STEM education from a social constructionist perspective. Believing that gender is understood based on cultural ideas, sometimes very localized cultural ideas, integrates well with evangelicalism as a localized form of Christianity. Views might be different in another religious tradition or in an evangelical belief system outside of the United States. In terms of theory, the work of Raewyn Connell on gender regimes provides a flexible framework to explore the intersection of gender and religion within the institution of higher education from a social constructionist perspective.

Theoretical Framework

In this section I will briefly outline the social constructionist perspective I am utilising, before going on to specifically outline the social construction of gender, and the work of Connell in particular.

Social Constructionism

In choosing to pursue a social constructionist standpoint, it is important to note that the construction of identities is inclusive of more than just gender. These women are influenced by social and cultural ideas in identifying as students, as future engineers, and as Christians, just to name a few. By attending a small,

selective university, they are choosing to identify with a certain set of ideas which build into whom they are becoming, or perhaps whom they want others to see them as.

Berger and Luckmann (1966) describe the social construction of knowledge in their own work. 'I encounter knowledge in everyday life as socially distributed, that is, as possessed differently by different individuals and types of individuals, I do not share my knowledge equally with my fellowmen, and there may be some knowledge that I share with no one' (pp. 60). Critical here is the understanding that different groups of people, even different individuals, can and will 'know' different elements of reality based on their constructions of reality. Individuals are socialized into groups and institutions by playing then internalizing the roles modelled by significant others. Identities are formed through this process and therefore based on the social structures and social relations individuals have around them. Lorber (1994) says 'in social interaction throughout their lives, individuals learn what is expected, see what is expected, act and react in expected ways, and thus simultaneously construct and maintain the gender order' (pp. 60.) Therefore, those who have been socialized by different groups or in different environments will have different knowledge and identities based on the norms and roles they have experienced. Budgeon (2014) defines an integrated social constructionist approach as focusing on the key dimensions of 'the production of gendered selves, the cultural expectations regarding the performance of "proper" gender identities which shape everyday interactions and the structure of institutional domains that form the backdrop for changes to gender identities and norms' (pp. 319).

While the bulk of this research is aimed at studying the construction of gender within the evangelical higher education setting, it is important to note that both science and religion can be viewed as socially constructed. Pinch and Bijker (1984) sought to bring technology into the socially constructed fold of science by taking elements of the Empirical Programme of Relativism (EPOR) to form their Social Construction of Technology (SCOT). EPOR highlights the 'interpretive flexibility of scientific findings'. For SCOT, those social groups which determine problems to be corrected and contribute to the testing and refining of the

technology to solve the problems are proof of the social construction of that technology. Certain socioeconomic groups (often middle and upper classes) benefit from a specific technology, and those same socioeconomic groups are the ones to have a voice in the process.

Klein and Kleinman (2002) critique SCOT for missing the power differential in the development of technology. Which groups are able to contribute, and which voices are heard to define problems needing resolution are key aspects in the social construction of technology. For the students in this research, their engineering studies are influencing the construction of their understanding of engineering. They are already speaking of bringing clean water to communities, creating affordable housing, and working for the department of defence. Each of these goals is created from a specific group defining a problem – in some cases on behalf of another group – and then defining the solution. While the best of intentions may be involved, the power dynamics of these students learning to help others, or fix problems for other groups, cannot be dismissed. The students, perhaps through the encouragement of their professors, are identifying the needs of others, often of a lower socioeconomic status, and deciding how best to help those facing the need. They demonstrate a cultural capital, or knowledge of appropriate social practices (Bourdieu, 2011), that those they seek to 'help' do not possess.

Likewise, the concept of religion can be viewed as an object of social construction. Schilbrack (2012) tackles this idea by stating that the concept of religion arose in opposition to the secular. Religion and culture are distinguishable from each other, but closely entwined. In the case of an evangelical university, there are religious beliefs with which all students profess agreement when they begin their studies. There is also, though, a distinct Christian evangelical culture which is not directly related to theology, but which defines much behaviour. This culture (dressing modestly, listening to Christian music, reading the latest Bible study books, and even supporting conservative politics) is often how evangelicals are viewed in America, so one can see the complexity in separating the religious beliefs from the religious accoutrements. It may be important to note here that the 'modesty' referred to in much of

evangelical Christian culture is aimed specifically at women and specifically to how they dress. Clothes which are too tight, too low cut, or too high cut are thought to reveal the female body in a way which would be sexually tempting to men. Therefore, women should choose clothing which would not tempt the men around them to sin through impure thoughts. Because the onus here is on women, they are held spiritually accountable in ways men are not.

In the same vein, Bell (2006) describes Christianity as the prototype for what a religion looks like based on its world dominance through the colonization process. She describes 'world religions' as the common way for Americans to view spiritual beliefs around the globe, forcing them all to fit the Christian prototype and attempting to set them up as equals in the way they practice their beliefs. Many who practice 'religions' would not describe them as such if it were not for the Christian terminology which has spread around the globe. While Christians often use the term 'worldview' to describe interpretations of the reality around them, others might consider those interpretations to be a matter of culture. For most, this is simply their life, not some distinct theology or philosophy. Bell also notes that as the Enlightenment took hold in western thought during the 17th and 18th centuries, religion came to be seen as 'what science was not' (pp. 33). For engineering students at a Christian university, this adds another dimension of working out personal faith in the midst of a science viewed as secular. Students work within this tension of cultural opposition while professing interest in both.

Social Construction of Gender

Having said that, the social construction of gender is at the heart of this research. 'That gendered behavior is to some extent socially constructed is irrefutable, given that these behaviors, and those assigned appropriate to one gender or the other, vary between cultures and historic periods' (Francis, 2006, pp. 11). As Francis is saying here, the idea of what gender is and how people of different gender identities may behave is an aspect of societal behaviour surrounding an individual. This is specifically evident in the work of Raewyn Connell who talked about the various pieces of family and gender as parts of a

whole. ‘That whole is a social structure, not a biological one. It is, among other things, a structure of power, inequality and oppression; a structure of great scope, complexity, and consequence in our affairs as well as those of tribal and ancient societies’ (1985, pp. 260). The way in which gender is expressed and interpreted has not only changed over time but also varies between and within communities.

There were several paths that could have been taken in this research in regards to a framework. Intersectionality theory is highly relevant when considering how both gender and religion factor into these students’ concepts of identity (Crenshaw, 1989; Hill Collins, 1990). An evangelical feminist framework could also be used to explain the inherent differences between gender which are held to by most evangelicals but the desire for equality, particularly in the workplace, of many women (Cochran, 2005). In the end, I felt that neither of these provided the flexibility and explanatory power of Connell’s social constructionist approach to gender. Connell’s understanding of the plurality of masculinities makes space for a consideration of the dominant masculinity within STEM subjects which may present itself differently from the dominant masculinity in other areas of society. There is also flexibility in the understanding of gender regimes which can vary across locations. This works well with my thinking regarding the different environments and experiences created within individual universities, and within different types of universities. The theory also lays a groundwork of four dimensions to the assessment of these gender regimes which became helpful in a very practical way in analysing data. Overall, choosing Connell as my theoretical framework opens this research to understanding that there is a range of ways gender can be interpreted and enacted within institutions and this range was borne out in the findings.

Central to Connell’s theories on this social construction is the idea of hegemonic masculinity. However, as Connell and Messerschmidt (2005) note, ‘gender is always relational, and patterns of masculinity are socially defined in contradistinction from some model (whether real or imaginary) of femininity’ (pp. 848). The concept of masculine work does not exist without the presence of

its opposite, feminine work. Budgeon (2014) speaks to the tension between expressed femininities and hegemonic masculinity when she says

> Interrogating power dynamics associated with these complications involves examining the positioning of femininities in relation to hegemonic masculinity and the workings of internal processes within the category of femininity which devalue and marginalize specific kinds of femininities while assigning privileged status to others (pp. 321).

In this sense, heteronormative (or a preference for a heterosexual sexual orientation) femininity would be privileged over other femininities, while still being subordinate to the hegemonic masculinity within the evangelical university.

Connell (1996) saw gender as circulating within institutions, particularly educational institutions, which are in of themselves gendered. The gender relations, or patterns, within a given institution are referred to as it's 'gender regime'. Gender regimes then come together to build the gender order in a society at a specific point in history. Looking at the institution attended by my participants, there could and would be several gender regimes at play. The university itself would have its own regime based on the beliefs and policies set in place by administration and agreed to by students upon enrolment. There is an evangelical Christian gender regime which is a part of both the institution and individual student belief system. Then there is also a gender regime within the engineering department of which these students are a part.

A 'local' gender regime may involve practices that have similarities to a larger societal gender order, or it may stand apart from that order as actions and practices taken by those within the locality are what perpetuate the regime. In terms of an educational institution, this means that individual areas could have a regime which is unique within the institution (Connell, 2005). Connell (1996) believes the institution of higher education is itself gendered. If this is true, how much more so would engineering programmes within universities be gendered? As men have historically led the engineering profession and, therefore, the education programmes as well, it is no small stretch to say that men control the engineering culture within campus. Connell is clear to state the historical nature of these regimes and that they are subject to change. Viewing evangelicalism,

another form of institution, through this lens makes clear the changing nature of gender within religion. In this case, evangelicalism has a more 'traditional' view of gender roles. Its gender regime reflects a more complementarian view of the relationship between males and females than the more egalitarian gender regimes held by mainline Protestant believers. Each of these regimes, both in engineering and Christianity, represent the thinking of a specific group of people at a specific point in time, and how these perspectives translate into everyday practices. These will vary by place and time, adding to the local nature of the regimes.

Of interest in the theory of gender regimes is the role of power dynamics. Within a university, the function of power is at play within faculty/staff relationships as well as relationships between faculty and students. This research seeks to better understand the gender regimes created within the engineering department at one particular evangelical university in the Midwest of the United States. Through hearing the experiences of a group of female students, power dynamics at play within their university relationships will be followed and the gender role interpretations of these students will be investigated. By then also hearing from staff members, the dynamics within engineering will further be explored through faculty and staff perspectives of students and the importance of alumni relations.

In assessing this, or any gender regime, Connell (2005) suggests analysing four dimensions. First, the gender division of labour which includes occupations and labour relations. This could also be the gendered ideas surrounding choice of majors within a university and tensions between work inside and outside the home. Second, the gender relations of power reflect the hierarchy within a workplace or university. This would also include the dynamics between professors and students and the ways in which authority and control are exercised. Third, emotion and human relations covers the interactions between students and between students and professors. This could be feelings of belonging, sexual attractions, and even dislike. It covers all interactions between humans in a given environment and the emotions created as a result of those interactions. Fourth, gender culture and symbolism includes the symbols

and language used by a specific culture to represent and describe gender. The religious views of gender would be included in this dimension. By utilizing these four dimensions, Connell provides an outline for analysing a specific gender regime.

Methodology

This research is based on qualitative research methods underpinned by an interpretivist epistemology (theory of knowledge), which complements a social constructionist theoretical perspective. From a social constructionist perspective, 'reality' is never objective and is always interpreted by individuals according to their own social and cultural identities and experiences. Interpretivism emphasizes that the knowledge researchers uncover is likewise never objective and is open to interpretation. My participants were asked to share their own interpretations of their experiences in the undergraduate engineering programme, but these interpretations would not necessarily be generalizable. Lincoln (1995) discusses this thinking of standpoint epistemologists by saying that through their work

> we can deduce that texts that claim whole and complete truth or that claim to present universal, grand, metanarrative, or generalizable knowledge (or knowledge that applies to all similar individuals or groups across time and across contexts) are themselves specious, inauthentic, and misleading (pp. 280).

While my religious convictions would be opposed to standpoint theory as described above (viewing the Bible as such a text), this quote is helpful in describing the interpretivist position I am taking in this research. Participants could have a sense of shared meaning, shared interpretations, based on the way they viewed phenomena as they are all female students in the engineering programme who ascribe to a similar faith, but even those moments of shared experience would still capture a specific viewpoint at a specific time and of a specific time. Participants who share membership in certain communities may answer similarly based on those communities, but participants are still individuals with unique interpretations of events based on differing contexts. In this research, that could include different home lives, different experiences in secondary school, and differing other communities of membership. As Boswell and Corbett (2015) say, 'there is no expected or ideal end result to interpretive

research. Its final form is in no way obvious, and it can take multiple, conflicting forms' (pp. 218). I may note ideas or themes I anticipate hearing from participants, but the study could go in any direction based on the interpretations of the participants and from myself as the researcher.

Likewise, while there are dozens of Christian universities throughout the United States, many of which would define themselves as evangelical, findings from this group of students could be very different from a similar group of students at another university. Those who chose to attend this university did so for specific reasons and that can and will influence their understandings of experiences at university. This cannot be duplicated at another institution. In the same way, another researcher, with a different reflexive position, could also create differing themes from the interviews collected. My own background and worldview cannot be removed from this process. As Goffman (1959) says, when first meeting an individual, one uses past experiences and cues from this individual to form an initial impression and establish the nature of the relationship with the other person – in Goffman's terms, both people are constructing a 'definition of the situation'. My past experiences with engineering students and with evangelical Christians will and do shape the way I relate to participants and to these data. I have already mentioned the comments I heard regarding choice of major as an undergraduate student. I cannot unhear those, and I cannot pretend they do not return to mind when asking female students how they came to choose the study of engineering. This will inform my interpretations of what they say. I also am a Christian myself and have my own views of what gender dynamics are and should be. While I might not openly question something a participant says, my beliefs are impossible to separate from the way I interpret their words.

While the interpretivist approach focuses on the interpretations of an individual and sees no single truth revealed, this does not mean that there are no lessons to be learned through the interpretation and analysis of what participants have to say. Their experiences can speak to a larger social context through analysing how their interpretations of these experiences may be influenced by wider social/cultural processes. University and department administration can learn

from what these students have experienced to better understand how to support future students.

Participant Selection/Recruitment

This research is specifically aimed at listening to and interpreting the stories of female undergraduate engineering majors. Only female students were interviewed to focus on their interpretations of their university experience as a minority. Engineering was chosen as the major to be studied due to its continued male majority standing. Other STEM fields, such as biology, have a larger representation of female students. The decision was made to use participants from a single university in order to better understand experiences within a specific university environment. The university used in this research is a midwestern American evangelical institution of just over 4,000 students with a stated mission of education and discipleship (a Christian term for nurturing the faith of believers). Potential participants were identified and approached by a civil engineering professor at the university. This professor is an acquaintance of mine from work at a previous university. This means that I did not personally know any of the potential participants nor have I worked at their university. Those who were interested in taking part gave the professor permission to pass along their email address, and I contacted them from there. After the initial round of interviews, I asked participants to share contact information for friends who might be interested in participating. I also contacted the Society of Women Engineers (SWE) chapter at the university in search of interested participants.

Utilizing the assistance of a professor in this way has both positive and negative aspects. It is possible, perhaps even likely, that the professor will choose the 'best' students to refer to me for the research. 'Best' could be defined in a number of ways including those women with the highest grades, those that speak most positively about the program, those that have the best prospects for work after university, or those that just get along well with that individual professor. It would be impossible to know which factors were used by the professor to select students. However, interpretive research does not need to directly represent each individual in the department to be worthwhile research. In fact, it would be argued this is not even possible. In this situation, it is likely that the

professor's implied approval of myself as a researcher may have even encouraged the students to participate in the research as their trust in him would be reflected onto myself. That could be a significant benefit to using this means of sampling and was the major factor is determining its use.

The initial email to prospective participants introduced me and the research. If the student told me she was interested in taking part, I sent the participant information sheet, consent form, privacy notice, and information and samples for creating a timeline. By agreeing to take part in the research, I interpreted that participants self-identified as female. (The professor who initially helped identify students also interpreted the gender of the students as female.) After interviews, I sent a follow-up email asking for basic demographic information, and this is when the participants were given the opportunity to share their chosen gender. All who did this listed 'female'.

Those coming from a positivist perspective (a perspective that argues for knowledge to be based on empirical evidence that can be established as objective and 'representative' enough to be generalisable to wider populations) could see the utilization of a single university in this study as a limitation. Taking a positivist stance in research, the researcher would distance themself from the participants and study, without engaging and only observing what is measurable. On the other hand, with an interpretivist approach, the researcher will

> get involved in constructing meaning by engaging with participants through, say, interviews. For the interpretivist, there is more than meets the eye, and this can only be brought to our understanding if we engage with participants and enquire about how they construct their worldviews. We could say that such research is based on how reality is interpreted by researcher and participants, and it accepts that there are multiple ways of doing this (Chowdhury, 2019, pp. 104).

Evangelical universities are united in a basic set of religious beliefs, but institutions may vary on how these beliefs are expressed. Thus, the environment mentioned by participants in interviews is in some ways unique. Attempting to compare two Evangelical universities would not result in more 'scientific' data when the interpretations of individual perspectives and experiences will always be distinctive. Therefore, while this study would not be used to generalize findings across universities as a positivist might hope, it is important in beginning

the discussion of the intersection of religious faith and gender in STEM education and in higher education across the disciplines, a focus that remains under-researched. The interpretivist standpoint taken here acknowledges the uniqueness of the local gender regime, but also the validity of asking questions related to a pervasive and influential belief system such as evangelicalism in America.

Initially, I had a total of six interested engineering majors: four civil engineers, one electrical engineer, and one mechanical engineer (see Table 1). All students were in their junior year except for the electrical engineer who was a senior. I chose to focus on students in these years for two reasons. First, there are few direct engineering courses in the freshman and sophomore years. For many, these years are focused on math and science courses. In order to have a better picture of the dynamics within the engineering department, it is important for the students to have experienced several courses within the department itself. Second, this research took place in the second year of a worldwide pandemic (COVID-19). One of the results of this was a movement to distance learning for at least a partial semester at universities throughout the United States. While this experience was common among universities, it does not provide a 'normal' university experience for students. Had participants been in their first of second year of college, they might have struggled to describe dynamics with professors and students. Engineering programmes often involve group projects, and these also could have been limited had a student's experience been mainly within the pandemic. It is important to note that at the time this research was conducted, all participants had resumed taking courses in person on the university campus.

After these initial six interviews, I chose to seek out more participants for added diversity and depth in the data. I asked participants to suggest names of others who might be interested, and I contacted the head of the student chapter of the Society of Women Engineers (SWE) as listed on the university website. As a result of these efforts, I interviewed three more students. These three consisted of one electrical engineering major, one mechanical engineering major, and one civil engineering major. There was one junior, one sophomore, and one freshman. All

three of these new participants had completed at least one full year of coursework at the time of her interview.

Table 1

Name	Age	Gender	Year	Major
Anna	18-22	Female	Junior	Civil Engineering
Beth	18-22	Female	Junior	Civil Engineering
Cassie	18-22	Female	Junior	Civil Engineering
Darcy	18-22	Female	Senior	Electrical Engineering
Emily	18-22	Female	Junior	Civil Engineering
Faith	18-22	Female	Junior	Mechanical Engineering
Gwen	18-22	Female	Sophomore	Electrical Engineering
Hailey	18-22	Female	Junior	Mechanical Engineering
Ivy	18-22	Female	Freshman	Civil Engineering
Name	**Age**	**Gender**	**Title**	**Discipline**
Jenny	50-60	Female	Director of Annual Giving	Advancement Office
Kristin	30-40	Female	Assistant Professor	Electrical & Computer Engineering
Luke	30-40	Male	Associate Professor	Civil Engineering

Participation in this research was voluntary and there was nothing given in exchange for the interview. Those engineering majors who chose to participate may be more open than others by nature of being interested in talking to an unknown researcher (Robinson, 2014). These students might also be more inclined to think positively about their experience or be more willing to share only the more positive experiences. Likewise, while there was logical reasoning behind speaking to students in their junior and senior years, only students who have persisted in the programme were interviewed. The experiences of students who faced challenges and chose to leave the engineering programme would not be included, and this eliminates potential opposing views from the data analysis.

After conducting these student interviews, it felt beneficial to the research to include interviews from professors in the department. These interviews could give background to the environment the professors hoped to build as well as a space to hear their observations of female students within the programme. Two

professors, one male and one female, were chosen from the engineering faculty (twenty-four males and three females in total). Both agreed to take part in the research. One was a professor of civil engineering (this was not the same professor who assisted with student contacts) and one was a professor of electrical and computer engineering. At this point, it was also determined advancement office staff at the university would be interviewed to shed focus on the importance of alumni to the advancement of the university and the way in which engineering alumni, specifically the female graduates, relate back to the university upon leaving. The advancement staff member interviewed was a former colleague of mine who now works at the university used for my other interviews. These interviews followed a similar structure to the student interviews and were conducted during the analysis of the student data. The content of these interviews was influenced by the responses I had received from students leading me to more directly address the professors' views of gender. For example, more than one student stated a professor had encouraged her to look into graduate school because she was a female engineer. Therefore, the professors' views of gender in the field had a clear impact on their interactions with female students. The students were clear in their respect for their professors, so knowing more about the views these professors hold could link back to the views professed by their students.

Methods Used

Participants were interviewed via Zoom through my University of Glasgow account. This provided some protection from the possibility of cyber-hackers breaking into an interview. With the global pandemic increasing the use of platforms such as Zoom, internet security has become an issue to be considered and will be discussed more in the ethics section. I situated my camera during the interviews to, as best as possible, demonstrate that I was alone in the interview and participant privacy was adhered to. All participants consented to having interviews audio-recorded. The recordings where then transcribed through Zoom. These documents were more of a beginning to the transcription process as they were not without error. I listened to each recording and updated the

transcript as I went. This created more reliable transcripts and also made me more familiar with the data.

Due to the coronavirus pandemic, the conduction of in-person interviews was considered to be unsafe by the University of Glasgow. The possibility of transmitting the disease was high as was the level of stress in determining how best to socially distance and wear masks throughout the course of an interview. This was one of the reasons for choosing to pursue online interviews. It must also be acknowledged that participants were living through the pandemic at the time of interviews. There were comments regarding the possibilities of internships due to COVID-19, but little more conversation on the topic took place. I would hesitate to say the conclusion can then be drawn that the pandemic had little impact on the participants. All research conducted at this time must be seen through the lens of a pandemic, and it must be included in any conclusions drawn.

The decision to conduct interviews via Zoom was made prior to the coronavirus pandemic for convenience reasons due to physical distance from the university being used. However, once the pandemic began, Zoom was one of the most ethical options given the need for safety. Participants and I were able to speak freely without worrying about masking as well. While this was the best option available, it is important to note that research does show online interviews do not result in greater inhibition of sharing personal experiences (Jenner & Myers, 2019). It could also be that the more extensive use of such platforms throughout the pandemic has led to increased comfort in speaking to others online. While these are positive aspects of conducting Zoom interviews, there are still limitations. I could not be sure that privacy was kept on the student side of the interview. There are also the very real, pragmatic issues of sluggish internet and speaking over each other. No major technical issues were experienced in the course of the interviews, but the possibilities of dropping the call or other interruptions were present.

Semi-structured interviews were chosen for both students and staff due to their 'versatile and flexible' nature so that all participants were asked the same questions with individual follow-up questions based on responses (Kallio, Pietilä, Johnson & Kangasniemi, 2016, p. 2955). The student interviews began with questions about participant background, including the origins of interest in engineering and how this specific university was chosen for attendance. Questions then moved to initial impressions of the engineering department and other students, current coursework and group projects, and plans for the future. Students were also asked if there was anything that could be added or changed within the engineering department to enhance the experiences of future students like themselves. Staff interviews were structured in a similar manner, beginning with a background of their interest in engineering, their choice in working at this university, impressions of faculty relationships, impressions of students in the department, and future hopes for their students. In the case of the advancement interview, department questions were changed from engineering to the importance of alumni and fundraising at the university.

Part of the preliminary documentation sent to student participants was information on creating a timeline of their journey through engineering and university (see Table 2). In their study, Kolar et al. (2015) aimed to 'examine the potential of visual timelines to supplement and situate semi-structured interviewing with marginalized groups' (p. 15). In this study, timelines were developed at the beginning of the interview by the participants, but alongside the interviewer. The researchers determined that

> reflection, recall, and break down of life events through timelines allowed the participants to create a sense of direction of what they wanted to share when asked the interview questions. Participants became critical navigators of the content of their discussions (p. 26).

I chose to ask the students to create their timelines in advance instead of during the interview and provided two sample timelines they could use if they wished. This way, the timelines were helpful in preparing the participants for potential questions and triggering their memories. The choice of utilizing timeline methodology was intended to also make the students more comfortable with the research process by giving them an idea what questions would be asked and agency in preparing what they would be willing to share, as well as agency in determining their own key points in their journey. More than one used the

timeline at the end of the interview to bring up topics or ideas about which I had not asked. While I asked questions about topics I believed to be important, participants had the opportunity to respond with their own items of importance.

Table 2

Timeframe	Memories, Thoughts, Perceptions
First Interest in engineering May 2018 May of Senior year (after graduation) Never met an engineer, didn't know what they did	• Felt underprepared – no calc, physics or chemistry • Excited for something new and unknown • Thought engineering was only useful in the developed world (research, fancy new gadgets etc)
Choosing a college/major April/May 2018 Questbridge program "First gen" college student Paying for college on my own	• Wanted to do so many things, couldn't make up my mind • Considered teaching, pediatrics, environmental science, international diplomacy, and Middle eastern studies.
Arriving on campus: Aug 2018 Had never visited CU before	• Didn't know what to expect • Still disappointed about not being accepted to any of my first 8 choices • Felt very welcomed after a few days
Beginning coursework: Worked really hard because I knew I was at a disadvantage Freshman year was the most challenging academically (catch up work) Great professors who helped me learn	• Cardboard canoe team gave me a great core group of friends
Life in the School of Engineering Difficult to be a woman (homework help etc), but great SWE community Declined Ecuador internship b/c only woman on team.	• My professors have never demeaned women in engineering • Challenging program but good support system
Future goals Work overseas (Muslim world) on development type projects; share the Gospel. Work with an NGO like SP or Medair Be a mom	• Very excited • Not sure how everything with family and living in a conservative culture will work out with my career.

As the use of Zoom for interviews has strengths and limitations, so too does the matched gender of researcher and student participants (Archer, 2002). I hoped to evoke an environment of safety and concern throughout the interviews so that students felt free to share their thoughts and experiences. However, that does not mean that all participants felt this. There is the possibility that I was seen as an outsider to engineering. It is also possible that the fact I am a woman could make participants feel apprehensive or judged for their own beliefs in ways I would not have anticipated. It must be acknowledged that another researcher would have elicited different answers or emotions through the interviews whether that person was a man or a woman. One of the faculty participants was male, and that created its own unique dynamic. He seemed willing to discuss the role of gender in his work, but that does not eliminate our differing genders as a barrier in the research process. The data collected is very much a product of the specific interactions between me and the participants.

In her study regarding the role of gender and race in the researcher/participant relationship, Archer (2002) concludes with

> I have also argued that shared ethnicity/'race' between interviewer and participants does not guarantee 'truer' data?, nor does the inclusion of such accounts avoid the need to engage with issues of power, representation and control of the research. (p. 129)

I had anticipated that speaking with female college students who would be of the same gender and, given the demographic of their student body, probably identify as the same race as myself - would be natural and flow easily in the study. Because we attended similar evangelical universities, the chance of having a similar socioeconomic and religious background was also high. This thinking was naïve at best and perhaps ignorant at worst. One student participant chose not to turn on her Zoom video feed, demonstrating a clear sense of unease at least with being seen. As Archer points out, there are aspects of power and control within any study, and I must be aware that these would be a part of every interview I conduct. I cannot assume that a shared gender, or other identity, would mean a more open conversation with participants. My analysis of the data from the interviews, the way I interpret responses, is undoubtedly influenced by power dynamics. As researcher, I have a power over the interviews and interpretations which the participants do not share and makes me a part of the 'interviewing picture' (Hofisi et al., 2014). That power

dynamic can also be a function of past dynamics I have experienced. This cannot be eliminated and must be acknowledged.

Credibility

While the nature of interpretive qualitative study does not lend itself to positivistic proof of validity, this study should be considered credible in order to contribute to further research. Creswell and Miller (2000) describe this as 'how accurately the account represents participants' realities of the social phenomena' (pp. 124). In this study, I have been able check the accuracy of my interpretations in the following ways.

In this research, it is impossible for me to escape my own influence on the results as I interpret the data. I bring into the study my past experiences, stereotypes, and worldview. Therefore, it is important, for the credibility of the research, that I express these in my reflexive position (see page 68). By acknowledging these, others will be able to view the study holistically, with a better understanding of the lens through which I've viewed it.

Creswell and Miller recommend a peer review to add to credibility. In this study, the chief reviewer has been my dissertation supervisor. Throughout our monthly conversations, she has reviewed my writing and encouraged my thinking and assessing. My use of theory and analysis have been challenged, and my study has improved as a result. While not conducting the research alongside me, this second set of eyes, a second lens, has limited gaps within the research. While the participants were not given the opportunity to review the transcripts of their interviews or specifically contribute to my interpretation of those transcripts, they were able to submit their timelines to me, if they were comfortable in doing so. This allowed me to compare what I heard in the interview with what they wrote in their own words. Because the data analysis conducted was based on my own interpretation of key points in the women's experiences, their timelines were their opportunity to say for themselves what was important in their own stories. This did not necessarily change my analysis, but it did inform

the analysis and perhaps clarify points not fully explained in the course of the interview.

Ethics

Ethical approval for this research was given through the University of Glasgow as well as the university used in the study. In line with British Educational Research Association (BERA, 2018) standards, all participants were given a consent form and asked to give verbal consent to participating in the study prior to the recording of the interview, notified of their right to withdraw at any point in time, given a privacy notice and informed about data storage, notified that their names and university information would be anonymized, and provided no incentives to participate in the study.

While interview questions did not specifically address material considered potentially harmful, participants were monitored for signs of discomfort or distress and points were not pressed if there was a question of discomfort or distress. Religion can be considered a controversial topic and so participants were not explicitly asked questions that would test their belief systems. Rather, they were able to answer the open-ended questions with as much or as little religious detail as they would like. With gender, questions were more direct, but again participants could choose how to answer the questions and were not required to give more personal detail than they were comfortable giving. It is possible that conducting interviews through an online medium could have reduced the level of stress in speaking.

While some of these larger ideas regarding ethics seemed straightforward in laying the foundation for this research, there were moments while conducting the study which proved less clearcut. One participant chose to keep her camera off throughout the interview. I had not considered this as a possibility and therefore had to quickly decide how to handle the situation. I chose not to acknowledge her choice and conduct the interview as I had every other, looking directly at the computer, assuming she could see me. I felt that pointing out her

choice might have created a level of discomfort between the two of us that would cause undue stress to her and potentially impact the data collected. Another example of this would be the choice to not explicitly ask religious questions and instead allude to the implicitly. I made this decision early on to maintain the focus of the research but also to maintain that level of comfort and trust between myself and the participants. In practice, it was difficult at times to know when to follow up with a question and when to let comments stand once religious thoughts were mentioned. These experiences demonstrated to me the complexities of conducting ethical research.

Reflexive Positionality

As Archer (2002) states ‘research is a socially constructed process, whereby the identity of the researcher, and the methodology adopted, shape the knowledge produced’ (pp. 190). In the case of this study, my identity shaped the research from the start. The idea for the study developed as a result of my own experience, first at an evangelical university best known for engineering then later as the alumni director at the same university. I experienced the stereotypes and rhetoric associated with a male-dominated profession even though I myself did not major in engineering. I also heard alumni asking why there was not more diversity in the department, particularly in fields such as welding. This led me to wonder how faith and gender might be intersecting within engineering.

By questioning this intersection, I am implying that there could well be a relationship. At the very least, there could be positions or policies that could be changed in order to improve the environment within the department. I did not interview students from the school I attended, so I cannot assume that the two universities, while similar in faith commitment, would have the same gender dynamics. It could be that these dynamics, or gender regimes, are very different.

I am also approaching this research as a Christian myself. I did not share my views in relation to religion and gender with participants, and I also did not question the validity of any faith statements they made. This study is not to question religion but rather to investigate the interaction of faith and gender roles. Participants were not asked directly about their faith but were free to bring it up as they answered questions and discussed their journeys.

Finally, this research forced me to confront my own stereotypes. As Lincoln and Guba (2000) say,

> reflexivity forces us to come to terms not only with our choice of research problem and with those with whom we engage in the research process, but with our selves and with the multiple identities that represent the fluid self in the research setting (pp. 183).

I attended a university with many engineering majors. Through that experience, I developed my own ideas of how engineers act and who they are. I have characteristics in mind which differentiate the specializations within the field. I was even surprised while conducting interviews if participants did not match those ideas in my mind. This means that while I did not know any of the participants personally, I constructed ideas about them and could not be completely neutral in my understandings or interpretations of the data collected. It is not entirely possible to separate the identity I bestow upon them from the identity they are constructing for themselves.

Lincoln (1995) addresses the elephant in the room in terms of reflexivity by saying,

> For the somewhat dark side of research hides the fact that most of our research is written for ourselves and our own consumption, and it earns us the dignity, respect, prestige, and economic power in our own worlds that those about whom we write frequently do not have (pp. 285).

Ultimately, this research is the method through which I will receive a degree. As sincere as my curiosity and concern for the subject material is, I will benefit from this, and that truth must be acknowledged in any analysis. If I were not pursuing a degree, I might still speak with engineering students and faculty members as opportunities arose, but my questions would not be as defined or as consistent. I also might only theoretically or philosophically consider what I

could be doing with the information. By conducting this research I am far more methodical in my interrogation of the subject, but it is in some sense for the purpose of what the research can do for me in terms of my career path. Those participants involved in the research will only benefit if I and others alter our professional practice based on the results.

Data Analysis

Thematic analysis has been used to evaluate the data collected from the interviews, specifically thematic analysis as defined by Braun and Clarke (2006). This process involves creating themes from the data, but Braun and Clarke are clear that the theoretical framework of the research dictates these themes. 'What is important is that the theoretical framework and methods match what the researcher wants to know, and that they acknowledge these decisions, and recognize them as decisions' (Braun & Clarke, 2006, pp. 80). For this research, identifying gender regimes is key and the themes will work towards answering the research questions in those terms. Identifying this as the purpose is a necessary part of reflexivity.

Six steps are laid out for this analysis (Braun & Clarke, 2006). The first step is for the researcher to familiarize herself with the data. In this case, that means reading through the transcripts of the interviews multiple times and also comparing transcripts with timelines, when provided, to have a fuller picture of that participant's experiences. The second step is to generate initial codes or highlighting certain features across all the data. Those codes are then put together in the third step to create themes, followed by the review of these themes in the fourth step. The fifth step is to define and name these themes. Finally, the sixth step is to write the report, in this case that is the data analysis and discussion chapters.

One of the chief comments of Braun and Clarke's view of analysis is that the themes should not be a restatement of the interview questions. This would simply be utilizing the outline of questioning as the themes themselves.

However, it is easy to see how this would be possible. As I first began conducting interviews, my thoughts surrounding what I was hearing started to coalesce around the idea of self-esteem. I started thinking that this would be the story of the research, and then I slowly started to realize this line of thought was falling into the category of fixing women. If they had more self-esteem, they were persevering in these programmes. I caught myself falling into a trap of conflating self-esteem with self-identification. Once my full data collection was finished, I began the more formal coding process. By starting fresh with focusing on all of the comments which were interesting to me, without trying to immediately understand why they are interesting, helped me be more open to other themes I could form from this data. I believe that lead to a richer analysis.

In coding the transcripts, I began by highlighting key words in the answers in each interview. Then, I grouped those highlighted words/concepts into seven codes which could be found weaving through multiple questions and from multiple participants. In some cases, the individual response from a participant might be the opposite of another, but the code still carried throughout. For example, one student participant stated that she preferred to study alone while most others praised the formation of study groups. A negative response to an aspect of community is still a statement about community. The seven codes were then combined to form five overarching themes from the student participants. Perhaps the greatest challenge came in coding the transcripts of the professors. They did not speak to all of the same themes as student participants (since they were not attending university themselves), but their comments, particularly on the construction of religious gender identities, added a fascinating element to the study as their responses did not align with assumptions I made regarding the professors' own gender identities. I chose to address the professors' responses in terms of the student themes but within their own analytic section and then combine responses from all participants under a religious culture theme for a total of six themes overall.

Recognizing the impact of the researcher on the research is also an important aspect for Braun and Clarke's thematic analysis. They emphasize that themes are not discovered, and they do not emerge. The researcher creates the theme

through her own interpretation of the data. ‘Themes are creative and interpretive stories about the data, produced at the intersection of the researcher’s theoretical assumptions, their analytic resources and skill, and the data themselves’ (2019, pp. 594). The analysis of the data I have collected will be unique to me with my own background, theories, and research interest. For example, my own religious background encourages a more favourable impression of religious wording and thinking. I have interpreted the acknowledgement by both students and professors of a higher power with an overarching plan as a positive aspect of their identities. Others might view these same comments as symbols of a cultural power dynamic at work which is influencing the freedom of choice of these individuals. This does not invalidate the research, but it must be front and centre throughout the process.

Conclusion

This qualitative research is situated within an interpretivist research paradigm, using Connell’s theory of gender regimes and the gender order (2005) to investigate the experiences of female undergraduate engineering majors at an evangelical university in the United States. Studying the intersection of gender and religion within a STEM field is highly under-researched and will provide valuable insight into life within this environment. While interpretivist research may not be, and does not set out to be, generalizable, Braun and Clarke’s thematic analysis (2006) provides an opportunity to construct themes which allow the researcher to make connections with wider social and cultural patterns and dynamics and could benefit others living similar experiences. University and department administration have the opportunity to review these experiences and make alterations which could improve the student experience, particularly the female student experience.

Nine female engineering students took part in semi-structured interviews, representing multiple areas of specialization. Questions sought to understand experiences with engineering prior to entering university, initial impressions upon entering university, and thoughts about the future after graduating. Participants were directly asked about their roles as females in the major. Three

staff members were also interviewed, two engineering professors and one advancement staff member. These interviews were similar to student interviews in structure covering their history with engineering, impressions of students and professors in the department, and hopes for their students after graduation. Due to distance and COVID-19 pandemic concerns, interviews were conducted via a University of Glasgow Zoom account and only audio-recorded.

It is important, moving forward, to understand my part as the researcher in the research process. I share a similar religious background to these participants and attended a similar university. I did not seek to interrogate their religious views but was curious about the interplay of traditional Christian views of gender roles and the choice to enter a male-dominated profession. The candour and openness of the participants was instrumental in the process.

Chapter 4: Findings from Student and Professor Interviews

The tension involved in addressing the position of women in engineering at an evangelical institution became evident after interviewing my participants. Even in a university with clearly defined religious beliefs and behavioural expectations, understandings of the role of gender in an engineering career seem to differ. Even so, themes regarding an identifiable local gender regime, to use Connell's theory (see chapter 3) within the engineering department can be discerned. This chapter will address these findings that I have crafted from the interviews. I will begin with a discussion of the influences in choosing engineering as a major, then student relationships with professors. Next, I will cover student relationships with peers and group project dynamics. After that, I will discuss the professors' interview responses and then conclude with information from all participants regarding the religious culture of the university.

Using Connell's (2006) dimensions of gender relations, four areas of participants' interviews will be analysed. Gender division of labour, gender relations of power, emotion and human relations, and gender culture and symbolism are all elements of how Connell describes a local gender regime (see page 53). Gender division of labour includes the way male and female students conceive of themselves as belonging to separate groups, divide labour in group projects, and also how they study together and have expectations about future work based on gender. Gender relations of power, in this instance, are seen in the student-professor dynamic and between students but can also include interactions between professors and the influence of parents on students. The dimension of emotion and human relations is explored in relation to the interactions of students with each other and with professors on a non-academic level, the social situations and challenges which arise. Finally, the dimension of gender culture and symbolism encompasses here the powerful dynamic which religion as an aspect of culture plays in this research, underlying much of the data. By viewing participant responses through the lens of these dimensions, the complexity of a local gender order takes shape within this university's engineering department.

Influences in Choosing Engineering as a Major

Student participant interviews began with questions surrounding the origins of the students' interest in engineering. The participants share a variety of influencers. Some were influenced by their father, some by their mother, and some by teachers. For Darcy, it was a man, her father, who encouraged her to look into engineering.

> Darcy: He probably for sure, could have been an engineer. But he builds jet engines for GE, so he's like an assembler. So he kind of does that, but he definitely has like the engineers mind. And I'm a lot like him, so that's why he's like 'you should do this because, like, I think I couldn't do it, and I should have' and he's like 'you think the way I do' and I agreed so he kind of helped me pick what I wanted to do. So, it was good to have him. (Darcy, senior electrical engineering major, 18-22)

Darcy's father seems to feel that he missed an opportunity to do more with his career. Darcy does not elaborate on how he missed this, but her father does recognize in Darcy the same mechanical inclination. In terms of parenting, it is good to see this father acknowledging his daughter's strengths. However, his encouragement may also indicate that he would like to see his own dreams fulfilled through his daughter. There may be a question here of how much Darcy is interested in engineering versus how much her father wishes he had made other choices himself. Either way, he does not appear to view engineering as an exclusively male discipline that would be inappropriate for his daughter to aspire to, and this could be influential in forming Darcy's ideas of gender and engineering.

For Ivy, it was her mother who put the idea of engineering in her mind.

> Ivy: I remember being in third grade and I was like 'Mom, I want to be a hairdresser. Look at this girl's hair. It's so beautiful, it's all braided and everything.' I just go around telling people like a third grader just talking to everybody and my mom was saying 'No, knowing what you like to do, you making crafts and liking math and science, you should look at engineering. It's really cool.' I'm like, 'Mom, I have no idea what that is but OK.' So I looked into it. (Ivy, freshman civil engineering major, 18-22)

Ivy tells her story by beginning with a culturally constructed 'feminine' interest – hair. She tells her mom how beautiful certain hair is and thought this could be a career she likes. Here, Ivy arguably reflects aspects of Connell's notion of

emphasized femininity (see page 52). Yet, her mother tells her ‘no’ and encourages engineering based on Ivy’s enjoyment of crafting, math, and science. This does not seem to be a steering in a different direction. The way Ivy tells it, her mother almost commands her to pursue a different course, and Ivy obliges without even understanding what engineering is. Ivy tells this story with kindness and openness, but it does leave her actual feelings concerning her career path in question. Again, like Darcy, regardless of the parental motivation for encouragement, Ivy’s mother is demonstrating her belief in engineering being an appropriate path for women. Indeed, she seems to prefer her daughter entering it rather than a more traditionally female field. This could be because of the higher cultural value placed on this traditionally masculine career, or it could be a practical reflection of the potential earning power in engineering. Ivy’s mother seems most concerned with her daughter’s academic interests and encourages her to pursue those things, regardless of how they may be traditionally gendered.

Faith was introduced to engineering by a teacher.

> Faith: So my physics teacher had us research different types of engineering and, like the differences between them, so I knew, like, I guess, a general basics of engineering, but I decided to take a class on just some like basic principles, where we just did a lot of like 2D, learned about the 2D computer programs like autocad, and we were able to do some hands on projects. So that was really cool and I talked a lot with my teacher at the time about what it was like, um, when he went to school for engineering and teaching. So he gave me a little bit of information about that and it became, it was a, it was a type of subject that I was more interested in, and even though I didn’t know a whole lot about engineering, I like the idea of being challenged, um, so that’s kind of how I decided to go into engineering. (Faith, junior mechanical engineering major, 18-22)

Unlike Darcy and Ivy, Faith has a slow introduction into engineering. She learned the basics in her physics class and then began asking more questions of her teacher as her interest grew. While her teacher assigned research in engineering, of the participants noted here, Faith is the one who seems to decide most independently to pursue the field. There is no mention of the physics teacher questioning her interest or her decision, but she is the one who uses the words ‘I decided to go into engineering’.

Connell (2006) utilises the term gender relations of power to refer to the ways in which cultural ideas about gender influence the ways authority figures exercise their power. It is interesting that both men and women encouraged these students in their interest in engineering. This seems to demonstrate an appreciation for diversity in the field by those surrounding the students. Although arguably holding a degree of power and influence over the participants, parents and teachers in these instances did not appear to have ascribed to or helped to maintain the concept of a traditional gender order in the math and science disciplines, and each of these students chose to follow the advice of these authority figures in their lives. They respected the opinions they heard, but more than just respecting, they followed the encouragement. It is unclear if the participants' interest in engineering would have held without the encouragement of these authority figures, but the portrayal of events is a positive one.

Student Relationships with Professors

Perhaps the greatest influences of power in the participants' lives upon entering university are their professors. The relationships the professors have with these students demonstrate their understandings of gender in the discipline and have a potentially strong influence over how female students will view their identities as they move on from school. The personal feelings of professors regarding gender in engineering will inevitably flow into their interactions with their students, as we will see later in this chapter. Darcy and Faith all make a point of commenting on the care professors show towards them as students. The students do not make an issue of gender but do seem surprised, in a positive way, that these authority figures express genuine concern for them as students and as individuals.

> Darcy: And then all the profs are all like really nice, so I really loved…Especially being a Christian university, the profs here, they kind of care about you more as a person, so I…it wasn't just like 'oh, like I'm the prof and I know everything. You guys don't really know anything'. They were so willing to be like helpful, which was really nice because they knew that we, like we're trying to learn, so it's really good that they just

> weren't there just for their job they're, they're actually really caring about people.

Darcy makes an interesting observation about the power dynamics at this university in regard to the students and professors. She seems surprised at how kind the professors are (and attributes this to it being a Christian university) and specifically that they do not seem to see their own knowledge as giving them power over their students. It is unclear if she has experienced this sort of authoritarian dynamic in other courses or if this was an assumption she had about how professors at a university might behave. In saying the professors acknowledge the effort the students are making and seem to view their role at the university as more than just a job, she is demonstrating a high opinion of the professors in her classes.

Faith refers to a specific professor in describing the care she felt early on at university.

> Faith: And there was one of my profs, for the class I took at the time called digital logic design, and he would start every class with a little Scripture reading that he would do in the morning, like in his devotions, and he would share that with us and just encourage us with that. And I really liked how that started off the class because it put us in a better, in a like good mindset, and the way that they were able to like integrate Scripture and like bring that into the class and like apply it to the real world was really cool too. So my first day of classes, I remember, I was overwhelmed but the professors and everyone else in the class did a really good job at making it an easier transition.

Faith frequently references the religious nature of her studies, and that topic will be examined later in reference to gender culture. Here, the focus is on the way the professor, even on the first day of class, calmed her nerves by demonstrating kindness, as she perceived it.

Darcy and Faith speak of students as a whole in relating to professors. Anna makes an interesting comment about her professors in describing their care specifically for female students.

> Anna: I would never say that any of the guys in my classes or my male professors ever thought of me as less than them, um, because I was a woman in engineering, so I've never felt demeaned or looked down on. Um, I would say that even some of my professors, maybe go to the

> opposite extreme of trying to encourage the women even more in saying how we might be better at certain skills compared to the guys. (Anna, junior civil engineering major, 18-22)

While complimenting the equity she feels in regard to her gender as a student in the engineering programme, Anna seems to believe that the female students might get more encouragement than the male students. This could be the result of professors sensing a need to go farther to make the women feel comfortable through an equity approach (i.e. the idea that disadvantaged groups may need extra support to achieve equality). It does also mean that there could be a perception the students are not being treated equally. Of course, it is unclear if male students would agree about the amount of encouragement. It is also unclear what the 'certain skills' might be with which professors deem female students are better. Do the female students really need more encouragement, or do they feel a need for more encouragement because the assumption is that they have different skills than the male students?

Emily is more blunt in her assessment of professors. While she does mention one particular professor with whom she connected, she expresses that the dean makes her feel intimidated. Somehow high expectations were expressed which caused her concern.

> Emily: Some of them were pretty intense, especially like the department dean. So I was like a little intimidated by him and how much he was like pushing towards like sort of almost perfectionism, and…but then I also really enjoyed the engineering graphics teacher I had. He was a lot more chill, and he's also the advisor for one of the orgs I'm in, and so I really enjoyed him as like sort of faculty mentor sort. (Emily, junior civil engineering major, 18-22)

It is unclear how this 'perfectionism' was communicated, but Emily seems to indicate more than one engineering professor intimidated her. When complimenting another professor, she uses the term 'chill' to seemingly imply he applied less pressure in his teaching. Emily appears to respond better to less intensity. Wacquant (1990) noted the hierarchal nature of academic power in the classroom, and this could explain the way Emily felt towards the dean. It is not clear that Emily might even be able to explain why she felt the way she did, but it is worth noting that her comfort in the programme is not applied universally across all professors and teaching styles.

Like Emily, Beth highlights a specific professor in explaining her interactions. She is describing a male professor but talks about how they are 'like-minded' in their logic. It is interesting to see her relating to a professor of a different gender and could mean that she did not feel a greatly gendered power differential.

> Beth: I really like talking to my engineering professors. And, well, I only had two technically, but I would like talk to Dr *name*, obviously he's the head of the department, and I always just enjoy talking to him and I felt like we were pretty like-minded. We thought the same way a lot, like he's a very like logical person. (Beth, junior civil engineering major, 18-22)

Interestingly, after commenting on how similar she and a male professor think, Beth does later point to the lack of connection to female engineering professors. So, while she is able to connect with the men (seemingly over a shared sense of logic, considered in Western society to be a masculine trait), there is still some part of her looking for a female influence or possibly a mentor.

> Beth: I think it's important to like meet who you're going to be learning from and, especially, I really never met any of the female engineering professors, and I feel like that would have also been really beneficial, as a young engineering student, I really didn't talk to any of them. Some, um, like my math, like I had like math professors that were female and I would go to their office hours and ask some questions, but like, I didn't know any female engineering faculty, so I think that would've been really beneficial to…if they like, maybe, if they even like came to SWE events that would be really cool.

Here, Beth seeking out female authority figures in her life demonstrates Connell's (2006) dimension of gender relations of power. Beth might not use these terms, but she seems to be responding to the hegemonic masculinity of the department. She feels like there was a missed opportunity early in her time at university to connect with specifically female engineering professors. The underlying assumption here is that there would be something different a female professor could provide for her than what a male professor could provide. That something could be Beth trying to work out a way to enact femininities within the masculine department and seeking a frame of reference (female professor) from which to work out these femininities.

Looking again more specifically at the role of female professors, Anna expresses frustration at not having more female professors in the department. She

acknowledges that there could be a higher level of comfort in connecting with female professors. In Connell's terms, this could be an acknowledgement that femininities are shaped by organizational culture and Anna is here trying to negotiate what that femininity might be within the engineering department context.

> Anna: And there, there are several female engineering professors. Um, one of the three civil engineering professors is a woman, and I think that's been great. But maybe, yeah, maybe it would be nice if they, if they hired some more women as professors, so that the other, you know, female students in the program would feel like there are more people that they could reach out to and ask questions that they may not feel comfortable asking one of their male professors. But I also recognize that, you know, the percentage of female students is very low. So similarly, the percentage of female professors is low. So it might be fine with how it is, but… yeah, I don't really have an opinion on that.

Anna goes back and forth in this statement by referring to several female professors but then expressing a desire for more female professors and back tracking after that by saying perhaps the gender ratio of professors just needs to be similar to that of students. She seems to be pulling away from making any sort of assertive statement regarding gender in the programme. She could be wary of making a statement about the programme which could be seen as negative, or she could be uncomfortable discussing the impact of gender (see next chapter for a discussion of reticence around explicitly feminist ideas). She does not clarify the kinds of questions which would be better asked of women, and this lack of clarity runs all the way through her statement to the lack of 'opinion' even after she just expressed one. Looking back, it would have been beneficial to have encouraged Anna to go into more detail in regards to the types of questions she might bring to a female faculty member.

For those students who do connect with female professors, like Gwen and Hailey, those connections seem to be about more than engineering.

> Gwen: This past semester I had the chance to take two classes with an awesome female engineering professor. She had a huge positive impact on my life last semester. She's so open to talking about pretty much anything and can be counted on to provide reasonable input. You can tell she does her best to be honest and live in accordance with her values. (Gwen, sophomore electrical engineering major, 18-22)

Gwen does not use the word ‘mentor’ but relates to this female professor as such. She specifically appreciates the professor’s perceived honesty and values.

> Hailey: So I, this last semester, I got to take ethics with a female engineering professor, and that was really cool because she is extremely conservative and to be around another female who is extremely conservative and an engineer, that was really cool. (Hailey, junior mechanical engineering major, 18-22)

Like Gwen, Hailey is drawn to a similar belief system and identifies as ‘extremely conservative’. It’s a common assumption that female engineering students can benefit from the professional experiences of female engineering professors (see page 22). Gwen and Hailey, though, seem to see that as a sidebar in the relationships. Choosing to attend a private, evangelical university is arguably as much about shared values as it is the education. These participants are drawn to those who share similar beliefs as mentors as much as they are to those who have a career they would like to emulate. While this demonstrates a power differential between professor and student, the differential is perhaps deemphasized as it is layered underneath respect and heroism. Within this Christian culture, mentoring is multidimensional, and students are looking at the adults around them as more than professors teaching a specific subject, they are looking at the whole person, both academic traits and non-academic traits, as someone to pattern themselves after.

Another dynamic in the relationships between students and professors is the acknowledgement of the minority status of these female students. Both Anna and Beth describe being told to consider graduate school specifically because they are women.

> Anna: So yeah, several of my professors have said that, as a woman in engineering, while, while being women in engineering is becoming a lot more acceptable in the US and it's, you know, you can find a job…it's, people don't look down on you…that's not the case in a lot of, a lot of the rest of the world, particularly the places where I want to live. And they've told me that if I get a Masters or a PhD it'll give me a lot more credibility to do the work that I want to do, um, whether it would be maybe teaching as a professor in a university or working on projects in the field, which I’m not sure how all of that would work out exactly because I know in some areas, you know as a woman, I can't really do anything because it would create like a, a cultural barrier between me and the people that

> I'm trying to reach out to, so I'm not sure how all of that is going to work out in the end, yet.

Anna would like to be a missionary and use her engineering degree to enrich the lives of people around the world. So, when she comments here on credibility, she is echoing the view of her professors that other cultures may not believe a woman is as equipped to be an engineer as a man is. They encourage graduate school as 'proof' of ability. Anna also acknowledges that some other cultures may not accept her as a female engineer not because they question her skill but because of her gender. Connell (2014) in fact comments that while there is no global model of gender relations, the changing dynamics in postcolonial countries has led to a more 'essentialist, heterosexually defined masculinity' (pp. 225). Anna may be seeing this more acutely in other cultures than in her own.

Unlike Anna, Beth is not looking at engineering in an international context.

> Beth: I've been encouraged a lot to look into that and to apply just to see, especially being a female engineering student they do encourage you to do that because you have a leg up, which is kind of cool and that is, honestly, encouraging to me.

Beth has still had graduate school suggested by professors as a way of standing out amongst other engineers. The implication is that both women must do more to prove their abilities. It is not clear where the professors might be coming from in this advice. It may be good to realize that the female students are not viewed in the same way the male students are upon graduation, but we do not know what counsel may have been given to male students. These participants see the advice as positive and sound appreciative that their professors are invested in the pursuit of their goals.

The student participants demonstrate a respect for the professors in their lives. The women seek to give overall positive appraisals of power dynamics, but it cannot be assumed that these positive words are not also a way of demonstrating their respect. When Connell (2006) describes the gender relations of power, a key insight is that women can seemingly go out of their way in trying to prove that they experience equality in areas where some positive change has

occurred. These students know they are a minority group and have expressed the care they've felt from both male and female professors. The implication is not that the dynamic is perfect, but that these students may be sensing a positive shift in the gender regime of university engineering.

Student Relationships with Peers

As the literature has discussed (see page 37), relationships with authority figures are important, but so are relationships amongst peers. Participants discussed their interactions with male students, with several speaking of similar feelings of awkwardness in the situation. This demonstrates a seemingly immediate categorization of male students and female students and a comparison between the two.

> Anna: I would usually go to my other female friends to ask for help on homework and I felt a little less comfortable going to some of my guy friends for help, because I was sometimes worried that they would misinterpret my request for help as something more that I didn't intend. So yes, there, there were, especially my freshman year, as I was still getting to know people at the beginning, there were definitely some days where I felt a little isolated and alone doing homework and wanting, wanting some people to help me out but only having like a few options of people I don't know if that makes sense.

For Anna, her minority status in engineering led to feelings of loneliness. She feels most comfortable studying with other female students, but she has a limited number of options as they are fewer in number. These feelings of isolation may not be shared with her male counterparts as they are the majority group and would have many students with whom to work. Anna's reason for feeling awkward with the male students is a concern that they would think her intentions were romantic rather than academic. This could be seen as an example of compulsory heterosexuality within this local gender regime. It is assumed that communication between the sexes could or would lead to sexual interactions or harassment.

Beth also expresses the romantic concern in making friends with male students.

> Beth: So it was kind of weird, I was like, I was expecting to be the only like, like one of very few girls. I didn't realize like what that would

> actually look like, and a lot of my classes, especially like the engineering class and the math classes, um. It was kind of weird because, like making friends in those classes is kind of weird because I like, I've never had an issue like making friends with like guys or anything, but it's like when like most of your classes, especially like second semester freshman year, when they're like all guys it's like. Um. I mean honestly, it's like they think that you're trying to like date them or something like if you talk to them or like trying to like have just a general conversation with them. It's just kind of funny. Um. So you really quickly like get to know the girl engineering students in your classes and make connections right away.

Unlike Anna, Beth speaks more in terms of building friendships than studying together. She expresses an ease in being friends with male students in the past but references a change in dynamic now that she is in a male-dominated discipline. The male students see female students more in terms of possible romantic relationships than as fellow engineers. Friendships with female students seem to feel safer from romantic misconceptions in this heteronormative university gender regime. Beth also seems to be trying to minimize the seriousness of the situation by referring to it as ‘funny’.

> Darcy: Yeah, I mean here like, at first, like all the dudes are like almost afraid to talk to you, which is kind of funny. Like we've all said the same thing. But, like, I know, like between me and the other girl engineers, like we became really close and then eventually like the guys warm up to you and they'll talk to you some. But it just kind of takes time.

Darcy seems to know what her fellow female participants have mentioned in terms of gendered relationships when she implies male students are ‘afraid’ to talk to them because they are female. Like Beth, she uses humour to downplay the situation. She acknowledges that the discomfort with the male students may be temporary.

Anna, Beth, and Darcy are all concerned about how their contact with male students will be interpreted. They are looking to make friends and find help with coursework, but they suspect the men will think they are flirting or romantically interested in them. So, the feelings of loneliness associated with being a member of a minority are compounded by concerns of not just being misunderstood but of being sexually misunderstood. This is generally something which is laughed off, as it was by these participants, but it points to a serious issue inherent in environments where women are a minority.

Unlike those above, Faith speaks openly about her feelings of inferiority. She does not mention the issues with romantic interest but rather is concerned about how much more prepared the men seem. She is still constructing men and women as two separate categories and making a comparison, choosing to turn her focus to a different comparison from some of the other participants.

> Faith: Yeah, so I did expect to be part of a minority, and I am. Um, at first, I guess, it was a little less intimidating because there were more females, but, you know, as we went through more semesters more and more of us dropped out. So it definitely, um, was and still is a challenge sometimes, um, feeling like you're in the minority, and there's a lot of guys in our engineering classes who have been like, who have been involved with different types of engineering programs and clubs in high school to now. I came in without that experience, so I did feel kind of, um, I guess inferior to the other guys who have been like used to this kind of stuff. But they haven't made me feel like that. Like the guys that are in my class do a very good job at like including the females who are there and, yeah, sometimes I do like get intimidated by how smart they are and how many of them there are, but overall it's been a better experience than what I initially thought it would be. I thought they might be like a little bit demeaning, but it hasn't been that way at all.

Faith makes a point of saying that the men include the women and are not ‘demeaning’, but she does still feel that they are smarter than her and have had more opportunities than her. She specifically references high school activities that these male students were a part of, and she was not. It is not clear if she did not have the same opportunities or if she did not take the opportunities, but this feeling that the men are smarter betrays another symptom of minority membership – believing oneself to be unworthy. She is there, in the classroom participating, but she seems less sure that she belongs. She says that she feels less so now and that the students did not make her feel this way, seemingly going out of her way to not place blame, but she does still speak of being intimidated in the present tense. She seems to feel there is still a hierarchy within students, even as she has gotten farther into the programme. Her feelings demonstrate a similarity to the ‘benevolent sexism’ view of some evangelical men (see page 20).

Like Faith, Hailey demonstrates concern over her identity as an engineer.

> Hailey: I was extremely excited to meet everybody, I was, um, really happy to just be with a bunch of Christian engineers. And I knew in the beginning that a lot of people weren't going to make it, and so I think that really affected me as well as like knowing like am I going to make it? Am I

> in the ranks of those who are going to make it? And when I would meet other engineers, I kind of questioned that in my mind, like is this person really an engineer. So, and I would also say like in the very beginning SWE was something that was extremely exciting for me. Um, SWE… I really didn't have very many female friends growing up, and especially not like group of female friends, and so I think SWE is the first time that I really had a good group of female friends. So that was really exciting.

While she is clear in her excitement and appreciative of making female friends through SWE, Hailey did not elaborate on why she has struggled to form female friendships in the past. She also seems keenly aware of the perception of the engineering programme as difficult. She looks at her classmates and wonders who will be able to finish the programme, ultimately questioning if she herself will. There is a seeming dichotomy between her expressed happiness and her concern for belonging. Hailey has a sense of what an engineer is and struggles to identify as one.

In terms of peer interactions, Cassie has a unique experience when compared to the other participants. She is the only one who is involved in athletics. Even though her soccer team is all women, they frequently interact with the men's team through practices and traveling. This means that she has a solid group of female friends as well as a common interest with male students.

> Cassie: So yeah, um, definitely in the minority, um, but yeah, I haven't found it to be too much of a challenge, or a hindrance. There are times when I'm, yeah I mean, I'm kind of in two different, very different spheres. I look at my experience, I'm kind of in either an engineering sphere where it's mostly guys, or I'm with my soccer team and it's all girls. So very different experience, but I appreciate the differences and, um, having a, I have a brother, so like I kind of, kind of know how some, you know, how you guys operate, and I can appreciate the humor and some of the things they do, and then it's kind of nice. I can go and hang out with some of my girlfriends too, you know. (Cassie, junior civil engineering major, 18-22)

Cassie is forthright in saying that engineering is primarily male in number and that that dynamic is different from her all-female soccer team. She says she appreciates the differences between the two experiences. She also explains her comfort around male students is related to having a brother and her ease with him. Cassie links her comfort to her family structure, but that does not mean that none of the other participants have brothers and are therefore less comfortable with male students. It could be that Cassie's experiences have been different or that she has personality traits which make her more confident in the

situation. Continuing on, Cassie says it was men who invited her to study with them, an action which she credits with helping her stay in the engineering programme.

> Cassie: I think it was the volume that really, you know, ate at me and, um, simultaneously having to take, I think I was in calc three and a civil engineering materials course. So this is a really heavy course load and, um, that, yeah, that really became overwhelming. And I remember just feeling like I need to change my major, like I can't do this anymore. I've tried reading the textbook, I've tried trying to find help online, I've tried going to see my professor, and, um, one night a couple of friends of mine that are on the men's soccer team texted me and they were like 'hey we're going to be studying in this cafe in our campus, you want to come study?' and I was like I got no other option so I may as well try it. […] But to have other people to link arms with and say, you know, we're just going to struggle through this together, that was really a big turning point in my educational experience.

It is possible that the presence of an outside factor, in this case soccer, could increase the comfort between male and female engineering students. It is a common ground beyond academics which other participants do not seem to have in their experience. Regardless of the reasons for it, though, Cassie seems clear that this study group, this community, gave her the encouragement to continue in engineering when she was unsure she could do so on her own.

Finally, Emily's take on student relations cuts straight to her own feeling of isolation in referencing her interactions with other students.

> Emily: Um, I think most of it comes down to what I've done personally with just sort of how I've distanced myself from others, to a certain extent. So maybe like trying to be a bit more proactive and like making sure that students are able to form groups with each other and that would probably just be the best way to like make sure no one gets isolated off on their own and will continue to do so throughout their studies.

Emily is able to recognize how her own behaviours have impacted her relationships with other students. When asked what could be done for future students, even though she does not demonstrate regret over her actions, she points towards a need to connect. She seems to see early decisions as leading towards continued isolation in her own student experience, and this is not preferable in her mind. We cannot be sure if Emily actively chose to distance herself, or if she felt pushed into the situation. Either way, she, as do the other participants and a wealth of literature (see page 36), emphasizes the importance of community.

‘Emotional connections and antagonisms are unquestionably a significant dimension of gender regimes’ (Connell, 2006, pp. 843). The students express a variety of interpersonal experiences with fellow students. They share discomfort in possibly being misunderstood by male students. They also share insecurity in their place in the programme compared to the other, specifically male, students. But as Emily seems to suggest, these experiences with other students have merit regardless of the outcome. These interactions, the good and the bad, are helping participants formulate their identities as engineers.

Group Project Dynamics

Interactions with peers can take many forms, but female and male students working together on engineering projects have specific implications for future work dynamics. In this university setting, female students and male students are assigned the same work, or labour, however the ways female students address this work and study give hints towards their understanding of gender and labour. This engineering programme is largely project-based and provides opportunities for students to navigate how they will work together. Connell (2006) describes the gender division of labour as a ‘powerful presence’, and this can be seen as female participants share their experiences navigating working alongside a majority of men in their studies. In this specific engineering department, there is roughly one major group project per academic year. As participants describe their experiences in the various projects, there are signs that, particularly in the early years of their experiences in the programme, discomfort exists in determining their place in the assigned project workload.

Gwen begins by showing a preference for working with other female students. Then, in denying awkwardness, she seems to reinforce the stereotype that male engineers must somehow be awkward in their interactions.

> Gwen: So if I have a group project usually I’ll tend to do that with other girls. But I mean, the guys there aren't too, too weird. It's not awkward to talk or do projects with them either.

It is unclear exactly what Gwen means when she says that the male students are not ‘too, too weird’. She seems to express discomfort and then try to walk that back by saying she does not have an issue working with the men. Gwen is already grouping her fellow students according to gender and classifying her interactions with them accordingly. This seems to be another example of participants having an opinion but then possibly softening it in the interview.

Indeed, personality and individual interpretations of skills and events also come into play when participants describe their experiences. Anna describes a group project in which she was the only female.

> Anna: There are four people in my group, myself and three guys and two of the guys were really handy with, you know, using power tools and building things so myself and one of the other guys, we did a lot more of the, the research and the calculations and kind of the design work. Um, and then the other two guys, who were good at building things kind of built the model that we had designed, um, but so it was it was good that we were able to communicate clearly as a as a team and figure out what people's strong suits were and kind of divvy out the different tasks within the project based on who was good at what. I think we were able to, to delegate that really well within our team. Um, and it was it was an enjoyable, enjoyable project, like I really loved working with them.

While Anna and a male student worked on research, she is not clear as to why she does not consider herself ‘handy’. It may or may not reflect the gendering of work in delegating responsibilities. She expresses positive feelings about their communication as a team and the way skills were used, but there is a hint of ideas of ‘appropriate’ work for each gender in her explanation.

Cassie does not describe any tension in her group work. She sees the whole class as having a close dynamic as they move through the programme.

> Cassie: And then, see, our junior year, so last fall, we did a water treatment system and it had to basically run autonomously…So I think I was in a group of four, worked with three other guys, and I would say at this, at that point, like our junior year our class has gotten pretty close, so everyone pretty much knows everyone and the dynamic was much more relaxed I would say.

Faith experienced more of a challenge in delegating roles.

> Faith: So we were split up into groups of three. And so I worked with two other guys and it wasn't just like putting it together. We had to actually

> like choose what type of a truss we wanted and just design how we would connect the joints and everything. So, um, it was a little bit challenging to adjust to like our roles at first just because it was our first major group project and there was a lot of it involved…So the two guys that I worked with, we all have very different skill sets so we kind of had to coordinate with each other who would be doing what and how we would be able to help one another, if one of the persons had more like a higher workload than the other. So it was a good learning experience and just learning what each other's skills were.

For Faith, the experience is still considered positive, but she is open about the effort and time involved in becoming familiar with the skills each student possesses and how best to manage the workload.

Hailey echoes this sentiment, feeling that she has become closer to her fellow students through the process.

> Hailey: Um, but as far as like classwork and group projects that way, I really enjoy those. I think I really, this last year especially, I've grown really close to my classmates, and not just the girls, which before I had just really gotten close to the girls, and now I feel like I can call most of the guys my friends as well, which is cool. And, yeah, I feel like being at *university* I haven't really felt like there's been people that I want to avoid to work with, if you know what I mean. Like there's kind of generally across the board, yeah, there's people that maybe I don't work as best with, but I would still be like willing to work with just about anybody.

Hailey acknowledges initial comfort working with other women but says she has developed friendships with the men as well over time. She admits that there are some students she would not work as well with as others (we are not clear how this group is comprised) but show a willingness to partner with anyone.

As Anna, Cassie, Faith, and Hailey describe their experiences, they focus on the positives of working together with their classmates, of both genders, and in learning how to navigate the different skill sets. They detail the ways responsibilities are divided but also reflect on the feeling of community they enjoyed in the project process. Overall, they see it as a positive process. Unlike those above, Gwen describes a project which was divided along gender lines and which served to encourage her to become involved with SWE (Society of Women

Engineers). For her, it was working specifically with other women in the programme which created comfort.

> Gwen: And so the teams are divided up by gender so that if you want to build your canoe in your dorm and stuff like that it's easier. So SWE kind of unofficially takes charge of the female teams and they'll supply the upperclassman for the canoe team. So that's how I first got involved in SWE. We all, all the female teams got together in one, like one big room and we all built together. And so, if there were times where we needed a bunch of hands to roll one of the like, one of the parts of the structure, then we can help, help each other out.

At this university, and many such evangelical schools, dormitories are divided by sex largely in an effort to promote conceptions of modesty and sexual purity (see page 23). This is why Gwen says it is easier to work on this project at any time as all women have access to the facilities. Students in their third and fourth years join the younger students in the building process, and SWE members were active in this. For Gwen, this is how she began to build a community through that organization.

Emily's experience is unique amongst the participants in that she references having a 'harsh' demeanour. She also seems to defer to her male counterparts when it comes to the building portion of a project.

> Emily: The first one would be my second year in the, well actually first one was freshman year fall semester and that was a group of girls now and was sort of eh because we just didn't really know each other too well and we just tried to work together and it worked relatively decently. And the next would have been sophomore, well second freshman year, spring semester, when we were working on a bridge and it...that one worked pretty well. What I did for that one was mostly the modeling and then also like measuring and cutting measuring for the members that we were using to build the bridge. Then the guys really just mostly took over for the assembly because I was like 'I don't have the technical skills to really do this efficiently. I'll leave it to you guys' and then after that it's been pretty well a lot of guys on most of the group projects, occasionally girls. This time my lab partner is a girl this semester, so that's been pretty good. Apparently I can come off a little harsh towards her sometimes. Whoops.

This description is particularly interesting because it could be speculated that Emily exhibits a harsh demeanour in an attempt to distance herself from 'emphasised' forms of femininity, more so aligning with Connell's hegemonic masculinity. She is somewhat callous in her description of possibly offending

another female student. At the same time, she says the male students have more technical skills than she does. It could be that she sees this as an honest appraisal of her abilities. It is also possible that this acknowledgement is related more to classic gendered stereotypes which say men have more technical prowess than women (see page 29). So, Emily does not speak very highly of her experiences working with female students, and she allows male students to take the lead in assembling projects due to her self-determined inadequacies.

Beth describes herself as having this same lack of technical ability but uses it to reinforce her preference for leadership roles when working on projects.

> Beth: I've always, um, been more like in a leading position, just because I am not soft spoken really and I, I like managing people, to be honest, so I, and I'm not always, like I've never considered myself like the smartest or the most like technically inclined engineering student out of a group. So being in a like leadership position is very comfortable because I'm more like managing and like timeline and like making sure like people get stuff done and like also, of course, like doing technical stuff. But. So yeah, pretty much, on all that, all projects that I've done, I have been in more of a leadership position.

Taking on a leadership role would typically be seen as showing confidence in her engineering abilities, but Beth seems to downplay her technical abilities. In fact, she also minimizes her intelligence. She may not be demonstrating confidence as much as she is finding a role which she feels comfortable assuming.

Of all the participants, Ivy provides the most dynamic view of being a female engineering student working on a class project.

> Ivy: This past semester, I was in a group for my intro to civil class, we worked, we built a bridge, a little footbridge, 20 feet long. Um, and so I was in a group of four with another girl and two other guys, and I think getting started the guys took over with assigning us what to do and how to go about different project tasks that we needed to complete. But I'm the kind of person who's a little bold, I'm like 'wait, hold on a second. What if I want to do something else, or like I think I'll be better at helping with this' and other girl was a little bit shy, and so, but after a couple of weeks, like we all became pretty close and more comfortable working with each other. And so even a professor, we were working on our bridge, assembling, and one of the professors saw, who was a lab technician, that saw that we were like putting together our bridge and us two girls were standing to the side while the guys are doing the work because I was asking like 'hey, like, how, what do you think?' I don't mind if one of them was like more of a leader in the group, which I'm fine with, but it's more

> just I don't want to just stand here and do nothing. I want to take part and be active, and so the lab technician came over and he's like ‘hey, why are you guys standing around? Are you okay? Like, is everything fine?’ I was like ‘well, I’m not sure how we can help right now, and they're just doing all the work and I’m asking and they're not being super responsive.’ So, um, but the lab technician stepped in and helped with making sure we were able to get a spot in putting together the bridge and after that one instance, it, it was just like the four of us were equal and working together.

In this description, we see male students stepping into a leadership role, seemingly without consideration of possible interest from the female students. Ivy is confident enough to try to stand up for herself, but the other female student seems to accept the male leadership. Ivy’s voice is not heard by the male students, but a lab technician, a person in authority, steps in. It is key to note two things here. First, Ivy does not accept that her ideas have less worth because of she is not male. Second, the lab technician was present enough in the situation to see what was happening and demonstrates a more equitable understanding of work on the project. Ivy kindly concludes by saying this altered the team dynamic and things went well afterwards. It is unclear, however, if the change in behaviour exhibited by the male students was related to a better understanding of equity or a respect for the authority exhibited by the male lab technician.

In light of all the participant interviews, it seems that the women overall have constructed positive interpretations of their experiences with both male and female students. Many feel a solidarity with other female students and a camaraderie with the male students in their classes. However, the descriptions used do still seem to show that female students feel less technically adept than their male classmates. They relinquish those tasks to the men and sometimes need to push to be heard. It may be good that the women have positive feelings about their project experiences, but there is evidence that they do not feel full equity in their work.

Looking Through the Lens of Professors

After having interviewed the student participants, I decided it was important to gain some data on staff perspectives of gender dynamics in the engineering department. Luke, a male civil engineering professor, first discusses the interaction between professors within the department. He notes that many are more advanced in their careers and less interested in learning new and possibly better practices.

> Luke: There's quite a bit of kind of focus on continuing to do things the way that they have been done. And to some degree I've even caught some a little bit of sort of dismissal of some of these ideas related to just general engineering education related stuff, how do we do things in best practice. […] I think I'll probably get there myself someday, I suppose, but I think if you, when you do this for a while you figure that you've already figured out the best way to do things, and so I have noticed that there is a little bit of a greater resistance to change, um, less flexibility, more resistance to new ideas kind of thing than I've seen previously in other places. (Luke, associate professor of civil engineering)

Luke seems open to advancing his teaching practice and learning new and better ways to do what he loves. He says there could be resistance to this in some of the older members of the engineering faculty. It is not clear if Luke is directly referencing gender in these statements, but as he will later do this, he could be acknowledging the less equitable views of older academics in his department and a resistance to seeing the systemic changes Luke himself will later mention as necessary.

Kristin, a professor of electrical and computer engineering, describes what she interprets as a paternal feeling displayed towards her by other (male) professors.

> Kristin: Um, the other faculty here are really great. I mean, they're all like a bunch of dads, you know. They all have daughters my age. Well now there's more younger guys who are more, you know, more my age, but um. The ones that I had been familiar with, you know, I always had good relationships with them when I was a student, and they always treated me really well and I felt like, you know, that it would be a supportive environment, super not worried about interfacing with them. And yeah, they're, they're fantastic, they're good guys. I mean there's, there's a lot of power in a good man. Like a man who's willing to be a man and do the manly things and treat women like they're women, and that's the way that they treat me and it's, it's very positive. (Kristin, assistant professor of electrical and computer engineering)

These are interesting comments to analyse. Acting like fathers can be seen as infantilizing female professors, feeling as though they need to be cared for in a way the young male professors do not. While Kristin does not see this as a negative, her statements uncover a sense of inequity amongst the professors. She is acknowledging a hegemonic masculinity within the engineering department while trying to rationalize its existence. She also references treating women 'like they're women' in a way which may further emphasize an evangelical complementarian view of women as essentially different than men (see page 18). Kristin is demonstrating a desire to practice a type of femininity within the department by making this comment, and she has enacted this femininity in the context of what she interprets as deemed appropriate by the organizational culture.

Unlike Kristin, Luke views the small number of female faculty with a critical eye and as evidence of inequity. He uses this as he speaks with female students about their future.

> Luke: And I, and conversations that I've had with them over the years have been things like, oh, look at your faculty and like where are all the, the female faculty members. Especially at the old university I was at, there was zero out of 30, I think, when, when I was last there or a couple of years ago. A little better here at *university* in the engineering department. There's, there's at least a few women that are representing the, the full-time faculty members. But I'll say, I'm talking with students, just like look, I, it's, there's no one like you teaching you right now, at least in this way, and that's potentially challenging and so maybe you can be the, the person that someone in the future can look up to. And I think that conversation I've had with a number of students who are now in grad school getting their PhDs. So hopefully we'll see a few, few more female engineering faculty members in the future.

Luke uses the lack of female faculty to serve as encouragement amongst his female students to pursue further education. He encourages them to become professors themselves to be able to mentor future female engineering students. By doing this, Luke demonstrates a concern for the future of female engineering students and the department which Kristin does not explicitly articulate.

Continuing on to his perspective of student work, Luke states that his experience has proven to him that female engineering students are harder workers than the male students.

> Luke: But as a general statement, the, the female students that I've had in my engineering classes generally performed better than the male students. Or if they don't perform better, they at least try harder. The quality of the work that I get from female students is almost always somewhere within like a pretty narrow range of quality that's somewhat towards the top, and then the quality of work I get from male students is probably much, much wider spread that definitely extends further down. So that's, that's always been kind of an interesting thing to me is, as far as why they seem to show up better motivated to try to perform well in the courses.

What is not clear in Luke's statement is his reasoning as to why women work harder. Assuming that he is correct in his observation, multiple explanations are possible. The female students could be smarter, more dedicated students than this group of males. But the women could also be working harder due to their minority status, feeling that they must prove they belong in the department. Or it could be that the work of the female students stands out more to Luke because there are fewer of them in the programme, and he is paying more attention to them. This concept of hypervisibility can lead to students feeling as though they have been denied a voice or recognition in their studies and perhaps have even become tokens within the department to prove diversity (Vaccaro et al., 2020).

As professors discuss interactions with others along gender lines, Kristin states both as a professor and as a student at this same university that she never felt gender was an issue. (This seems to fall in line with the idea of not wanting to be seen as wanting or needing preferential treatment as discussed on page 35.) She says she understands how being completely alone could be awkward, but she never felt completely alone, and she now encourages her students not to view gender as an issue for themselves.

> Kristin: I think, um, I think the fact that we have female faculty is a plus for the female students. I think that if we had no female faculty, they might find that kind of awkward. I know, um, one lady who was an instructor for us for a while had done her undergrad at *university*, but like, you know, maybe a decade or two before I had, and she was the only lady in her graduating class and there were no lady faculty. It was a much smaller department at the time, so just kind of odds, you know, but, um,

> and she seemed to think that was like really significant. And, um, when I was a student, I think we had one, one female faculty at *university*, again we're talking about like one out of 20 people or something. So it's not like, it's like the proportion is about right according to what who's available, um, but yeah, I don't know. I didn't find it to be an issue. I suppose it probably, I could imagine it feeling different if you were literally the only woman in the class and there was no female faculty… I try to encourage my students not to make it a bigger issue than it is, you know.

Kristin works hard to downplay the gender issue. She places distance between herself and another female professor who thought her gender was significant in her studies. As one of the student participants did, she relates back to the idea that representation should be proportionate, or at least that if it is proportionate than that should be acceptable. This mathematical way of viewing the number of female faculty seems to remove the personal or emotional connection to representation.

While Kristin believes gender should be a non-issue, Luke has attempted to confront it head-on with his female students.

> Luke: And so it's been a number of years now, but I even went so far as to basically have like a mini conference with the women in the civil engineering program where we sat down and talked about, here's, here's some kind of national statistics on what it looks like to be a female and be in engineering. Here's the challenges. Here's what happens. I mean there's the statistics about things like female students who get an engineering degree and never work in engineering at a much higher proportion than, than male students. And so talked about some of those things with some students just from the perspective of really just wanting to get feedback from them on are they - given that we're already pulling students, female students, into the program - are there things that we could do that would make it an even better experience for them? Are there things that we're overlooking that, that cause problems? And are there, are there changes that we can make to basically just try to build on what was already sort of looking to be somewhat of a strength? So I think that was, that was a good opportunity to talk with some female students.

Luke takes a feminist approach and demonstrates an awareness and concern for the female students in his department, knowing they face challenges the male students do not face. He continues on with what he learned from meeting with the women.

> Luke: Learned pretty quickly that, and this should not be shocking by any means, but different students have different perspectives on it and there, there were some students who were eager to talk about it and felt like it

> was a very important part of them and their engineering experience that they were female in a male-dominated discipline, and there were some students who did not feel that there was any influence, didn't want to, didn't want to, I think, have it phrased in such a way as like they were overcoming disadvantage or anything like that. And so it really is, is kind of individual, I think, as far as how the students felt about being female in engineering and how important that they felt that was to sort of their, their development and what they hope to do.

Luke's insight into the individuality of experiences and interpretations of those experiences is born out through this research. He does not use a term such as hegemonic masculinity, but he does grapple with the concept of challenging the gendered order of engineering. Luke appears to be embracing a view of needing to fix the system rather than needing to fix women. He seeks out feedback and advice from female students, recognizing that he cannot understand their experiences. Luke seems to be attempting to give the women power they may not feel they have in their daily lives as engineering students, power to have their voices heard. It is unclear if the students would see this or feel as though they could be honest with him as he is still in a power position himself as their professor.

Luke and Kristin have nearly opposite views of the gender order in engineering. One might think Kristin would challenge the current construction because of her gender, and yet she seems to instead question why anything might be seen as 'wrong' with the current order. She does not seem to advocate for gender blindness but rather sees males as a protective influence even amongst professors. Luke, however, is actively working towards recruiting female students into academia to increase female representation. (This will be addressed further in the following chapter.) The cultural influences intersecting with the views expressed by these professors and the student participants are discussed in the next section.

Religious Culture of the University

Analysing the gender dynamics in the engineering department at this specific university would not be complete without acknowledging the profound influence of Christian faith. The world of evangelical Christianity in the United States has a

culture all its own (see chapter 2), and that culture intersects with engineering at the university researched. Many of the words used, actions taken, and worldviews shared demonstrate the pervasive nature of religious thought and behaviour. Connell (2006) describes the gender culture and symbolism of an organization as 'the way in which gender identities are defined in culture, the language and symbols of gender difference, and the prevailing beliefs and attitudes about gender' (pp. 839). This university will have developed a gender culture of its own, but that culture intersects with evangelical belief and teachings regarding gender.

This sense of culture becomes evident as Anna tells a story reflecting the tension of working so closely with men.

> Anna: So I had, I had an opportunity to do an internship in Ecuador, for this upcoming summer to work on a water project, and I was, I was really excited for the project, um, and just for the experience that it would offer me to be you know, working on something in a context that I hope to be working in, um, in the future. Um, but then I learned that I would be the only woman on the team, so all the other interns and the other engineers I'd be working with were all men and I didn't feel comfortable going to another country without any other women on the team. So I unfortunately had to decline the internship. And I'm looking for other options, but that was, that was a big letdown for me. Because I think that was the first time where being a woman in engineering like had a significant impact on something that I wanted to do. Um. Yeah, rather than just like little relational things like in my classes, but this is like, you know, an internship that I was really looking forward to. Um, and I never expected that I would have to decline something because I'm a woman or, you know, wouldn't get an opportunity because of it.

As noted earlier, part of conservative Christian beliefs is the notion of modesty and purity in male/female relationships outside of marriage. In most cases this means no premarital sex (see page 23), but some conservative Christian groups take it farther to mean little to no physical touching at all. For a young woman like Anna, travelling, especially great distances, alone with men could create an image of impropriety and an opening for something inappropriate to happen. It creates a sense of discomfort which, in her reflection here, leads her to begin to wonder about her place in the profession. Anna is serious in her concern that she will miss out on professional opportunities solely because of her gender. This line of thinking might not even cross the mind of a female student without the same cultural conventions around behaviour.

In an almost opposing story, Beth identifies with a father from a mission's trip when she was younger.

> Beth: I remember when I was in high school, I went on a lot of mission trips and they would always bring like the handy parents along and, um, like one of my favorite leaders, he was a chemical engineer, but he was like really good with tools and whatnot and I would always go onto work sites with him and we were just like talking about engineering and it was always fun. So like I hope to be that parent someday like going on my, my kids mission trip with them, maybe in high school or something, when they're in high school, and just being able to help out in that way.

We do not know how many women may have been on this trip, but Beth does not seem to make a distinction between genders in this memory. She related to a male engineer and then hopes to be able to be similar, as a female, on trips with her own children. It is interesting that two participants who have such similar belief systems as Anna and Beth would have such different ideas about how their gender may impact their future in engineering. This could point to the importance of individual experiences beyond shared cultural beliefs and norms. It could also demonstrate that two female engineering students, attending the same university and agreeing to the same doctrinal statement might hold different constructions of gender. The women may be enacting different types of femininities within the department gender regime. The variation in these femininities could be based on individual beliefs as well as commitments to cultural and career demands (O'Connor, O'Hagen, & Gray, 2018).

So if views of femininity can differ, as seen with Anna and Beth, what is it exactly that these women believe in common? Anna, Cassie, and Ivy show evidence of an underlying belief of a greater purpose in their studies.

> Anna: Um, but I don't think it would be a complete failure if I didn't go into engineering, because I have learned so much while I'm here that's not even related to civil engineering. Whether it's growing in my relationship with the Lord or learning a lot of soft skills, how to communicate with people, how to work in groups, how to be diligent and persevere. All those things I can take into any field. And I would also love to be a mom and have kids and a family and I don't know how that would all work out with…um…pursuing a career as a civil engineer.

Anna is pursuing engineering as a major but is seen here to be creating a dialogue in the case that she does not pursue engineering as a career. She

expresses her desire for a family and admits to being unsure of how to do this and be an engineer. But in her explanation, she lists the many things she has learned through her studies. They tend to be related to personal development, and she mentions her relationship with Jesus. The decision to attend an evangelical university includes an emphasis on the personal nature of Christian faith. Anna is reflecting the importance of this in her life and sees it as a positive outcome of her university experience.

> Cassie: But it's applying the, the gifts that we've been given in math and science to something that can be practical for, for humans, so.

Here, Cassie is referencing a belief that people are 'gifted' or talented in specific areas. She describes her pursuit of engineering as using a gift she has been given – underlying assumption is by God – to help others. It is possible to look at the term 'gifted' and believe this in some way makes the decision to pursue engineering less of a choice. For Christians, the concept is less about removing choice and more about providing a purpose.

> Ivy: And in high school, I was talking to my math teacher about it and he's like 'you should just try. You should see if this is something that you want to study in college and just go for it. If you don't like it, it's okay. People change their major all the time, so I prayed about it, and I was nervous because I know it's a more difficult major than others, but I felt at peace about it, so I just decided to go for it…I love it, I'm excited to go forward and just see how the Lord works through my classes and, hopefully, I stay in it. And if I end up switching, I know that it was all part of His plan anyways, so I'm fine with that. But I love it all right now, so.

Like Anna, Ivy seems unsure if she will finish the programme. Also, like Anna, she is looking at the positive side of being in the programme now regardless of what happens in the future. She references the idea of a larger purpose to life by speaking of 'His plan' and believes in an active, personal relationship with Jesus which sees Him involved in her classes. This is a key – perhaps the key – aspect making this research a new contribution to knowledge. The participants have demonstrated similarities to past research in their understandings of being a minority in the field of engineering, but the way in which these women react to their studies takes a different turn as they emphasize the Christian religious concepts of giftedness, God's plan for their lives, and their relationships with their God. This is the undercurrent running through their university experiences and which gives their work purpose despite where their futures might lead.

Kristin addresses the culture of the university from a professor's point of view by discussing the ideas of a 'standard of behaviour' and 'moral code' which she believes students at this evangelical university share.

> Kristin: Um, I mean, somewhere at a big state school like that I think you get a much, like a bigger standard deviation, but also a lower mean. That's kind of the way that we came to see it. And I don't really, it's hard to say exactly why that would be, like why, I mean, perhaps the university culture just kind of, you know, encourages a certain standard of behavior. I also think that they tend to be from a certain kind of family that encourages a certain standard of behavior, and the expectations are perhaps more homogeneous than they would be at a bigger, more secular school.

Kristin is using mathematical terms (perhaps demonstrating her STEM credentials) to say she believes a larger university would have more differentiation in student behaviour, but that the average behaviour of students would be less 'good', read as less moral, than the average behaviour at this small Christian institution. She continues to describe the student behaviour she observes.

> Kristin: I think the fact that everybody does kind of come from a fairly cohesive like moral code or expectation makes a big difference. I think the boys treat the girls better at *university* and at similar places than they might, in general, secular universities. I think, I think they, they see each other more as having like a brotherly/sisterly relationship because of their shared religion, um. And I think that plays out pretty profoundly for the vast majority of them. […] That is the reality for the vast majority of people, that they have goodwill toward each other, and they have each other's backs because they believe that's right and they treat each other as properly as they can, you know. So I think that that helps, you know, even if the girls feel like they're in a minority. They don't feel unsafe. They feel cared for and they feel, you know, if the guys they're with are good guys, they feel maybe more safe than if they weren't with any good guys. So, at least that's the way I see it usually playing out.

While Kristin is making a case for the behaviours she sees as positive in the relations between male students and female students, she also demonstrates specific feelings about the families of these students and what the student concerns might be. In saying the students come from 'certain' kinds of families, she may be referring to the religious beliefs of the families, but in this case, it also brings with it the likelihood the families are middle-class, educated, and white. In commenting on male/female interactions, she says that the female students do not feel 'unsafe' as a minority. Again, she may mean to say that the women feel more physically safe in having friends who are men and could defend them, perhaps specifically safe from sexual harassment. This also reflects gender

conceptions within an evangelical gender regime, underpinned by a philosophy of complementarianism, where women are viewed as weak and in need of protection by men. However, the minority status of women in engineering is not just a story of physical safety. There is also a need for safety to form their own identities as engineers.

Luke also thinks highly of the opportunity to work at a university and express his religious views. Like Kristin, he discusses a 'shared set of values' which intersect with his teaching.

> Luke: I have a pretty high value on Christian higher ed. Um, I think that there's an opportunity there to share a common motivation with the students when, when we can talk about why we do the things we do. Having that that shared set of values, I think, it opens up doors to potentially be more effective with the things that we do in the classroom and also, just be more, more impactful as far as like the work that I'm doing teaching and what, what we're actually capable of doing. The things that we can talk about go far outside the sort of normal limits of what is engineering to talking about how do you, how do you make life decisions, how do you, how do you handle difficult situations in the workplace. And then some of that may come up in an engineering program at a secular university, but at a Christian school the opportunity to kind of look at the Bible together and use that as the kind of common ground for trying to help students sort of lay a foundation, not just how they're going to work but, but how they're going to live life after college and make use of these gifts that God's given them. I think that's, that's really important.

Luke's words here explaining the benefits of Christian education are a good summary of how evangelical universities market themselves to students. In many ways this is *the* shared mission and vision of the university. Students receive a quality academic education, but they also have faith incorporated throughout their work inside and outside of the classroom. Luke is using the same 'gift' terminology student participants used to describe their propensities and how those propensities can guide their futures. There is a sense of a bigger picture, a larger purpose, in what is happening which goes beyond engineering.

If this is how professors view the overall culture of the university, how do they see the gender culture within the programme? Summarizing her stance on women in engineering, Kristin questions the basis for wanting more women represented.

> Kristin: The way that I look at this is that I don't think that it does anybody any good to try to convince young ladies to do something that they don't want to do. I don't think it does them any good. I don't think it does the profession any good. I think that there's plenty of ladies, young ladies that do want to be engineers. And because I agree or believe that men and women do tend to have differences, I think there are ways that we can support those young ladies that might be different than the most effective ways to support young men. So, like on that level I'm, I'm all in, for, you know, like I, like I host SWE [Society of Women Engineers] parties at my house sometimes and, you know, stuff like that or… it doesn't happen, I think it's only ever happened once that a girl student came to my office because she needed a place to cry away from boys.

Here, Kristin makes several assumptions. She views the movement supporting women in engineering as attempting to push more women into a career they do not want. She acknowledges that female students may need to be supported in different ways then the male students but adds in a story about a woman coming to her to cry. She is quick to say this does not happen often, but this addition seems to suggest that she views crying as weakness and most female students are not that weak. This could be a demonstration of the gender dualism in which women are viewed as emotional and devalued compared to the rational control of the male.

Digging further into the issue, Kristin equates concern about the numbers of women with Marxism and directly questions why it is wrong for more men to be in engineering than women.

> Kristin: I'm glad I don't see *university* wasting too much energy on the whole let's manipulate young women to be engineers just so that we can pad numbers and look good to the people who are more Marxist than anything else. Um, I don't see them doing that. Whereas, at the same time, like our, our SWE chapter [Society of Women Engineers] is the most active student org. related to engineering like by far. They have like a whole mentorship program. They do all kinds of stuff. They're doing a fantastic job and I think that the girls really appreciate it. Like I think, I guess what I'm saying is I've seen that evolve over the last few years. I think it's evolving in a really good direction. It's actually helping them and not spinning any wheels. So, I guess I hope to see that continue to evolve as the apparent needs of the students evolve and I hope to continue to support that…I guess what I mean is like, why is it bad that engineering is 85% male? Like does it act- is it actually bad? Would it be better in any measurable way if it was different? And I think that, you know, the onus is on the people who say we need more women in engineering to prove to me that it's actually worth turning over our systems for, I guess.

In these comments, Kristin returns to the idea that women are being coerced into engineering and that doing so demonstrates more concern with equality (her Marxist comment) than with the women. She praises her institution for not being so concerned with numbers and praises the work done by SWE. It is difficult to question the positive impact SWE is having on female students at this university as many of the student participants show gratitude for the programme. However, Kristin comes back to the idea of numbers and rather bluntly asks why more women are needed. The question seems worthwhile to ask, but her final statement here is telling. Kristin says that having more women in the field of engineering would require 'turning over our systems'. It seems the only way this could be true is if she believes the academic culture of engineering is masculine. She is an engineer herself, and yet she sees engineering culture as male-focused with no need to change it. Kristin is not inclined to see the small percentage of women in engineering as a sign of a broken system, rather attempting to add more women could break the system as far as she is concerned. If the system is not broken, then men really must be more adept at engineering in order to explain their greater number in the field. This does make one wonder if Kristin sees herself as an anomaly in this scenario.

On the other hand, Luke is viewing the larger picture of faith, politics, and gender. He expresses discomfort with the way conservative religious views and conservative politics have combined.

> Luke: I've had some, some conversations with students. Some here and some at my previous university with female students where, I think, coming from a background of conservative Christianity which I think is probably, partially the, the conservative, the conservative theology of Christianity and partially that conservative politics that we also tend to associate with Christianity, for some reason.

Luke then goes on to describe conversations he has had with his female students in terms of their future goals. He notes at least three common responses he has heard from these students.

> Luke:I have, I think there's, there's some of that intertwined a little bit in that some of the conversations I've had with, with female students have been things along the lines of 'I don't really want to be in a leadership position because I don't think that that's necessarily something that's biblical'. And so I have had a few students who have graduated with engineering degrees where their, their goal is to actually never be in a position of leadership. They want to do, potentially, some engineering

> work for a little while but they don't see themselves as being, as it being appropriate for them to have goals of really advancing in the workplace. And, of course, a number of conversations with students who, for female students who for personal reasons have questions 'I-what am I doing in engineering if I just want to start a family someday', which is, I think, probably a really common conversation. But also some who, I think, have felt some pressure of 'what am I doing in engineering. I'm not supposed to have a job' which is then, of course, kind of a different topic entirely.

According to Luke, some women express concern about taking on a leadership role in the workplace. This reflects an adherence to the evangelical complementarian view of male headship. Others express concern over maintaining a work/life balance with having a family. A final group are not even sure they should be working, demonstrating an even stricter view of male leadership within the family.

> Luke: So I have at least noticed a little bit of that as sort of the, the, the culture here at *university*. I don't know that I would say that that's directly related to the engineering program so much as perhaps even just the, the customer base that a university like *university* tends to have and what their backgrounds are perhaps even before they come here.

Luke expresses concern with the conversations he's had with female students regarding their future plans. He will not relate that concern directly to actions of the university, but he does relate it to the culture amongst evangelical students, as he terms 'the customer base'. Later, he digs a little deeper into a specific conversation he had.

> Luke: It, honestly, it floored me the first time, a couple years ago, when I first had a conversation with a female student who was a senior, who was a high performer, and actually had them write a paper basically about like their, their career objectives and things like that. And I talked to her a little bit afterwards, but her paper was, basically was, was what I mentioned. It was like 'I don't really think that it's right to be a woman in a leadership role and so I'm not really sure what that looks like for me in engineering but I'm gonna get my degree and hopefully can find a place where I don't, I don't have to confront that potential problem of, of where I don't really believe that women should be in leadership roles'. And I mean if a male student had turned in that paper, we would have had a very different conversation afterwards. With it, with it being a female student speaking from, from her belief system, I mean, we talked about it a little bit, but I wasn't, I was honestly a little bit confounded and not really sure what the correct approach was.

Luke is clear in his surprise at being confronted with a female student who was not interested in leadership purely because she is female. It is important to remember that this university has a very clear statement of faith which all students and faculty agree to uphold. So, in theory, his beliefs should be quite

similar to his students'. Yet here we see that there is still room for interpretation of specific beliefs (see page 19). Luke acknowledges that a male expressing these sentiments would have led him to a 'different' conversation, demonstrating his greater comfort in speaking with males. For him, the fact that this is a female student specifically referencing her faith makes it more difficult to approach. In fact, he does not give a clear answer as to how he handled the situation. It is interesting that in a setting where religious faith is so freely discussed, certain aspects of it are still uncomfortable.

Through interviews with both students and professors, the undercurrent of belief that God has given individuals specific gifts, He is actively working in their lives, and they are part of a larger purpose is evident. This is part of their shared evangelical belief system. How their gender interacts with this, what their studies will amount to, and what life looks like in the future, however, seem left to their interpretations of cultural norms.

Conclusion

After analysing interviews with students and professors at this university, it would be naïve to believe that a clearly defined gender regime has been revealed. The statements made reflect a complex array of understandings of how faith and gender and engineering intersect, or interact, as Connell (1996) would say. As students reflect on the origins of their interest in engineering, their interactions with professors and peers, and working together on group projects, these women do not demonstrate one clear vision of their experience as women. Even in the comments from professors, disagreement exists between the relationship of gender to engineering and even the relationship between gender and Christian faith.

As Connell (2005) found, these participants also utilized mechanisms to distance themselves from the issue of gender in their studies. The students all arrived at university with the expectation that they would be part of a minority in their programme of study, but several of them tried to state as clearly as possible that

the university and fellow students did not fuel feelings of minority status. Kristin, an authority figure as a professor, even demonstrated a desire for gender blindness in her support of the view that gender does not matter. It can be imagined that this would increase the confusion experienced by female students as they struggle to find their identity.

This can be read as defensiveness, and, while it may be originating from a sincere loyalty to friends and university, will arguably not lead to organizational change. Forward movement tends to occur as a result of transparent dialogue regarding ways in which an organization, in this case university department, may not be conforming to what it 'should' be (Connell, 2005). Some students approach statements regarding what could be done better within their engineering studies, but most then retreat back to a position of not having an opinion or being unsure of what might be best. It is Luke who most openly addresses a desire for change in terms of best practices. He takes the initiative to open a dialogue with female students regarding their identity in the field of engineering and the potential for their futures. At first glance, it could be surprising that the male professor interviewed seeks to be a catalyst for change while the female professor questions the need for more women in engineering. However, this juxtaposition could also be an insight into the pressures for women to conform to the hegemonic masculinity of the engineering field and the freedom men may feel, as the majority, to doubt the current order. As Kristin demonstrates by questioning the need for upending the current system of engineering in order to add more women while being a female engineer herself, our constructions of gender may not line up with our own gender identity.

If there is a conclusion to be drawn here, it might be a confirmation of Connell's (2006) words that organizational gender regimes are different and are 'associated with a different configuration of personal experience and consciousness' (pp. 845). Each participant, whether student or professor, has had her (or his) identity shaped through individual experiences and understandings. From the earliest moments of learning about engineering to facing their future careers, each responds according to their interpretation of

gender and gender roles. There is not one clear way for a female engineer to think or behave. There is not one clear career path. Even in the seemingly homogenous world of evangelical Christianity, there is not one set of beliefs about the relationship of men and women. These students are navigating their studies, and this department is navigating its direction, based on the individual consciousness of which Connell spoke.

Chapter 5: Constructing a Local Gender Regime

This research aims to provide insight into the experiences of female undergraduate engineering students at an evangelical, American university and the ways in which conceptions of gender and faith identities intersect. In speaking with students and professors, a complicated and diverse understanding of what it means to be a female in engineering emerges. All participants acknowledge the minority status of women in the field, but their interpretations of what that status means and how one should respond to it vary greatly.

Throughout their interviews, student participants reflected on what led them to study engineering, their relationships with both male and female students, and their relationships with their professors. These women reflect on the importance of finding community as part of minority membership (Seron et al., 2016), seek out friendships with other women (Heron, 2020), and share similar struggles in finding community with men. Several female students say the male students show greater technical prowess (Francis, 2017) while they feel more comfortable taking on management-style roles. Participants also demonstrate a nuanced view of the power relationship between professor and student (Guzzardo et al., 2021). Faculty participants shared their experiences within engineering and their observations of and interactions with students. Both students and professors seek an open and faith-fuelled dialogue which seems to work to lessen the gap between the two positions.

As I will demonstrate in this discussion chapter, my research reinforces many findings in the literature in the ways mentioned above. In addition, it introduces the understudied aspect of religion into the world of university engineering programmes, and the relationship between faith and gender as played out on campus at a faith-based university. There is much research which focuses on gender and engineering (Cech, 2015; Myers, Gallaher, & McCarragher, 2019), and even engineering education in the US and globally (Seron et al., 2018; Fouad et al., 2020), but there is a lack of focus on the specifically religious cultural aspects of gender identity in engineering and other STEM fields. This study attempts to address that gap, and this chapter will discuss the ways in which my

research supports current literature as well as expands upon it. I will be arguing in particular that the intersection of religion and gender in higher education constructs a local gender regime which in some ways facilitates and supports female students in engineering, but which can work against a woman's entry into the field as a career due to evangelical Christianity being associated with 'traditional' views on gender roles.

In the United States, as expressed in chapter 2, the concepts of religion and science, and religion and gender often stand in tension. The students interviewed in this study do not directly address the relationship between their faith and science. While this is a religious issue, it could be that the students who have chosen to study science at an evangelical institution have already come to terms with their view of how religion relates to science and agree with the way science is taught within this environment. These are suppositions but, based on the encouragement the women felt in pursuing their studies, it is reasonable to assume that they have some sense of agreement with western secular understandings of science and do not position it as contrary to Christianity. However, participants in this study do reflect the varying interpretations of how the gender identity of women interacts with their faith. This creates some complexity in determining the dynamics of a local gender regime, to use Connell's theoretical term. Nevertheless, I will discuss how the findings related in the last chapter compare and contrast with previous studies, looking first at women identifying as engineers, then at women finding belonging at university, and finally the idea of professors as mentors in the lives of female students.

Self-Identifying as an Engineer

As outlined in the previous chapter, a common theme among student participants was the tension experienced in self-identifying as an engineer. As some student participants in this study questioned their technical abilities, a preference for 'leadership' – read as managerial – positions is evidenced instead. Beth is one who clearly stated this preference in her interview. This supports previous research (Alegria, 2019; Cardador & Hill, 2018) which found that women

may prefer managerial positions to technical ones in the engineering industry with the researchers suggesting managerial positions may distance the women from identity threat and gendered hostility within technical positions. This literature suggests that the move into management allows the technical aspects of engineering to remain male-dominated and with less of a need to focus on diversifying. It is also suggested (Faulkner, 2000; 2007; Hill et al., 2017), that women feel more confident in their people skills (traditionally feminine skills) than their technical abilities (traditionally masculine skills), and this could be why they gravitate towards managerial positions. It is not clear if either of these factored into the preferences of the women interviewed in this research. It is possible these students would not be able to identify exactly why they feel they are better suited for people-related work. It is also necessary to state the difference between leadership and managerial roles. While the participants might use the word 'leadership', there is a sharp line used to divide the preferred work to the technical work. Therefore, the female student is not stating a preference for the technical capacity of the group, more so managing the human resources. In this way, the women may be conforming to dominant constructions of femininity prevalent across the global North – not just within this local gender regime. As Francis (2017) points out, there is a socially constructed view that the difficulty inherent in the technical fields requires a level of cleverness which is equated with masculinity. The women interviewed do relate feeling less prepared for their engineering courses than their fellow, primarily male, students. This is in line with Francis' words and means the female students must navigate these dualisms.

Again, past research has shown that women in engineering also tend to specialize in areas which are more nurturing, or helping, as opposed to those which are more technical as nurturing characteristics are socially considered more feminine (Faulkner, 2000, 2007; Alegria, 2019; Cardador & Hill, 2018). While the students did comment on their technical abilities, as discussed, they were less obvious in explanations for their chosen area of engineering. One participant was majoring in electrical engineering and did not relate this to technical ability or to any sort of altruistic motive. Other participants were civil engineering majors and spoke of wanting to help others and use their skills on

the mission field. This falls more in line with previous research such as Faulkner (2007) whose female participants spoke of the struggle to be seen as competent engineers but also embrace other aspects of their lives. The focus of the students in my study was rarely the love of the technical aspects of engineering work and more often what could be done with the skills learned through the programme. It is worth noting, however, that while women choosing civil engineering fits into what is considered a more female-friendly field, the male professor interviewed was a civil engineer. Of the twenty-six faculty members in the School of Engineering and Computer Science at the university studied, three are women.

While the student participants in this study reflected findings from past research in the ways mentioned above, they also brought religious factors into their pursuit of identity which were not present in past literature, i.e., including their faith as an integral aspect of who they are as an individual. The women spoke about gender and engineering, but they also spoke in ways that reflect an undercurrent of Christian evangelical terminology. Some of the participants noted religious concepts, such as 'the Lord's will', which do two things. First, this displays the pervasiveness of Christian doctrine in the context of these students' education. While much is made in the United States of the separation of church and state, evangelical universities purposefully combine faith and education (LeTourneau University's Community Covenant, 2017; What Matters Most to Us, 2022). The professors interviewed acknowledge their desire to be at a college where they can be open about their faith. For the students, then, there is also freedom to express these thoughts. The lens through which all aspects of life, from academic study to behaviour outside of the classroom, are viewed is informed by Christian faith. As mentioned in the previous chapter the students have worked to build community to find belonging, and the faith community is another key aspect to their identities. They feel they belong, maybe not directly in engineering, but at their university because they share this faith, this worldview.

This has a number of consequences in terms of their interpretation of their identities and experience in higher education engineering. A key factor is that

the use of words assenting to a greater plan indicate a source of decision-making outside of the individual. These women have been encouraged in their pursuit of engineering, but, for some, there is an awareness that this discipline might not be their final destination. The women interviewed here do not demonstrate a consistent or uniform view of gender. Some seem unsure of how they will balance work and family life. Some wonder how they will be able to participate in a field where they are a minority. Some are openly questioning whether they will even stay in engineering but acknowledge all they have learned along the way about problem-solving and also their faith through interactions with professors and peers. And some are heading straight into a job in engineering, seemingly without hesitation. Part of determining 'God's will' is moving forward until there is a roadblock and then determining where to go next. This is evidenced as students mention examples like being the only female on a mission's trip, which created discomfort in terms of maintaining sexual purity and safety while mixing genders in such close proximity on trips abroad. This sort of event brings into question what the future might hold and whether a change in course may be required.

Seron et al. (2016) has tied the concept of belonging to confidence in ability. In their study, male students received more affirmation and encouragement that they belong in engineering. Since female students received less, they began to question their belonging in the field. That lack of confidence seemingly led to a greater possibility of failure to persist in the programme. My study notes specific obstacles faced by women in engineering which leave them to question their belonging in the field. Several participants in this research demonstrated such a lack of confidence. Some did so by comparing themselves to their (mostly male) peers and determining they were not as smart. Others described their work in groups by saying they allowed male students to take the lead because the men had better technical abilities. One woman even explicitly questioned whether she had what it takes to be a true engineer. She did not say she did not feel a sense of belongingness in engineering, but she did question the 'fit' between herself and an imagined future as an engineer, as Seron et al. also concluded.

These students are negotiating their identities as engineers throughout the course of their programme. They are taking the encouragement they received prior to university, their feelings as they compare themselves to other students, and their own assessments of their strengths to form a view of themselves, an identity. The women do not deny that their gender sets them apart in their studies as a minority, and they do not all share a definite view of their future. In one sense, identifying as an engineer may be a transitory state based on where the students are 'led' in the future. This indicates the local gender regime created within the engineering department may solely relate to the years the students are in the programme and not speak to their futures as engineers. While the professors interviewed varied in their ideas of the place of gender in STEM, they both were clear in their desire to help female students as they persist in their studies, albeit through different perspectives on gender. The students interviewed spoke of the place their faith held within their decision-making, believing they were in the right course of studies at this time. However, they seemed less clear in viewing 'engineer' as part of their identity moving forward in life.

Finding Belonging at University

As previously stated, the student participants are open in acknowledging they are fewer in number than the male students in the engineering programme. So, how did these women navigate their minority status, and how does the specific local gender regime influence this navigation? As Seron et al. (2016) suggest, students must feel a sense of belonging to persist in their engineering studies. Many of the participants in this study did so by creating community. The process of finding a group of others to whom they could relate was different for each student. For some, it seemed almost natural to find common interests with others. For others, it took time to get acclimated to the university environment.

One aspect of belonging several of these women mention is the impact of the national Society of Women Engineers (SWE) in their daily life at university. SWE provided student mentors to freshmen as they conducted their first group project. SWE also provided personal mentors to pray with and encourage

students as they began their studies. For those outside evangelical circles, it is important to note that the act of praying together is considered personal. So, for another student to care enough to pray with you makes an impression on a new student. These examples of SWE involvement are practical, specific actions which were taken, and the university allowing SWE to be active on campus demonstrates a larger institutional commitment to the support of female engineering students. Looking more broadly, though, the larger purpose of SWE is to provide female engineers a place to come together and share their experiences. Sankar, Gilmartin and Sobel (2015) document the fear female students can feel about being seen by their male classmates as 'dumb' if they ask questions. This group of solely female engineers would eliminate that fear. These student interactions are not random. They are women intentionally supporting and encouraging other women in the engineering field.

While SWE was a source of community for many of the student participants, it was not the only one mentioned. One student was on an athletic team and created a female community through sport. Because this student had played soccer in high school, it may have felt like an easier transition into university by having this group of almost built-in friendships. Interestingly, this same student is the only one who discusses forming friendships with male students, again through soccer. She credits these male soccer players with helping her form a study group which played a significant role in her persistence through the programme. It is through building friendships with fellow students that these women are able to progress in their studies, finding strength in each other and in their shared faith. As Heron (2020) posits, friendships lead to happiness, and happiness leads to confidence.

The search for a sense of belonging, for these friendships, is a key aspect of the minority status of the women. Unlike the student athlete mentioned above, other female students speak of awkward exchanges with their male peers. Some felt as though male students did not listen to them in group projects due to their gender. While several students downplay the interactions, these actions could contribute to a lack of belonging or lower self-efficacy as Tellhed et al. (2017) describe. This discomfort within the classroom could explain why some of the female participants in this study commented on how their male peers seemed

more prepared for the academics than they were, interpreting this as the men being smarter than them, harkening back to Francis' (2017) idea of cleverness. There is tension for these women in communicating they do not feel outright discriminated against and yet still see themselves as a minority. The women seem to have a picture of what discrimination would look like, and they do not feel they are experiencing that picture, but the way they are viewing themselves in relation to their male peers is far from equal. The foundation of this inequality could stem from the complementarian religious views expressed by many evangelicals (The Council on Biblical Manhood and Womanhood, 2022). The tension created from religious views of gender roles within this local gender regime may lead the women to feel insecure in their belonging to the programme and create the awkwardness the students reference in their interactions.

Just as the female students are comparing themselves to male students, so too do the professors. The male professor is attuned to the status these women have within engineering and seeks to engage with them on how to address the dynamic. He goes directly to the students and asks questions. The female professor says that she does not believe gender is an issue in engineering seemingly echoing the findings from Rhoton (2011) regarding female engineers distancing themselves from the perception of gender barriers within the field. Yet her responses do not indicate that women are treated as equals within her department. She rebuffs the call to have more women pursue engineering but also says she enjoys that her fellow professors treat her 'as a woman'. In this sense, she may be speaking more to her own sense of belonging – a belonging created by older male professors she says she sees as father figures – than a belonging which comes from being a true peer. This does not appear to be a group membership or community which is readily shared by her current students.

In addition to comparing themselves to the male students, several of the women interviewed expressed a form of sexual tension in relating to the men. While they seem to desire friendships with the men and many say they eventually developed them, there is an initial fear that their friendship would be mistaken for romantic interest. This could have prolonged the period of time in which the

female students are seeking that sense of belonging and made it more difficult to acquire. It also further complicates the women's ability to define their own gender identity within the engineering department as they must navigate their own and others' sexual identities and expectations further extending the inequity between male and female students. It is not clear that the male students actually did feel this way, but because the women feared that interpretation, an air of tension could develop. Also, though it was not directly mentioned, this same fear could have emerged regarding their future career. As Anna mentions cancelling a missions trip due to being the only woman, she may be referencing this same concern, the perceived sexual tension existing between groups of people defined by gender differences and perhaps an insecurity in how to manage it.

This study confirms the importance of student relationships with peers and faculty as discussed in chapter 2; it also confirms the way these relationships can lead to a sense of purpose. Lund et al. (2019) argued

> The relational aspects of high-quality mentoring relationships—authenticity, engagement, empowerment/zest—may be especially important in purpose formation as youth seek to understand their place in the world and how they can leverage their skills and gifts to contribute to the world beyond the self (pp. 1478).

The participants interviewed, both students and faculty, spoke to this sense of purpose and contribution to a larger cause. In fact, the faculty members described part of their role as helping to instil in their engineering students a desire to give back to others. Engineering can be a lucrative profession, but, within an evangelical university, it is also a platform from which to help communities in need. Some students interviewed mentioned their desire to spend time on the mission field, using their skills to provide for those less fortunate. While the study mentioned above is focused on students' motivations for contributing to the greater good, this current study takes that a step farther to look into the influence of religious faith.

In terms of belonging, having a common purpose can serve as another connection point. We've seen that female students relate to each other through SWE and form communities with other students through sport, but religion is another way

to form a community. As students consider missions work and being used for a higher purpose, they bring encouragement to one another. Sharing this same faith with their professors further strengthens the classroom as a community itself. Even the student participants who are unsure if they will continue on in engineering as a career or even the programme at university speak of an assurance, they feel that they have learned from their time in these studies and that time will not be wasted. This higher purpose is how evangelical universities differentiate themselves from others (What Matters Most to Us, 2022). This is why these students have chosen to study at the university in this research, because they belief a shared faith is important. It only makes sense, then, for that faith to be both a point of community development and of encouragement throughout their academic careers.

Professors as Mentors

While we have seen the need for peer-to-peer belonging, there is another piece which student participants in this research frequently mentioned – their relationships with professors. A small religious university, like the one studied here, will often pride itself on the low student to faculty ratio. This is considered a selling point for attendance at this sort of university over a larger research institution. The assumption, or implication, is that students are not merely a number in a crowded lecture hall. They are individuals and are able to interact with professors in a way they could not at a larger state school. Participants here noted how caring their professors were and how much they appreciated the time faculty took in helping them learn difficult concepts.

As discussed in chapter 2, positive relationships with professors have been shown to impact a student's happiness. Freeman et al. (2007) and Ingraham et al. (2018) relate these relationships to an increased sense of student belonging. Freeman et al. (2007) specifically focuses on how a students' sense of belonging correlates to their perception of professors as open and warm while Ingraham et al. (2018) conclude there are four principal determinants in student-faculty relationships: support, caring, diversity and incivility. Student participants in my study also reflected on their positive interactions with faculty. When looking at

the overall experience of students in college, interactions with faculty play a part in their persistence through their academic programmes. When asked about their professors, participants in this research noted the kindness they showed and reflected mostly positive feelings about their experiences. Whereas a more traditional view of academia might reflect a hierarchical academic power dynamic between professor and student (Wacquant, 1990), these students reflect a more democratic approach. The way a classroom is managed, and students are treated within that setting, makes a difference in their feelings towards their major. This can be seen in one example given by Ivy in her interview. As detailed in the previous chapter, she tells the story of a lab technician stepping in when she was not being allowed to participate in a group project because of assertive male students on her team. The willingness of that technician to step in – and the awareness he demonstrates in observing the situation – speak to the classroom dynamics being created. As the majority of students interviewed were in their third or fourth year at university, these sentiments of care and concern felt from faculty and staff would have served as encouragement to continue on in the programme as much as the experiences they have had with their fellow students.

As already referenced above, one topic repeated throughout literature is the importance of faculty relationships with students. Guzzardo et al. (2021) go so far as to state that faculty can help counterbalance the structural inequities that students experience by building positive relationships with the students and then connecting them with campus resources as necessary. When asked about the presence of female faculty in the engineering department, student participants were clear in the positive impact such female professors have in their studies and lives. Responses were less consistent as a few of the women sometimes used circular reasoning to explain why more female professors would be beneficial and then step back from that position, saying maybe current representation is enough. Feelings on the subject were also split amongst the professors interviewed. Therefore, even the desire for more female STEM role models is not without complexity. Some of this discomfort could be a result of a dynamic studied by Ceci et al. (2011). They caution that female representation can turn into additional work for women, counteracting a move towards equity by causing

them to serve on multiple committees, more so than male professors. This could be why students mention wishing female professors attended SWE meetings more often. The female professors could now be receiving informal duties associated with their minority membership. While intentions may be good, committee membership and club leadership might actually make women feel less belonging as they are consistently reminded of their otherness. In this situation, representation may not equal equity.

Some of the student participants mentioned appreciating the overall worldview of both their female and male professors. There is a conservative political view which they feel helps them better relate to each other. One student even mentioned connecting with a female professor specifically because she was conservative, and they thought in similar ways. One insight into this thinking might be that there is an assumption that a woman in a traditionally male discipline might be more liberal in her thinking. That this student would mention conservative views could betray this assumption and her comfort in finding that it was incorrect. Evangelicalism is a Christian set of beliefs, but it is also linked to politics (see page 14). When someone is deemed ‘conservative’ at a religious institution such as this, it almost certainly also links them to a set of conservative political views which a student might enjoy sharing with her professor.

There is also a notable discomfort in the ways in which the professors view gendering in engineering, particularly in how this relates to their interactions with students which could not help but be reflected in their mentoring of students. Again, there is a continuity in faith expression between the two professors interviewed, but that seems to be the end of the commonalities. The female professor chooses to view the engineering gender regime as one which is egalitarian and actively encourages female students to not acknowledge gender in their studies. In fact, this might line up more with the view that inequity results in the need to fix women, specifically ‘fixing’ them by teaching them to avoid the subject of gender. A discomfort in discussing gender could also move from engineering to religion. In other words, by not acknowledging the struggles women may face in engineering, one may choose to not acknowledge the

struggles women may face in their religion. For the male professor interviewed, deliberate steps were taken to address gender in his academic arena. He is looking to address gender inequity by fixing the system. However, he is also clear in his inability to respond to the gender identities constructed by some of his students. When matters of career path collide with religious views, he is unsure of what to say next. To question religious convictions would be a serious step. There is a general sense that one ought to respect what God might be doing in another's life, and to question it could be conceived as questioning God. For a professor, the sticking point comes when a student's conviction does not match his or her own. If this were a scientific question, there might be one correct answer. But in the realm of personal faith, answers are less explicit.

Thoughts on a Local Gender Regime

The participants in this study, both students and professors reflect the words used by Lidzy (2005) to describe her own participants. 'Their beliefs are guided by their Christian worldview and their integration of the cultural message about gender role expectations' (pp. 329). Evangelical cultural expectations have been applied to both sets of participants as they study at or work at the university. They have even agreed to abide by behavioural expectations, including abstaining from pre-marital sex and pornography (see page 23), which reflect this cultural message.

What does this then mean for the engineering department at this university? After analysing the participant responses, it appears that the gender regime may in fact be more strongly influenced by individual professors than explicit departmental or university policy. The two professors interviewed reflected different viewpoints concerning the inequity present within engineering. This difference in views led to a difference in how each related to their female students. The female professor encouraged her students to not consider gender. She believed it could simply not be made an issue and seemed to appreciate the ways in which she might be treated differently from her male counterparts. The male professor, however, was aware of the inequity and sought out ways to open a dialogue with his female students to learn from them and look for

opportunities to adjust his pedagogy. Depending on which classroom a student was in, her awareness of gender roles and thinking about her own identity as an engineer could change. Both professors evidenced a desire to support female engineering students, but the theories behind their pedagogies were quite different. This is significant as women hearing from one professor that they should not acknowledge their gender in their coursework and from another that their minority status ought to be addressed by the department would serve to confuse the students as they navigate their own feelings regarding gender identities.

The reality of a small private university is that many of the female engineering students could have both professors, or, using these professors as examples, professors holding to a variety of ideas concerning gender. Could the views of these women vacillate between classes? It is likely that their own views would be moulded by a particular professor with whom she felt especially connected given how clearly the students spoke of their respect for their professors. One student mentioned the closeness felt with a ‘conservative’ female professor. Another connected with a ‘logical’ male professor. Each of these professors could promote her or his own conception of gender in their field, influencing the students’ interpretations of their own genders.

Connell used four dimensions to describe a local gender regime: the gender division of labour, gender relations of power, emotion and human relations, and gender culture and symbolism (see page 54). I have mentioned earlier in this chapter the human relations dynamic in the importance of feeling belonging and the cultural aspect of religious faith. The division of labour and relations of power seem as though they could be tied to this idea of professors as mentors. The power differential between professor and student (Wacquant, 1990) as well as the ways in which professors manage their work within the classroom and outside as personal mentors to students (Ceci at al., 2011) were themes echoed by both the student and professor participants in this research. In working to create a homogenous university community holding to the same statement of faith and belief system (such as LeTourneau University’s Community Covenant, 2017), a single gender regime may not be possible to create. This may be the

largest surprise in the findings. Despite attempts to the contrary, ideas about gender roles within this group seem based on individual interpretations of their cultural beliefs, or the interpretations of respected professors. Clearly laying out a belief system in something like a Community Covenant does not eliminate individual interpretations of gender roles. Complementarian and egalitarian views were expressed by the two professors and students varied throughout. One view of women's place in engineering could not be determined.

For the engineering department at this university, a decision must then be made. Does the department want to have an established view of gender equity, a way to minimize student confusion as to how they relate to the programme, or will it leave the topic to individual professorial interpretations? There is a risk of alienating some which is inherent in the attempt to set a single standard from which to operate. From just the two professors interviewed in this study, it is clear that one or the other could struggle with the view chosen by the department. However, there would be strength in committing to one way in which to relate to minority students. There is also strength in the act of acknowledging that this minority exists and could benefit from greater inclusivity.

Additionally, the views expressed by students transition as questions move from current studies to future prospects. The influence of current professors and mentors seems clear during the university years. As these women discuss the next steps in their lives, though, they express a wider range of questions regarding what Connell (see page 52) might consider emphasized femininities. They are less clear in how to practice their gender within the constructs of their career interests and religious beliefs. Therefore, one might ask how beneficial a local gender regime is if it is disconnected from the future gender regimes these students might enter. Are they operating from a false understanding of what their future might look like? The women interviewed seem to know, whether overtly or implicitly, that the experiences they are having currently, however they may be interpreting them, may not align with their career experiences. This begs the question, is university meant to reflect what can be or what most likely will be?

Conclusion

There is now much research surrounding the experiences of women in STEM, both inside and outside the university setting, but there is little to no research of these students in the Christian university setting. These private, evangelical schools could be seen as just another type of university to be studied, but that would underestimate the importance of religion in the lives of the religious. As I have demonstrated in the previous chapter, when Christian students enter this setting and agree to adhere to a strict set of spiritual beliefs and rules, they are ostensibly evidencing the significance of these beliefs in the way they are choosing to live their lives. Their religious views then influence the way they see gender roles and wider gender regimes. How they view men and women is an integral part of these beliefs and cannot help but flow into their hopes for the future.

The students interviewed for this research all self-identified as women and were identified by faculty as women. They were also open in their acknowledgement of being a minority in their chosen major at university as a result of their gender. While they are able to name their minority status, this may be the first time some of them have ever found themselves not in the majority of a population. The evangelical Christian world, particularly in these universities which have large price tags, tends to be relatively homogenous in their recruitment of middle to upper middle class, primarily Caucasian students. Therefore, understanding their identity as a woman in the field of engineering could be very different from understanding their identity as a woman in other areas of their lives. In addressing this status, the women will seek out an area of engineering which seems to 'suit' their gender. So, while all participants chose a Christian university, speak of God's will for their lives, and hope to grow in their faith, the women still differ in their understanding of what it is to be a Christian woman. This points to a local gender regime that is seeking to encourage female students in their pursuit of engineering while on their campus, but has less to say (in fact, one professor recounts being left speechless during a conversation with a female student) about the student's future career path.

Chapter 6: Conclusion

This study sought to fill a gap in research regarding the perceived gender identities of female undergraduate engineering students attending evangelical American universities. While other studies have investigated the imbalance in numbers of women compared to men in the scholarship and industry of engineering, this study is aimed at the under-researched intersection of gender, subject choice, and religious faith.

Through nine student and three staff interviews at one such university, the tensions felt while navigating gender issues in major choice and faith belief systems were explored. Semi-structured interviews were conducted via Zoom in the spring of 2021. This was during the COVID-19 pandemic and while the students and staff were back in session on campus; their reflections on past experiences include the time when the university moved online due to a mandatory shutdown. These interviews were analysed using Braun and Clarke's (2006) thematic analysis. The findings of this study were rich, reinforcing previous studies regarding the complexities of female students identifying as engineers and the importance of finding a sense of belonging at university and in the engineering programme. The element of faith and religious views of gender roles added an under-researched element. The majority of those interviewed (students and staff) emphasized community and perceived like-mindedness while this did not eliminate the presence of differing views and a plurality of individual interpretations of gender roles.

In this conclusion, I will first revisit and try to answer each of the research questions used to underpin this study. Then I will share the impact this research has had on my professional practice. Finally, I will discuss potential recommendations for university policy and practice as well as further research opportunities.

Research Questions

How do female engineering students in the evangelical setting perceive gender roles and their own/others' gendered identities?

Through utilizing Connell's (2005) theory of local gender regimes to analyse student participants' perceptions of gender roles and their own and other's gendered identities, some areas of a local gender regime influenced by the evangelical Christian faith were detected. The student participants were all declared engineering majors, meaning they had in some sense chosen the identity of an engineering major in as much as they understood that term. While each student stated she knew upon entering the programme that she would be in a minority in the programme, the long-term effects of minority status for her career were less clear.

The majority of students said they did not feel any discrimination in the programme and enjoyed getting to know their professors and classmates. However, when asked about the future, participants varied in responses with some seeking careers in engineering and others saying they questioned how they would negotiate family life and being an engineer. One participant questioned how appropriate it might be for her to be the only female on overseas trips. A professor recounted a story of a female student stating she did not want a career position in which she served in a leadership role as it contradicted her belief system regarding women in leadership over men. This seemed to point to a transitory nature in their identification as an engineer. While at university, the women interviewed expressed a growing comfort in their places within the engineering program. Their responses regarding their future careers indicated that perhaps another identity would take priority after graduation.

Do these perceptions play a part in the sense of belonging or appropriateness in the engineering studies of these women?

As previously stated, some internal acceptance of appropriateness already took place for the women to have enrolled in the engineering programme. Once in the programme, a sense of belonging was not immediate. Several participants spoke of comparing themselves to other seemingly more prepared (and also male) students. One participant questioned if she 'had what it takes' to be an engineer. Another stated that even if she changed her major, she would have learned important lessons while in the program, commenting on God's direction of her path. Those students farther into the programme described a developed

feeling of membership, often resulting from the camaraderie built in small classes. Aspects of life outside the classroom also helped build this sense of belonging. Participants noted the friendships built through the Society of Women Engineers. Others mentioned the connections built through shared political and religious beliefs. Both students and professors interviewed noted the relationships built together which the university encouraged in its effort to care for students. Students stated these mentoring interactions helped them engage difficult coursework and consider their future possibilities. Faculty saw these relationships as an integral part of their work at the university and part of their own religious purpose.

The appropriateness of future engineering work, however, did not seem to be corelated to this membership. While conversations between students and faculty regarding their future were mentioned, the women interviewed were not all convinced of their next steps. In this way, there was a disconnect between university experiences and future career experiences. A sense of community seemed to be built over time with fellow students and professors, but it did not lead to a projection of future engineering community membership. It is possible this belonging was more related to the university and professor/student relationships than to engineering itself. This emphasises the importance of viewing local gender regimes in an intersectional way. The gender identity of these women cannot be viewed only in terms of their chosen major. It must also be viewed through understandings of faith.

What are the experiences of these students in terms of retention and course change, and do those experiences relate to their gender perspectives?

While most of the student participants were in their third or fourth year of the programme, there was one still early in her studies. This participant did question whether or not she would continue in the programme. The language used often reflected the difficulty of the programme as a reason for questioning their studies rather than any specific gender concerns, but it was noted by more than one student participant that other students (particularly the male students) were more prepared for this coursework than they felt. Another participant, further along, stated that even if she did not pursue a career in engineering,

lessons such as critical thinking, teamwork, and perseverance would still have made the programme worthwhile. This downplays any negativity perceived to be a part of changing one's major.

In many cases, the ambiguity of the future was couched in religious terms demonstrating a concern for the larger picture and greater plan for their lives. This also led to a general positive expression of what may come next as such a view reflects on the student's religious faith. Whether sincere or not, there might be a cultural pressure to agree with what God might have in store for the future. This aspect of faith may help the students navigate unknown circumstances by relying on a greater power for guidance.

What are the students' views of current policy and practice in their programme and in what ways have these made a difference in their university experience?

These students were quite complementary in their assessments of the programme and the university. Whether these were genuine feelings or a desire to display loyalty is difficult to answer. One participant shared a story of a lab technician noticing she was side-lined in a group project as male students took charge. That technician purposefully addressed the men and made sure female students were included. This is an example of staff working to promote equity within the programme. Another student suggested the programme be more intentional in building community amongst students. That student considered herself to be more of a 'loner' but later emphasized the importance of providing opportunities to connect so students did not feel that they were on their own. This may demonstrate that she did not see her aloneness as a choice she made. Facilitating intentional opportunities to meet others within the major is an addition the engineering department could make to its programming.

The importance of community became a thread throughout the interviews and therefore it is no surprise that the creation of membership opportunities was highlighted. One evangelical Christian university describes its mission as transforming lives 'through excellent education and intentional discipleship in submission to biblical authority' (What Matters Most to Us, 2022). This concept

of ‘intentional discipleship’ is what students and professors referred to in their interviews. This is considered a university expectation which is used to encourage students to attend this specific university. Small private universities rely on this student/faculty dynamic, and interviews demonstrated the importance of these relationships to each group. This is more responsibility than professors might feel at other, larger universities, but those interviewed in this research saw it as part of their belief system emerging through their career choice.

What are the implications of this study to policy in evangelical institutions and the role of gender in engineering programmes more broadly?

As mentioned above, the significance of community is a key finding of this research. Students came into the engineering programme with minority status and sought out membership status. (Perhaps those who persevered through the programme are those who found this membership.) University faculty and staff may be able to help students form communities through the promotion of opportunities to meet and work with other students both inside and outside the classroom. A sense of belonging can also develop through students building relationships with professors. Asking professors to be available for this can increase their workload, but the students are clear in their praise of the benefits associated with these relationships.

While the makeup of an evangelical university, with its clear doctrinal beliefs, seems to lead towards a homogenous community of students, the understanding of gender roles as they relate to religious beliefs varied somewhat widely amongst participants, both student and staff. Building communities of like-minded people is commonly done, but this research suggests that true like-mindedness may be illusive. A practical implication, therefore, is to not assume all students are the same and to focus on creating an inclusive environment inside and outside the classroom. This may mean that the department of engineering seeks to identify and adhere to a single view of gender inequity in engineering. In doing this, there could be more consistency across courses and throughout the department in relating to minority students, and this could

benefit the recruitment and retention of students as well as the experiences of these future alumni.

Impacts on Professional Practice

Having worked in a professional capacity at an evangelical American university, my curiosity regarding the intersection of faith and gender was piqued as I heard alumni lamenting the lack of female student participation within the engineering program. It is worth noting that, as a student at the same university, I often heard offensive comments regarding the gender composition of various programmes. Two decades have passed, and I am told the campus 'joke' that I recounted in the Introduction has replaced the education program with the nursing program. The student participants in this study did not recount any such comments, nor do the alumni who inspired this research seem to hold these views. The comments do continue to impact my professional practice, however, as they motivate my questioning of the status quo.

As I approached this study, my primary focus was on the female students who, in my mind, were pushing the boundaries of the traditional, conservative, evangelical faith. I wondered if they felt encouraged in their studies and had a support system in place for navigating their university life. It was a pleasure to speak with these students and, even if they were grappling with their possible futures, hear their expressions of enjoyment in the study of engineering and using their education to better the lives of others. As a graduate school staff member, it was also reassuring to be told of friendships being formed and communities built amongst students. If my fear was of an isolated existence, it was clear that these students were seeking out camaraderie. That is not to say that the faculty and staff of this university and others like it could not do more to assist in the formation of support systems. The students I spoke with did suggest more intentionality on the part of the department in connecting students to each other. Overall, though, expressions of personal discomfort were few in number and limited to past coursework. As someone who deeply believes in the importance of higher education, this was good to hear.

What I did not anticipate was the disparity in perspectives evidenced by the professors interviewed. It was easy to assume that a female professor would acknowledge the masculine culture of the field of engineering and exhibit some solidarity with the female students in the program. It was unexpected to hear this professor acknowledge the masculine culture but then question why it could not remain. In effect, Kristin asks why hegemonic masculinity (Connell & Messerschmidt, 2005) is a negative. Likewise, I might have thought Luke would demonstrate care for the minority group of female students, perhaps rather paternalistically, but I would not have expected him to be progressive in his support of the students. He is the professor questioning the lack of openness to change within the department culture, or gender regime.

These findings highlight for me how open to interpretation religious beliefs can be even within a specific Christian population. It might not be surprising for university students to be wrestling with their understandings of religion and identity. It was, however, surprising to me to find two professors in the same department who have come to such different conclusions regarding their own interpretations of gender roles. I know it is best not to make assumptions, yet this research serves as a reminder to me of just how inaccurate assumptions may be. Working at a university, I cannot expect other faculty and staff to share my interpretive view of the Christian belief system even if we have agreed to certain foundational principles in working together (What Matters Most to Us, 2022).

This research has also demonstrated the importance of faculty in the lives of students. The women I spoke with were complimentary of the relationships built between professors and students and the opportunities for mentorship therein. Some even mentioned connections beyond career, including religious and political philosophies. As faculty and staff form these relationships, we must remember the influence we have over students. There is a power dynamic at work, without question, in regard to the authority we hold over the academic career of the student (Connell, 2006). More than that, though, it could be easy to transfer our interpretations of faith to the students with whom we interact. Indeed, a goal of the evangelical university is to support the spiritual growth of the student as aligned with the institution’s belief structure (see LeTourneau

University's Community Covenant, 2017). However, there is still room for interpretation within these confines, as this study has shown, and care must be taken in acknowledging and encouraging personal differences.

This research works to broaden my understanding of potential differences of religious thought amongst those I interact with every day whether they are students or faculty or staff. My views, religious and otherwise, may not be shared by others, but they do hold the power to influence others. I must be critically reflective in the way I approach these differences and express my perspective so that others are not unduly influenced into sharing my interpretations. At the same time, I can express an openness to different understandings of religious views of gender roles which could lead to a more discursive atmosphere on campus. That atmosphere could lead to a critical assessment of the gender regimes within departments and across campus. As the alumni who helped inspire this research have proven, as staff and as graduates, we have agency to initiate change within our institutions.

Research Implications and Recommendations

Knowing the importance of friendship to student well-being, Boda et al. (2020) suggest universities create opportunities for between-group networking and friendship building. While they found such early interventions to dwindle over time – students created new friendships as the progressed through their studies - the initial contacts help fulfil the sense of belonging students crave. The university studied for this research could benefit from such an intervention. Students told of an early project which brought them friendships, but it was divided by gender and therefore created in-group connections. Participants were clear that these friendships are important, but it can be questioned whether such relationships move the pursuit of gender equity forward. There could be an initial sense of belonging in female bonds, but this does not necessarily lead to a feeling of belonging within the engineering department.

It is important for universities to be aware of this reality as it could easily impact the recruitment and retention of female students in these programmes. Assumptions cannot be made regarding the intersection of faith and gender. As

the professor, Luke, pointed out, some students hold a much stricter view of the role of women in leadership positions than others. These differences change the way professors are able to speak with students and question the comfort level of professors themselves. There may be no set answer for how to navigate these differences and encourage the persistence of female students, however being aware of the multitude of opinions is a good place to start.

It is then crucial at the end of this research to ask, 'why is this important'? The answer could be two-fold. First, listening to the experiences of these women is important in providing for the wellbeing of future students. In order to help students be successful in their studies and future careers, they should feel a sense of belonging in their chosen field. Women in the field of engineering are a minority group, but they are not the only minority group within engineering or on evangelical campuses. The treatment and experiences of these groups should be of concern to all university faculty, staff, and administration members. Second, listening to alumni can provide universities with valuable feedback regarding programmes. Had it not been for alumni at my alma mater, I might not have felt a drive to undertake this research. Questioning the regime once outside of academia could lead to greater diversity and inclusivity within engineering. Involving alumni in this process, is also a vital part of providing for the financial future of the university.

Part of the mission statements of most Christian universities is a respect for and desire to strengthen students academically and spiritually. The term 'whole student' is often used in describing the way the university environment is structured. There is a sense that, as part of this small community (because these private schools are generally much smaller than state schools), students are surrounded by opportunities to grow through participation in chapel services, mission trips, and club activities. As student participants have said, professors exhibit a caring character which leads them to feel encouraged beyond the academics. They feel that their professors care about them as people. It makes sense that such a university would then care about the lives of their students.

When holding to a strict set of Christian beliefs that includes an emphasis on the importance of care, one would hope care would be demonstrated by searching

out areas where improvement is needed. This should mean that the views and opinions of the women in this study would be sought and engaged with, and their experiences in search of belonging would be noted. When these women speak of difficulty in finding community within engineering, the department has the opportunity to invest in methods to be more inclusive, to better understand the minority status of women, and to better see the minority status of other students. These women could be the catalyst for opening the eyes of the engineering community at the university to a changing workforce.

While it would be appealing to think that concern for the wellbeing of their students might be enough, private universities must also contend with the reality of funding. Because they are not able to rely on a stream of state or federal funding, these universities have a significant amount of fundraising which must take place every year to support their operating budgets. For these schools, alumni can be their best source of financial gifts. Entire offices are devoted to the engagement of alumni with the aim to increase their participation with their alma mater and ultimately bring in donations (Morse & Brooks, 2020). If a university is willing to invest money in these activities, it could only be because the outcomes make them economically worthwhile.

If students do not have a positive experience while at university, it only stands to reason that they would be less inclined to contribute back to the university after graduation. Academic departments leading to high-paying professions, such as the engineering department, would have the highest expectations in terms of alumni fundraising. As more women enter the field, and as women have been shown to be a greater force in determining charitable donations, female engineers should be a focus. It is also often alumni who can best probe the changing dynamics of the engineering industry and perhaps influence university departments to reflect the growing need for diversity. Involving alumni in the academic process provides opportunities for differing viewpoints and interpretations to be heard. As professors navigate the presence of and possible alterations to gender regimes, alumni may be less concerned with power dynamics than students and more easily and openly question the university authority figures.

Moving forward, future research could expand on religious views of gender roles by exploring other faith traditions. Comparing the responses of these students to the responses of perhaps conservative Muslim female students (Kargarmoakhar & Ross, 2019) could provide more insight into the intersection of religion and gender roles. This could demonstrate how cultural constructions of gender vary within conservative religions. As this research has shown, even other seemingly homogenous groups may experience differing understandings of appropriate roles and careers for men and women.

It would also be beneficial to follow these student participants into their careers. This sort of longitudinal study would provide more data regarding the possible transitory nature of belonging experienced within the university. It would also better demonstrate the depth of their concerns about balancing work and family life. Evangelical universities will often refer to their campuses as a 'bubble' set apart from the 'real world'. (This can be seen in the community covenant quoted on page 23.) The desire is to create a very specific type of community which is clearly not what will be experienced by graduates as they leave campus and move on with their lives. Discussing the experiences of these women upon leaving the 'bubble' could also provide a projection of their future involvement with the programme and university as alumni. This information could be even more important to the university as they plan to move forward in the neoliberal context of higher education in the United States.

Final Thoughts

Like women in other undergraduate engineering programmes, those enrolled in evangelical American universities find themselves in the minority. They navigate their programme through the support of families and professors and with the community of their fellow students. While teamwork experiences are reflected on in positive ways, conversations about the future can be more ambiguous. A religious thread of 'God's plan' is woven throughout the uncertainty of what might happen with an engineering degree. The gender identity of female engineering student seems more formed than that of female engineer. By this I mean that the women I spoke with demonstrated confidence, largely through their faith, that they were in the correct academic programme for them. After

their early years of study, they felt belonging as engineering students. However, they did not show the same level of confidence in considering themselves engineers upon graduation as several questioned whether or not they would pursue careers in the field at that point.

Reflecting back on the research process, I can see that while I felt very open to new thoughts and ideas, I was initially trying to keep myself from any ethical distress just as I was trying to avoid this for the participants. This was most clear when I was encouraged by my supervisor to pursue literature surrounding the social construction of religion. I was concerned about where that may lead but then found that research fascinating. So while I stand by the decisions I made regarding addressing religion with the student participants, it became important that I stretch myself as the researcher not just for this study but personally. My convictions that students should study what interests them regardless of their gender stand unchanged, and I believe this research has addressed my initial questions as discussed earlier in this chapter. However, looking back on this study, I see it as a beginning of a conversation. Perhaps it has led to more questions than answers.

Having long been curious about the nature of the intersection of religion, gender, and engineering, this study has surprised me. I have felt that evangelical universities work at being as homogenous as possible in terms of belief systems and worldviews, and yet these women and professors show markedly different understandings of gender in their careers. Assumptions cannot be made about the thoughts or beliefs of these women, and university leadership must remember this. There is still much to learn regarding the relationship of religion, gender, and a future career in engineering.

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