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UNIVERSITY OF NORTHERN COLORADO

Greeley, Colorado

The Graduate School

(DIS)INTEGRATED IDENTITIES: EXPERIENCES OF TENURE-  
TRACK ENGINEERING FACULTY WHO IDENTIFY  
AS SEXUAL MINORITIES

A Dissertation Submitted in Partial Fulfillment  
of the Requirements of the Degree of  
Doctor of Philosophy

Robyn Elisa Sandekian

College of Education and Behavioral Sciences  
Department of Leadership, Policy, and Development:  
Higher Education and P-12 Education  
Higher Education and Student Affairs Leadership

December 2017

This Dissertation by: Robyn Elisa Sandekian

Entitled: *(Dis)Integrated Identities: Experiences of Tenure-Track Engineering Faculty Who Identify as Sexual Minorities*

has been approved as meeting the requirement for the Degree of Doctor of Philosophy in College of Education and Behavioral Sciences in Department of Leadership, Policy, and Development: Higher Education and P-12 Education, Program of Higher Education and Student Affairs Leadership

Accepted by the Doctoral Committee

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Accepted by the Graduate School

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## ABSTRACT

Sandekian, Robyn E. *(Dis)Integrated Identities: Experiences of Tenure-Track Engineering Faculty Who Identify as Sexual Minorities*. Published Doctor of Philosophy dissertation, University of Northern Colorado, 2017.

This study was conducted to explore how full-time, tenure-track engineering faculty members who self-identify as sexual minorities have experienced working in Doctoral Universities. Literature reviewed for this study included the history of higher education and engineering education in the United States; a review of the differences between engineering and science, technology, engineering, and mathematics (STEM) fields; and an overview of the history of discrimination against sexual minorities. Using a mixed-methods explanatory sequential methodology, the study included an anonymous web-based survey followed by semi-structured interviews of the participants who agreed to be contacted. During the interviews, participants shared photographs of their workspaces and described how items displayed in those spaces were congruent or incongruent with their multiple dimensions of identity.

The simultaneous presence of both stigmatized and privileged identities led to complex relational interactions with colleagues and students that required individuals to dis-integrate, by denying some of their identities to successfully navigate in certain professional settings. Themes that emerged from the data included sexism, heterosexism, and hegemonic masculinity within the engineering academic environment; the value and importance of good mentoring; the professional pressures these faculty members faced

and how their identities interacted to magnify those pressures; and that geographic and social location mattered. Participants also noted the importance of the Out in STEM student organization in breaking down the isolation they felt as sexual minorities in engineering. Study results demonstrated that a sexual minority identity was one of a long list of identities that have not been welcomed or valued in the engineering profession.

This study's findings were significant because they shone a spotlight on an issue that has been surrounded by silence in the engineering community. The primary implication of this study was the need for a more welcoming culture within engineering academia that would allow all engineering faculty members to feel more comfortable sharing the full spectrum of their identities. Potential areas for future research included expansion of the study to non-tenure-track sexual minority engineering faculty members, engineering faculty members of any sexual identity, and re-evaluation of the underlying assumptions of the stigma and social identity theories used in this study.

Keywords: engineering faculty, mixed methods, sexual minority, social identity, stigma

## **DEDICATION**

In the words of country music star Kenney Chesney, “I didn’t get here alone.” This dissertation is lovingly dedicated to the woman who has stood beside me for nearly three decades as my cheering section, my emotional rock, and my (mostly) uncomplaining editor. Tara, you have helped me find a strength and perseverance that I did not know that I had. For that, and for all that you do for me, I will be eternally grateful. And to my parents, Matt and Clare, who encouraged me to embark on this journey but neither of who lived to see me finish what I started. They were constant sources of support and motivation to reach this goal. I know that they are as proud of me as I am.

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your efforts shining on the path, I hope to follow your example to improve engineering education for years to come.

To Stephanie Farrell and all of the members of the ASEE LGBTQ+ Equality Virtual Community of Practice: You gave me hope that we could band together and improve the environment for all engineers, but especially for those who feel that they must cover or downplay one of the most vital aspects of their personal identity. I am proud to be a member of our group and look forward to collaborating on this topic for many years to come.

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Last, but not least, I wish to thank the participants--the ones who responded anonymously and the ones who gave so graciously of even more of their time to allow me to interview them. It is my humble hope that sharing your stories will make a small difference in the culture of engineering academia that leads to an environment where all faculty members can share more openly the breadth of what makes them human.

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## CHAPTER I

### INTRODUCTION

In 2015 and 2016, more than 175 engineering deans signed the American Society of Engineering Education (ASEE) Engineering Deans Council (EDC) Diversity Initiative Letter to support efforts to increase the participation of women and underrepresented minorities in engineering education endeavors across the United States of America (United States). They “commit[ted] to ensuring that our institutions provide educational experiences that are inclusive and prevent marginalization of any groups of people *because of visible or invisible differences*” (American Society of Engineering Education Deans Council, 2015, para. 3, emphasis mine). Since diversity has been historically understood and measured in terms of ethnic, racial, and gender representation (Cartwright, 2015), the ASEE EDC Diversity Initiative Letter highlights the importance of increasing the representation of those demographic groups. However, women and racial/ethnic minorities have not been the only groups that have been underrepresented in engineering.

Visible and invisible differences have also encompassed dissimilarities of sexual and gender identity, a topic that has been frequently overlooked in the context of engineering (Cech & Waidzunus, 2009, 2011). The EDC Letter listed eight professional organizations that would be engaged to provide assistance with identifying and implementing diversity measures. However, the two professional organizations that support sexual and gender minorities in science, technology, engineering, and

mathematics (STEM), Out in STEM (oSTEM), and the National Organization of Gay and Lesbian Scientists and Technical Professionals Inc. (NOGLSTP), are missing from that list (American Society of Engineering Education Deans Council, 2015). Yet, increasing awareness of groups with invisible stigmas, such as sexual or gender minority status, was the first step toward those groups gaining greater acceptance and protection in the workplace (Beatty & Kirby, 2006).

Sexual minorities are individuals with non-heterosexual sexual orientations including, for example, lesbian, gay, bisexual, queer/questioning, asexual/aromantic, or others (LGBQA). Gender minorities are individuals whose gender identity does not match their gender assigned at birth (transgender) or who do not meet the socially constructed binary of male/female including queer, non-binary, or intersex. I discuss these terms in more detail in the terminology section of this chapter. It is important to note that this study focused on sexual minorities, not gender minorities, because the two groups may have different experiences working in engineering academia.

Increasing diversity among faculty, students, and working professionals within engineering has been a longstanding goal of engineering professional societies, universities, and government organizations (American Society of Civil Engineers, n.d.; American Society of Engineering Education Deans Council, 2015; Gephardt, Grassi, McCormick, & Shelton, 2016; National Science Foundation, n.d.; Society of Women Engineers, 2014; Wulf, 1998). However, progress has been slow (Bowman, 2016; National Science Foundation, Engineering Workforce Task Group, 2005; Whittaker & Montgomery, 2012; B. L. Yoder, 2016). In 2014, women comprised nearly 16% of tenured and tenure-track engineering faculty, while African Americans represented fewer

than 3% and Hispanics represented fewer than 4% (B. L. Yoder, 2016). Percentages of African American and Hispanic tenured and tenure-track faculty have increased by less than 1% in the past decade while women have increased their representation by only 4% (B. L. Yoder, 2016). Although underrepresented in the tenure-track streams, women faculty and underrepresented minorities have been overrepresented among non-tenure-track faculty across disciplines (Kezar & Sam, 2010; National Education Association, 1996).

Across the engineering disciplines, the percentages of diverse faculty have ranged by topic and ethnicity along gendered lines (B. L. Yoder, 2016). For example, topics considered closer to “true” or “pure” engineering that are based on physics and hold a maverick-type image (Leonardi, 2003) such as aerospace, mining, and nuclear engineering have remained bastions of whiteness and maleness (Banerjee, 2016). In contrast, female and underrepresented racial and ethnic faculty members have had higher representation within areas such as biological, chemical, and civil engineering (National Science Foundation, n.d.; National Science Foundation, Engineering Workforce Task Group, 2005; B. L. Yoder, 2016). This information is known and studied because demographics including gender, ethnicity, and disability status have been collected for decades (National Science Foundation, 2017) and that data has been used to track changes in participation of various underrepresented groups in engineering and many other disciplines. Unknown within the engineering faculty and student body demographics have been two facets of diversity that have rarely been discussed until recently--the spectrums of sexuality and gender identity. The lack of data has limited the full picture of existing diversity in engineering. It has also left unanswered the question

of whether additional efforts focused on a broader definition of diversity would be necessary to access an untapped resource that might widen the pipeline of potential future engineers and reverse the stagnation/decline of entry into, and persistence within, the field. The aim of this study was to share the experiences of engineering faculty members who included sexual minority status among their identities to start to fill that gap in the discourse and offer suggestions for tangible ways to begin to improve the discursive environment (Chase, 2001) within engineering academic programs. A desired outcome would be that engineering environments would be more conducive to encouraging open discussions regarding the full spectrum of diverse identities and increasing participation of individuals who hold these diverse identities. This study was a necessary next step to break the silence regarding the experience of a particular group of individuals who have yet to be included in existing diversity discussions. Diversity and inclusion efforts cannot be successful as long as underrepresented groups remain systematically excluded from the discussions.

### **Intersectionality of Identities**

An individual's identity goes beyond ethnicity/race and gender to include age, disability status, education, gender identity and expression, marital status, mental health status, nationality, religious beliefs and expression, sexual identity and orientation, socioeconomic status, work background, and many other categories (Bowleg, 2008; IVY Planning Group, 2015; Parent, DeBlaere, & Moradi, 2013; Tomlinson & Baruch, 2013). Every individual's identity incorporates multiple categories simultaneously (Cole, 2009) and, as Kimberlé Crenshaw first described, these facets of identity interact in ways that are intersectional, not additive (Crenshaw, 1989). In the simplest of terms, Crenshaw

intended her concept to mean that “forms of prejudice overlap” (Bartlett, 2017, para. 3). In other words, when someone’s identity includes multiply privileged, multiply marginalized, or a combination of both types of identities, that person’s experience cannot be explained by using existing theories that were based on a “single-axis” of discrimination such as race or gender alone (Crenshaw, 1989, p. 139). As Case (2017) states,

Identity [is] co-constitutive, in separable, and interdependent. . . . Analyses of multiple categories of identity and oppression cannot be accomplished via an “add and stir” approach. Therefore, one must think in terms of chemical reactions or multiplication as a starting place for avoiding ineffective additive models of the past. (para. 7)

Within this study, I worked alongside my participants to jointly consider and describe aspects of their identities that were vital to their daily experiences yet rarely discussed such as those beyond their roles as faculty and technical experts. Bowleg (2008) noted that “people can be members of dominant and subordinate groups” (p. 314) simultaneously (e.g., a White lesbian engineering professor), and it would be impossible for that person to deconstruct her experience of racial power and privilege juxtaposed with the racism, sexism, and homophobia she may have faced based solely on one of those identities. For instance, Asian males may face stereotype threat (Steele, 2010) in engineering environments because they have been expected to be model minorities and better at math than Whites (Trytten, Lowe, & Walden, 2012). At the same time, however, Asians have been stereotyped as non-aggressive which contrasts with the common perception that successful engineers are forceful and authoritarian in presenting and defending their proposed solutions because those solutions are based on proven, scientific facts (de Pillis & de Pillis, 2008). This type of identity interaction has made the challenge

of studying self-identified sexual minorities in engineering complex because participants who were White or Asian males were likely to have significantly different experiences than others who hold multiply marginalized identities such as African American men or women of color.

### **Terminology**

The terminology to describe individuals who identify as sexual and gender minorities has been imprecise, contested, and evolving (Bolger, 2015; Jourian, 2015). However, I tried to honor the original authors' intents and followed their terms. Frequently, studies have discussed the experiences of lesbian, gay, bisexual, and transgender (LGBT) individuals with the mistaken, or at least conflated, concept that sexual and gender minorities could be lumped into the same category (Moradi, Mohr, Worthington, & Fassinger, 2009). Whereas lesbian, gay, bisexual, queer/questioning, and asexual/aromantic (LGBQA) describe a person's sexual or affectional orientation, the terms transgender, cisgender, agender, and intersex describe a person's gender identity (Moradi et al., 2009). Someone would be considered transgender if that person did not identify with the gender that was assigned at birth (Human Rights Campaign, n.d.). Cisgender identity, on the other hand, would be rarely mentioned because it has been normalized as the hegemonic gender identity and, therefore, the unquestioned state where people identify with the gender assigned to them at birth (Cisgender, n.d.). Intersex individuals were born with a reproductive or sexual anatomy that did not fit the typical definitions of female or male (Intersex Society of North America, n.d.).

Aspects of identity such as gender and sexual orientation were once assumed to be binary. In other words, the dominant normative assumption in the United States has

been that a person would be either male or female, gay or straight (Elizabeth, 2013); however, recent studies have acknowledged that these attributes may actually fall along a continuum (Elizabeth, 2013; Faulkner, 2000a; GLAAD, 2016). I honored that continuum within this study by allowing my participants to self-identify their personal attributes including sexuality and gender terminology by accepting the presence or absence of either or both.

Throughout this study, I used the term self-identified sexual minority rather than the linguistically simpler sexual orientation. This was intentional because there have been meaningful differences between orientation and identity. Orientation is an “inherent or immutable enduring emotional, romantic or sexual attraction to other people” (Human Rights Campaign, n.d., p. 1). Although a person may have an orientation towards specific romantic or sexual relationships, that person may not actively embrace or accept membership in that group. The first step in coming out has been to come out to oneself (Human Rights Campaign, 2014) and part of this process meant selecting a sexual identity that fits, even if that identity was fluid. As Brewer (1991) stated, “Membership may be voluntary or imposed, but social identities are chosen” (p. 477). As a researcher, I did not wish to impose membership in a stigmatized group on any of my participants; therefore, I stated the inclusion criteria as individuals who self-identify as a member of a sexual minority, at least for the timeframe of my study.

### **Definition of Terms**

The following definitions are provided to ensure that readers understand the concepts used throughout. I, the researcher, developed definitions without citation.



*Gender* involves “the psychological, behavioral, social, and cultural aspects of being male or female (i.e., masculinity or femininity)” (American Psychological Association, 2015b, p. 2).

*Gender roles* are socially constructed and based on expectations about which behaviors are believed appropriate for which sex (Blackstone, 2003). Masculine roles have been those that have been deemed culturally appropriate for men; feminine roles have been those that have been deemed culturally appropriate for women (Blackstone, 2003). Certain professions have been gendered (Acker, 1990; Faulkner, 2000a). Those gendered masculinely, such as engineering, hold a higher status than those gendered femininely (Hacker, 1981). For example, even though the “underlying conceptual characteristics (e.g., mathematics in textile production, mechanics and electronics in household equipment)” overlapped between engineering and home economics disciplines, engineering was considered “men’s work” and given higher social status and home economics was labeled “women’s work” (Pawley, 2007, p. S2H-17). Even within engineering, certain disciplinary areas have become home to more self-identified women, and over time, those sub-disciplines have seen their status lowered by engineers in the remaining masculinized fields (Acker, 1990).

*Heterosexism* “is the assumption that all people are heterosexual and that heterosexuality is superior and more desirable than homosexuality or bisexuality. Heterosexism is also the stigmatization, denial and/or denigration of anything non-heterosexual” (James Madison University, 2005, p. 1). Similar to other discriminatory behaviors, heterosexism can be overt or subtle and can be perpetuated by

individuals or policies. For instance, prior to the *Obergefell v. Hodges* marriage equality decision by the Supreme Court in 2015, denying employment benefits to same sex couples that were available to opposite sex couples based on marital status would be considered a heterosexist policy because same sex couples were unable to legally marry in all 50 states.

*Out* or *out of the closet* are terms that describe individuals who have acknowledged their sexuality, usually as being part of the LGBTQ community. *Openly gay* is another term with a similar meaning and is in contrast to closeted or not open about their sexuality (GLAAD, 2016). It is important for readers to remember that being out or closeted is not a binary. Coming out happens on a daily basis, every time an LGBTQ person encounters either an unknown person or someone they know but to whom they have not yet disclosed their sexuality. Outness can be measured on a spectrum. Individuals could be out to no one, out to some people, out to all people they know on a personal or professional level, or out to the world (such as celebrities Elton John, Ellen DeGeneres, and Anderson Cooper). Also, the advantages and disadvantages of being out would depend on an individual's intersectional identities and culture. For example, based on personal discussions I have had during this study, some African American women have chosen not to publically disclose their sexual identities because of the repercussions they expect to face in their faith communities or professional circles.

*Queer* is defined in the Merriam-Webster dictionary as “differing in some odd way from what is usual or normal,” but is also an umbrella term used by individuals who feel limited by the terms gay, lesbian, or bisexual (Queer, 2017, n.p.). The term

was originally considered pejorative but has been reclaimed by some members of the gay community. The use of the word is still contested, however, typically with older generation gay males still finding it objectionable (American Psychological Association, 2015a; PFLAG, 2017).

*Sex* “usually refers to the biological aspects of maleness or femaleness” (American Psychological Association, 2015a, p. 2) and is typically determined by inspection of genitalia and reproductive systems.

*Sexual orientation* is a person’s “manifestation of sexuality as expressed through sexual, affectional, and relational predispositions toward other persons on the basis of their gender” (Moradi et al., 2009, p. 6). A heterosexual orientation would mean that a person was predisposed to being attracted to persons of the opposite sex or gender (Manning, 2009), whereas a homosexual orientation would mean that a person was predisposed to being attracted to persons of the same sex or gender. A bisexual or pansexual orientation would mean that a person was attracted, to some degree, to persons of either or any sex or gender (Davis & Heilbroner, 2015; Gates, 2011; Human Rights Campaign, 2014). Sexuality has been recognized as non-binary for nearly 70 years thanks to Dr. Alfred Kinsey and his colleagues (Kinsey, Pomeroy, & Martin, 1948/1998). Kinsey’s research team identified sexuality along “a Likert-type scale from exclusive heterosexual attraction (score of 0) to exclusive homosexual attraction (score of 6), with bisexuality falling in the middle” (Walton, Lykins, & Bhullar, 2016, p. 1591). Kinsey also described an asexual orientation as someone who was not sexually or romantically attracted to other people (Walton et al., 2016). Additional terms including *demisexual* and

*pansexual* have recently been added to the vernacular to provide more specificity for those whose internal perceptions of their attraction (or lack thereof) towards others were more nuanced (Walton et al., 2016). The difference in the definition of bisexual and pansexual has been contested, but the basic idea has been that bisexuality implied binary sex and gender options of male and female whereas the word pansexual included the concept that sex and gender lied on a spectrum and explicitly included transgender individuals (Elizabeth, 2013).

The meanings of these terms have been refined and revised throughout history and a current topic of discussion would be whether sexual orientation was a static trait or fluid throughout a person's life (Horley & Clarke, 2016). I used the terms self-identified sexual minority and sexual identity throughout this study to acknowledge that an "identity is the inward or outward conscious claiming of those predispositions" (Moradi et al., 2009, p. 6) and an identity, sexual or otherwise, was chosen (Schwartz, Luyckx, & Vignoles, 2011). When referring to extant literature, I have used the acronyms as published by the authors.

### **Statement of the Problem**

#### **The Problem for Lesbian, Gay, Bisexual, and Transgender Employees**

Experiences among individuals who identify as sexual or gender minorities have varied widely by industry, profession, and geographic region (Tilcsik, Anteby, & Knight, 2015; J. B. Yoder & Mattheis, 2016). Research has shown that a majority of LGB (Ragins, Singh, & Cornwell, 2007) and LGBT (Fidas & Cooper, 2014; Riley, 2008) employees across a range of industries and settings in the United States have feared negative consequences if their identity was known by co-workers. There has been a

substantive and growing body of research regarding the experiences of LGBT employees in general and the work climate that they face (Badgett, Lau, Sears, & Ho, 2007; Fidas & Cooper, 2014; Griffith & Hebl, 2002; Kitzinger, 2005; Newheiser & Barreto, 2014; Tilcsik et al., 2015), however, employees in higher education have been mostly left out of those discussions.

Higher education institutions have mirrored society and, consequently, faculty members have been subjected to many of the same social concerns as other employees (Coleman, 2016; Dilley, 2002; Perkin, 1997). The problem that this study addressed was that, as research by Badgett, et al. (2007) and Fidas and Cooper (2014) has shown, LGBT employees have faced discriminatory and exclusionary behavior in the workplace. While this could lead to employee dissatisfaction and turnover in any industry, the repercussions and long-term effects within higher education could be profound. Faculty members train future workers and managers who would impact the environment within academic disciplines and affiliated industries for decades to come.

### **The Problem, Specifically in Engineering**

Even amidst nationwide efforts to increase diversity and inclusion within academia at all levels, continued marginalization and invisibility of engineering faculty members who identify as, or are assumed to be, sexual minorities has existed (Riley, 2008). Diversity initiatives have tended to focus on increasing the numbers of visually identifiable minorities such as women, racial, and ethnic minorities other than Asians who were well-represented within engineering, and those with visible physical disabilities--criteria that excluded some sexual and gender minorities by omission (Blackwell, Snyder, & Mavriplis, 2009; National Science Foundation, 2016a; Patridge,

Barthelemy, & Rankin, 2014). There have been several possible reasons why sexual identity and gender identity were frequently excluded among diversity discussions in the U.S., and in the field of engineering specifically. Within the engineering culture of depoliticization, or the belief that social issues could be separated from the technical issues of engineering, a person's sexual identity fell squarely on the social side of the technical/social duality so it was considered irrelevant (Cech, 2013b; Faulkner, 2000a). Yet for individuals whose minority status within engineering was visually clear, such as women and many ethnic or racial groups, their physical presence has made them difficult to ignore completely (Cech, 2013b). Therefore, through decades of concerted efforts, their experiences have become part of the discussion of engineering culture and the need for change to make that culture more welcoming for them has become commonplace. The same could not be said for sexual minorities who may or may not be visually identifiable as outside the norm.

Some researchers have suggested that sexual identity could remain hidden in most academic and work environments (Goffman, 1963; Moradi et al., 2009; Quinn & Earnshaw, 2013). This opinion has been partially supported because individuals with concealable stigmatized identities did not always self-disclose (Goodman, 2011). However, social norms for gender expression and gender roles have made it difficult for some individuals to hide their sexual identity. Based on stereotypes made about appearance, people have made assumptions regarding individual's sexuality based on failure to adhere to social norms. This has led to a double threat to women in engineering who were simultaneously acculturated to downplay their femininity so that they were taken seriously as engineers while at the same time being expected to maintain

gendered roles such as being student advisors within their jobs as engineering faculty (Rosser, 2004).

Throughout my career, I have frequently heard the phrase, “After I get tenure, I will . . .” or “After I get promoted to full professor, I will . . .” This is indicative of the recognition that individuals who go against the grain need to have an appropriate level of social capital to survive the potential backlash. In the hierarchical, masculine, and privileged academic environment, “Academics from both privileged and oppressed groups are professionalized to conform to dominant norms that reinforce social inequality, and those who disrupt the status quo typically face negative sanctions, including harassment, stigmatization, and discrimination in retention, tenure, and promotion” (Stockdill & Danico, 2012, p. 2). Even so, some faculty in engineering and elsewhere refuse to hide the most important aspects of their authentic identities. They refuse to disintegrate, so-to-speak, what makes them fully human. The reasons for this are as personal as the reasons are for those who decide not to be open about all of their identities.

Some of the commonly identified benefits for people to share their identities at work include the release of the daily stress and effort required to hide who you are, and the desire to have stronger relationships with coworkers and others with whom they interact frequently (Human Rights Campaign, 2014). In the words of the Rochelle Diamond, former chairwoman of the National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP), “Pretending to be something you’re not takes a huge amount of energy” (as quoted in Keeney, 2014). Others believe that by sharing their sexual minority status, they can help “break down barriers and stereotypes

that have kept others in the closet” and that they can “lead by example” (Human Rights Campaign, 2014, p. 4). People should be able to choose to keep their identities private or share them publicly without fear of job loss, stigmatization, or retribution.

Data-driven researchers, such as those common in engineering, may be challenged to study sexual minorities as a population because comprehensive data did not exist in the same way that they existed for women and other underrepresented minorities (Moradi et al., 2009). Neither sexual identity nor gender identity has been included in institutional databases or federal laws/statutes used to define underrepresentation in certain areas such as STEM (National Science Foundation, 2016a). Therefore, this particular population did not qualify for programs and grants that used those diversity statistics as inclusion criteria, leading to a lack of financial or programmatic support available to study these populations (National Science Foundation, 2016a). In other words, the lack of currently available data has lead directly to the lack of accessibility of funding for research to obtain those data.

### **Significance of the Study**

Research has shown that positive experiences with a role model with a similar identity was an important factor in career success, especially for those who were numerical minorities in a profession (Erickson, 2012; Richman, vanDellen, & Wood, 2011). In addition, some faculty members may provide social support that has been shown to be “related to better achievement outcomes among minority groups” (Richman et al., 2011, p. 496). However, faculty turnover and/or compartmentalization of identities have left students without opportunities to develop long-term relationships with those who could model success in engineering by someone with a shared sexual minority



identity. An extensive body of literature has stated that student learning was positively related to interactions with faculty, both inside and outside the classroom (Astin, 1993; Chickering & Gamson, 1987; Pascarella & Terenzini, 1991; Tinto, 1993; Umbach & Wawrzynski, 2005). Those increased interactions outside the classroom may lead students to visit a faculty member's office where they might view subtle or obvious photos or artifacts identifying that faculty member as a sexual minority. For example, a faculty member's office could house family photos showing a same gender partner/spouse, awards from LGBTQ organizations such as oSTEM or NOGLSTP, a rainbow flag or Human Rights Campaign equality stickers, newspaper articles describing the individual's work to support equality efforts on campus, etc.

The concern about students' reactions might have led some faculty to avoid these types of interactions meaning that both the faculty member and the student have missed out on opportunities to build relationships that could lead to mentoring and professional connections. Alternatively, the faculty member might have chosen to forgo displaying any of these types of artifacts and maintain a depersonalized workspace. This further perpetuated the current culture in which engineers were only supposed to focus on technical topics, not social or political topics such as the importance of having a family or participation in an organization outside of engineering. Therefore, it would be imperative for higher education administrators and fellow faculty to recognize and understand the challenges that certain individuals face when directly asked or expected to hide significant aspects of their authentic selves such as their sexual or gender identity. Yet few studies in extant literature have discussed these issues within the context of engineering academia.

### **Purpose of the Study**

This study filled a gap by exploring the lived experiences of engineering faculty who simultaneously held a highly prestigious role at research universities yet individually identified with an invisible, underrepresented group--sexual minorities. The purpose of this study was to explore and analyze their experiences to bring to light the challenges that these faculty members faced and the benefits that their identities brought to their roles as researchers, teachers, and mentors. The goal was that administrators, peers, and the individuals themselves could better recognize the relevance of these identities as they related directly to faculty performance and satisfaction. The underlying assumptions of this study were that people simultaneously maintained intersectional identities that could not be disaggregated into the simple sum of their parts (Crenshaw, 1989) and that depoliticization (Cech, 2013a; Cech & Sherick, 2015) limited the consideration of the full breadth of diversity issues that affected the college climate for all students, faculty, and staff.

The most basic goal of this study was to raise the consciousness (Kravetz, 2015) of administrators, faculty, and students about the experiences of a typically invisible and understudied segment of engineering faculty so that they could be more cognizant of the ways in which various identities shaped the actions of faculty members. The hope was that, with increased awareness and dialogue surrounding the sexual diversity of the people who were already or aspire to become engineers, the concerns faced by this often-overlooked population would be explicitly incorporated into diversity and inclusion discussions and efforts needed to improve the culture within of engineering programs nationwide. In turn, broader inclusion of diverse perspectives and the recognition of

importance of social and political contexts have been touted as ways to improve engineering designs to meet the needs of global customers, including those previously excluded from the benefits of many engineering solutions (Cech, 2013a). From a social justice perspective, encouraging a broad range of individuals into engineering, and making the environment a place where they could succeed, is the moral thing to do. The final aim of this study was to provide additional data points in the gathering body of evidence that would show that research on sexual minorities was valuable to the discussion of improving educational environments in a way that would support the long-term growth and retention of diverse faculty, staff, and students in engineering.

### **Research Questions**

I shaped my investigation into these questions using aspects of social identity theory (Tajfel & Turner, 1979) and stigma theory (Goffman, 1959, 1963). Both have been considered relational concepts meaning that they should be construed from a socially constructed perspective of interpersonal relationships and within a context (Goffman, 1963; Newheiser & Barreto, 2014). In this study, I considered relationships between faculty participants, their colleagues, and their students within the context of the faculty member's particular geographic environment including institution, college, department, and workgroup, as well as their place in the social hierarchy that exists within the United States in general, and within engineering academia specifically.

According to Goffman (1963), people manage stigmatized identities through coping mechanisms and relationship management techniques including passing, covering, and compartmentalizing personal and professional aspects of their lives. The emotional toll of dealing with concealable stigmas (Goffman, 1963) has presented a burden on some

faculty by reducing cognitive resources available for other activities that require high cognitive loads such as a faculty member's primary professional duties including research, teaching, and service (Smart & Wegner, 1999; Sylva, Rieger, Linsenmeier, & Bailey, 2010). This burden may also simultaneously affect their relationships with colleagues and students negatively (Fagundes & Diamond, 2013) because identities that were stigmatized or forced to be hidden tended to foreground themselves in a person's mind and, hence, become all encompassing (Steele, 2010). My research questions sought to tease out whether sexual minority faculty members still engaged in passing, covering, and compartmentalizing their lives as was documented during my literature review and, if so, how those actions might have shaped their work-based relationships.

Social identity researchers have theorized that people's self-concepts are constructed based on interactions with the world surrounding them including group memberships (Brown, 1999; Tajfel & Turner, 1979). However, social identity and membership in a group or category should not be considered the same thing because "membership may be voluntary or imposed, but social identities are chosen" (Brewer, 1991, p. 477). Individuals could simultaneously hold many identities and physical traits that shape a person's self-concept and social interactions with others (Quinn & Earnshaw, 2013). Some of those identities may allow faculty members to categorize themselves as within the "in-group" or within the norm of engineering faculty, whereas other identities could place individuals in an "out-group" (Tajfel & Turner, 1979) or stigmatized role (Goffman, 1963) within their engineering faculty group identity. Understanding more about the interactions between faculty with stigmatized identities and their colleagues and students could help clarify what needs to change within the current engineering

environment in order to ease the tension that may have led to unnecessary social barriers between faculty members, their colleagues, and students. Those barriers may impede development of the relationships necessary to gain the full benefits of faculty interactions described throughout the student affairs literature (Astin, 1993; Boyer, Moser, & Ream, 2015; Chickering & Gamson, 1987; Pascarella & Terenzini, 1991).

To learn more about the ways that these engineering faculty managed their identities and relationships, I guided my study using one over-arching research question followed by a series of sub-questions:

- Q1 How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities experience working in Doctoral Universities as defined in the 2015 Carnegie Classification?
  - Q1a How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities describe their identities?
  - Q1b At what types of institutions and in what regions of the United States do full-time, tenure-track engineering faculty members who self-identify as sexual work?
  - Q1c How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities perceive that their identities influence their relationships with their professional colleagues?
  - Q1d How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities perceive that their identities influence their relationships with their students?

### **Scope of the Study**

Due to the limited prior empirical research focused on experiences of engineering faculty who identify as sexual minorities, this study provided an initial glimpse into the lives of six participants as a starting point for further investigation into a segment of this understudied population. This study focused on engineering faculty because they represented a unique subset of individuals within the STEM group of disciplines. The

STEM umbrella terminology covered a broad range of disciplines, including sociology, psychology, anthropology, economics, statistics, and other social and behavioral science as well as natural science and education disciplines, technology, engineering and mathematics (National Science Foundation, 2014). These disciplines encompassed disparate environments with varied knowledge paradigms and gender representation, both within and across disciplines. Engineering as an industry has had the lowest percentage of women across the STEM fields, and as J. B. Yoder and Matthies (2016) demonstrated, there has been a correlation between the number of women in a field and the openness and acceptance of diversity regarding sexual identity. Hence, I chose to study individuals in engineering to learn about the potential differences of experiences within the field based on the combination of identities, disciplines, and geographic locations of the individuals who participated.

I chose to limit my study to full-time, tenure-track faculty at public or private, non-religiously affiliated doctoral institutions because they have been the most frequent training grounds for individuals seeking to earn Doctor of Philosophy (Ph.D.) degrees in engineering within the United States (National Science Foundation, 2014). The Ph.D. has been the traditional entry-level credential necessary to enter the professorate (U.S. Bureau of Labor Statistics, 2015). Hence, U.S. doctoral institutions have constituted the site of social identity development and engineering culture for many engineering faculty --in some cases, as undergraduate and/or graduate students and then again as engineering faculty. Even among foreign-born academic engineering and science faculty, approximately 80.0% were educated at U.S. doctoral institutions (National Science Foundation, 2014). As described by Wilkins (2007), “faculty identity is learned by being

a keen observer of culture and behavior in a given institution and subsequently behaving in appropriate ways until one internalizes the existing system” (p. 34).

The primary reason for the exclusion of religiously-affiliated universities was that they were likely to have different climates and campus anti-discrimination policies for sexual minorities because, “Often, the religious or political affiliations of private institutions determine a priori the contents and contexts suitable for learning. Many of these institutions explicitly assert a heterosexual agenda at the expense of diversity” (Dolan, 1998, p. 43). In addition, I was concerned that it would be difficult, if not impossible, to maintain participant confidentiality within such a small subset of a subset of potential respondents, i.e., sexual minority engineering faculty working at religiously affiliated doctoral institutions within the United States).

### **Limitations**

Identifying members of a group with a presumably invisible stigma for research purposes can be difficult (Berry & Gunn, 2014; Trau, Härtel, & Härtel, 2013) and identities are internally generated (Schwartz et al., 2011), not something that should be imposed on a person by a researcher. Hence, this study was limited to engineering faculty members who *self-identified* as sexual minorities among their many other identities. As was mentioned earlier, “membership may be voluntary or imposed, but social identities are chosen” (Brewer, 1991, p. 477) and this study was limited to those individuals who chose to identify publically as sexual minorities. Other individuals who might have been eligible for the study but did not identify as sexual minorities. Some examples of those excluded included men who have had sex with men, or both men and women, but still self-identified as heterosexual. Another limitation within this study was that it depended

on participants' varied degree of "outness" that might limit their willingness to participate in a research study based on sexual minority status. For example, even if people knew about the study and met inclusion criteria, they might have chosen not to pursue the opportunity to share their story in such a public manner. This would directly tie into the limitation that all but one of my participants identified as white. On more than one occasion during my research, I was told about ethnic minorities who would have been eligible for this study but, based on what participants knew about how those individuals managed their public images, who would not have been likely to participate. The perception was that queer women of color already fought battles due to other aspects of their personal identities and "don't seem willing to take one more [career] risk" by publically acknowledging that they were also gay or lesbian (quoted from participant Phyllis).

Finally, the participant pool was limited to those individuals whom I could contact via my personal networks or through gatekeepers at their institutions because they were a hard-to-reach populations (Goodman, 2011) meaning that there was no sampling frame or manner of constructing a sampling frame from which to pull potential participants. Even though I had a significant network of professional contacts that focus on LGBTQ equality efforts within engineering academia, it was not so exhaustive that I had contacts at every engineering school or region across the United States. It was also impossible to determine how many engineering deans forwarded my study and why they chose to do so or not to do so. This led to small sample sizes for both the quantitative ( $n = 11$ ) and qualitative ( $n = 6$ ) portions of this study.



The intention of this investigation was not to develop findings that would be generalizable across a large population. Rather, it was my intention to conduct a study that would result in findings that could be viewed as believable by individuals who share some of the traits of the participants and by those who work with or employ those individuals. Due to these limitations, my findings might not include the full breadth of experiences of individuals who met my inclusion criteria.

### **The Researcher's Role**

I hold a unique role, straddling the line between being an insider (holding an emic perspective) and an outsider (holding an etic perspective) to this research. My background included various roles including student, staff, and temporary lecturer. I have worked with engineering faculty members on a daily basis and have been immersed in an engineering academic environment for the majority of my 25-year professional career. My role and my positionality are discussed in detail in the methodology chapter of this proposal.

### **Chapter Summary**

In this opening chapter, I identified the problem of the continued marginalization and invisibility of faculty members in engineering academia who identify as sexual minorities. That marginalization has been shown to lead to fear of career consequences for faculty and limitations or self-censoring discussions that could help make the environment within engineering academia more inclusive for a wider cross-section of individuals. I explained that this explanatory mixed-methods study would delve into the experiences of engineering faculty members who self-identify as sexual minorities in an attempt to learn more about ways that they make meaning of their relationships with

colleagues and students. Using lenses of stigma theory and social identity theory as starting points, I crafted my research questions to seek out and analyze faculty members' personal experiences working with engineering students and colleagues while having to negotiate their images as people who fit within the heteronormative and masculine environment of engineering that discourages discourse on anything outside the technical realm.

Next, I described the scope, limitations, boundaries, and assumptions that went into this study. Specifically, I described the differences between sexual identity and gender identities, and explained why I chose to focus solely on sexual identity. To maintain the greatest level of confidentiality as possible, I chose to limit this study to the self-identified sexual minorities who work at non-religiously-affiliated doctoral institutions that offer engineering degrees. Finally, to situate myself within the research, I briefly described my status on the cusp of the insider/outsider role as a staff member who has worked beside faculty for decades without carrying the same burdens of faculty job duties or high-pressure retention or tenure processes.

## **CHAPTER II**

### **LITERATURE REVIEW**

The limited pool of literature specifically focused on engineering faculty who identified as sexual minorities led me to investigate a broad range of subject areas while conducting my literature review and that investigation continued throughout my study. To provide necessary background information to the reader, I open this chapter with a brief history of higher education within the United States, highlighting the development of engineering education followed by a discussion of major diversity efforts within higher education over the past two centuries. I discuss key legislation and a shift in the perspective of what needed to be fixed, so-to-speak, to improve participation of underrepresented minorities away from the so-called deficit model that focused on remediating “the academic deficits of minority students” (Beasley & Fischer, 2012, p. 428). More recently, efforts have moved towards an abundance or strengths model and shifted the focus of problematization from the people entering engineering to the engineering culture itself (Ayre, Mills, & Gill, 2011; Bastalich, Franzway, Gill, Mills, & Sharp, 2007; Blickenstaff, 2006; Louie, Myers, Tsai, & Ennis, 2017). Next, I offer a brief introduction to what was known about the population of LGBTQ individuals in the United States and followed that with a primer on the modern-day fight for gay rights. Afterwards, I highlight literature that described experiences of sexual minority (lesbian, gay, bisexual, and queer; LGBTQ) employees in various disciplines and industries before describing the smaller pool of literature on sexual minority professionals in science,

technology, engineering, and mathematics (STEM). I present an overview of the culture of engineering, concepts of campus culture and climate, and then narrowed down to how those influenced faculty roles and relationships as they related to both the field of engineering and campuses. Finally, I summarize the literature on experiences of sexual minority engineering faculty and students. I conclude this chapter with a discussion of two theoretical perspectives used throughout this study: stigma theory (Goffman, 1963) and social identity theory (Brown, 1999; Tajfel & Turner, 1979).

### **History of Engineering Education and Higher Education in the United States**

In general, U.S. universities were modeled after the British system and were designed to promote the character building of young men who were expected to become civically engaged members of society and clergy (Brickman, 1972; Perkin, 1997; Schuster & Finkelstein, 2006). Most of the early American colleges were controlled by religiously affiliated boards and at least partially funded by the affiliated church (Perkin, 1997). In contrast, engineering education within the United States began in the late 1700s and was focused on skills formation and training students to use scientific principles to meet the everyday needs of society, which was more akin to the German model of higher education (Grayson, 1980). In 1802, Congress authorized the United States Military Academy at West Point to train engineers and to ensure that the cadets and engineers were available for both military and civilian endeavors (Grayson, 1980). As the Superintendent of West Point starting in 1817, Colonel Sylvanus Thayer instituted a multi-year program of study that included lectures, labs, and a uniform curriculum that closely emulated the French system (Grayson, 1980).

As the first chancellor of University of California, Berkeley, who later became president of the University of California system, Clark Kerr (2001) said, “As society goes, so goes the university; but also, as the university goes, so goes society” (p. 194). After the United States broke from England and obtained its independence, colonial leaders recognized the need to educate engineers with skills to meet the growing military, industrial, and public works needs of the quickly expanding country (Grayson, 1980). Approximately one dozen military and civilian colleges of engineering were founded during the first 80 years of independence. None allowed enrollment of women, although the founder of the Rensselaer School in 1824 stated that the new institution was designed “to qualify teachers for instructing the sons *and daughters* of farmers and mechanics” (Van Rensselaer as cited by Grayson, 1980, p. 376, emphasis added).

### **Expansion of Higher Education**

The year 1862 was pivotal for higher education, including engineering education. The Morrill Act of 1862 dramatically expanded the number of state universities in the United States, encouraged research activities that were directly related to improving agriculture and industry, and expanded higher education access to the working class, at least in theory (Duderstadt, 2012; Prono, 2008). That same year, Congress authorized Union Pacific to build a transcontinental railroad from Nebraska to California (Grayson, 1980). Based on the necessity of needing more and better trained individuals to meet the technical and scientific challenges of the new railroad, the number of engineering schools grew by nearly a factor of 6 over the next decade from about 12 in 1862 to 70 in 1872 (Grayson, 1980).

From the earliest days, engineering was seen as an occupation for White men, albeit of a lower socio-economic class than other types of education at the time (Oldenziel, 2005). White women were acknowledged as practicing engineers, albeit untrained, as early as the mid-1800s (Ivey Engineering Inc., 2013) and frequently borrowed their professional status from a male relative (Oldenziel, 2005) who had been trained in engineering. It was not until decades later that women were allowed to enroll as degree seeking students in the nation's engineering colleges. Elizabeth Bragg was the first woman to obtain an engineering degree in the United States. She earned her degree in Civil Engineering from the University of California, Berkeley in 1876 (B. Reynolds & Tietjen, 2001). Although engineering quickly became an occupation of the masses rather than a few elites, with diverse roles and specializations, few women were allowed within the ranks (Oldenziel, 2005). The "push to upgrade the field through professional ideals resulted in the masculinization of higher engineering education" (Oldenziel, 2005, p. 42). This occurred through the exclusionary membership requirements of professional engineering organizations, described later in this chapter.

### **Continued Expansion of Engineering Education**

Through the turn of the 20th century, engineering education continued to grow in depth and breadth. Dozens of separate engineering disciplines were identified and offered at colleges across the nation (Grayson, 1980). Engineering faculty from within the United States wrote their own textbooks to replace those from France that had long been used in the early years of education (Grayson, 1980). World War I and continued industrial expansion throughout much of the United States brought the need for as many technically trained individuals as possible to meet the consumption of chemicals, oil, and electricity

for newly developed internal combustion engines for use in cars and airplanes (Grayson, 1980). The technical skills and mathematical understanding needed for large infrastructure projects went beyond those that could be learned on the job.

World War II was the impetus for research on topics directly related to economic prosperity and national security (Park, 1996) and the U.S. government directed significant financial resources into universities accordingly (Geiger, 2011; Mumper, Gladieux, King, & Corrigan, 2011). This external support of applied research during the on-going Cold War further encouraged faculty to increase their time allocation on research activities and away from undergraduate education while simultaneously “encourag[ing] more students to attend college and study in areas of national interest, such as science, engineering, and foreign languages” (Mumper et al., 2011, p. 116).

Once again, while the men were at war, women were welcomed into technical careers and some engineering universities in the United States (Oldenziel, 2005; Rensselaer Polytechnic Institute Archives Staff, 2007). While some of the newer institutions opened within the Western United States were immediately welcoming to women and Black students, the earliest U.S. engineering institutions were slower to admit them (B. Reynolds & Tietjen, 2001). Admission of Black students into integrated institutions was delayed especially among the states of the former Confederacy (Wallenstein, 1997). One of the earliest engineering schools, West Point Military Academy, admitted its first Black student in 1870 (Shellum, 2006) but did not admit women until the early 1970s (Schloesser, 2010).

## **Expansion of the Engineering Profession Beyond White Men**

The initial Morrill Act of 1862 that established land grant institutions focused on agriculture and mechanical arts across the Western United States had done little to extend education to Black or Native Americans who were still excluded from most institutions (Editors of Encyclopædia Britannica, 2016). Engineering programs were not formed at Historically Black Colleges and Universities (HBCUs) until the 1920s, and they were underfunded for decades (Lovett, 2011). A group of HBCU administrators finally banded together and petitioned the U.S. Department of Education for assistance to expand the number of engineering and science programs at HBCUs. With additional financial support, enrollments in engineering and science programs at HBCUs skyrocketed between the 1980s and 2000 (Lovett, 2011). Lovett (2011) noted that, even though only 15 HBCUs offered accredited engineering programs, they produced “a disproportionately large” number of Black men and women engineers and scientists at the baccalaureate, master’s, and doctoral levels demonstrating success that has yet to be reproduced at many of the top traditional white institutions (TWIs) in the United States (p. 279). A student who transferred from the traditionally White University of Kentucky to HBCU Tennessee State University (TSU) summed up her experience thusly, “They remind you constantly that you are black. . . . I thank TSU and other schools that strive to give their students a sense of [positive self-] identity and the motivation to excel in life” (Lovett, 2011, p. 279). This student’s quote highlighted the asset model in place at TSU. Black students at TSU, and presumably other HBCUs, recognized that they were not the majority population in the United States but, when surrounded by others who share their racial



identity and when they are both encouraged and expected to work hard, they could and did succeed.

Women's colleges also demonstrated the ability to graduate individuals underrepresented among engineering programs in traditional institutions, but the timeline was significantly later and the scope significantly smaller than for HBCUs. The first accredited engineering program at a women's liberal arts college was founded at Smith College in 1999 (Pfabe & Easwar, 1999). Six years later, in 2005, Sweet Briar College became the second women's college in the United States to offer a stand-alone 4-year engineering degree (Sweet Briar College, 2017). Surrounded by other women, retention rates in engineering at the women's colleges outpaced those at coeducational institutions (Brand & Kasarda, 2014). However, the Board of Directors at Sweet Briar College abruptly announced in March 2015 that it intended to close before the beginning of the 2015-2016 academic year due to declining enrollments and forecasts of continuing decline (Jaschick, 2015). Although the school's administration abruptly reversed course and both the college and the engineering program survived, retention rates would be difficult to ascertain at that institution for several years to come.

### **Engineering Professional Organizations as Gatekeepers**

The expansion of engineering as a profession led to concerns regarding how to maintain its prestige. In 1914, the American Association of Engineers (AEE) formed in order to:

- (1) promote the social and economic welfare of its members;
- (2) develop public service on the part of the engineer;
- (3) increase engineering efficiency and raise the plane of the profession; and
- (4) provide a sound, enduring medium for engineering unity. (Robbins, 1984, p. 3)

The organization was divided into chapters and by 1922 its membership involved approximately 22,000 individuals and 200 chapters (Robbins, 1984). Although the group sat a goal to ensure professional registration of engineers in every state, it lacked any enforcement power to ensure that and did not include licensure as a requirement for its members. D. B. Steinman served as one of the first presidents of AAE but felt that the organization was not doing enough to ensure that individual engineers were sufficiently involved in the engineering educational process or the licensing and registration process that he felt was absolutely necessary to maintain standards for the engineering profession. Therefore, he invited representatives from a handful of professional organizations from four northeastern states to attend a meeting to discuss the potential formation of a new national society.

**National Society of Professional Engineers.** When first founded in 1934, the National Society of Professional Engineers (NSPE) was envisioned as an umbrella organization for the handful of state-based engineering organizations and AAE. Reflecting Mr. Steinman's views on the fundamental requirement of licensure, membership in the NSPE was restricted to "registered professional engineers" (Robbins, 1984, p. 5). Another difference of NSPE was that, as opposed to the other professional engineering organizations in existence at the time, membership in NSPE was for individual engineers. As a national organization, it was not intend to be a federation of state organizations. Therefore, membership in the national society required each engineer to also be "a member of his State Society and Local Chapter" (Robbins, 1984, p. 5). In theory, the membership limitation was intended to ensure that NSPE members were those who were officially educated and eligible for professional registration by their individual

states. In practice, this restriction limited the number of women and racial minorities who could become members because those individuals had limited opportunities to earn an engineering degree and gain the professional experience necessary to become licensed. Therefore, although women and minorities were not explicitly excluded from the professional society, in practice, few of them were eligible. This was one factor that led to the creation of individual professional societies by those who were underrepresented in both the discipline and the professional societies that purportedly represented all engineers.

**Society of Women Engineers.** In parallel to the creation of the existing professional engineering societies, the few women engineers who were enrolled or had graduated from engineering programs attempted to connect with each other and form their own society. In 1919, two engineering students from the University of Colorado began to contact engineering faculty at schools across the country to try to connect with other women engineers. The responses they received have now been maintained in a dedicated archive at Wayne State University and followed a basic theme that women were not currently, nor likely in the near future, to be admitted to most engineering programs. Early attempts to coalesce existing organizations for women engineers into a national organization were foiled because of the desire to maintain the same standards as implemented by existing male-dominated organizations, which excluded current students or working women engineers who were not formally trained and degreed as such (LaFrance, 2017). Therefore, it was not until 1950 that 61 women engineers and students finally incorporated the national Society of Women Engineers organization. At the time, “less than five percent of working engineers in the USA were women” (Eller, 2012, p.

299). Two of the four goals of the national organization were to share the stories of women who were currently working in the field and to encourage mentors, counselors, and parents of young women that engineering was a viable career field (Eller, 2012). Today, nearly 70 years later, women engineers still make up only about 11% of employed engineers but are making great strides in earning engineering degrees, albeit still gender-segregated among disciplines with significantly more women in biological, chemical, and environmental engineering as compared to aerospace, electrical, or mechanical engineering (National Science Foundation, 2017).

**National Society of Black Engineers.** In 1971, two male undergraduate students at Purdue approached their dean regarding their idea to create a Black Society of Engineering student group (National Society of Black Engineers, 2016a). In 1975, four other Black male engineering students joined the original two students and their advisor to plan and host the first national conference. Together “The Chicago Six,” as they were called, joined with 42 other students from 32 schools and drafted the organization’s constitution, elected a national chairperson, and chose the official name to be “The National Society of Black Engineers” (NSBE; National Society of Black Engineers, 2016b, p. 3). As of 2016, the society was the largest student-managed organization in the United States and included hundreds of chapters worldwide (National Society of Black Engineers, 2016b).

**Professional organizations maintain the same silos and silence.** Tying back into the main topic of this dissertation, with respect to the invisibility of sexual minorities and the separation of identities, a quick search on the NSBE website (NSBE.org) for the term “gay and lesbian” or “LGBT” came up empty except for an individual whose last

name was Gay. A similar web search for the term “women” led to the women’s clothing section of the NSBE merchandise store. The Society of Women Engineers website ([societyofwomenengineers.swe.org](http://societyofwomenengineers.swe.org)) similarly lacked information about “LGBT” or “lesbian” individuals with the exception of two references: a press release highlighting a grant that SWE received from the Motorola Solutions Foundation and about a half dozen news releases about a congressional briefing that was co-sponsored by NOGLSTP. This brief search demonstrated that, even among organizations specifically founded to support diverse individuals in entering engineering, groups such as sexual minorities were still rendered invisible.

### **Diversity and Discrimination within Higher Education**

Discussions of sexual minorities were missing from the discussion of the founding of engineering education so I turned back to the history of higher education in general for that perspective. At each point of expansion of academic access, discrimination against those who were previously excluded occurred through the implementation of policies or institutional cultures (Dilley, 2002; Perkin, 1997; Schuster & Finkelstein, 2006). Steele (2010) called these “identity contingencies” and categorized them as either “on the ground,” based on policies that physically excluded individuals with certain identities, or “in the air,” leading to a concern about stereotype threat (p. 5). At first, on the ground contingencies physically limited women and racial minorities from participating in engineering higher education by barring acceptance into the engineering academic programs needed to enter the profession. Women made the earliest progress, with enrollment in women’s colleges and coeducational institutions as early as the late 18th century (Goodchild, Wechsler, & Eisenmann, 2007), albeit rarely in engineering

schools. However, the content and quality of education provided to women was significantly less than that available to men (National Women's History Museum, 2007).

### **The Second Morrill Act Promised Increased Diversity**

It was not until the second Morrill Act, passed in 1890, that racial discrimination was forbidden in admission decisions for newly created colleges. That document contained a clause that led to the establishment of land grant institutions for Black Americans. However, it also set the stage for the “separate but equal” policy that led to discrimination against them in higher education for more than another half century (Committee on the Future of Land Grant Colleges of Agriculture, Board on Agriculture, National Research Council, 1995). In 1901, David Robert Lewis graduated in 1894 as Purdue University’s first Black undergraduate (Purdue University, n.d.). Even though the Supreme Court found in *Brown v. Board of Educ.* (1954) that separate educational facilities for Black students were unconstitutional, it was not until after the Civil Rights Act of 1964 was passed that Black students were allowed to enroll in most institutions of higher education (Leadership Conference on Civil and Human Rights, 2015). Whereas women and racial minorities faced “on the ground” contingencies that barred them from entering academia or the engineering profession such as being formally or informally excluded by policy or the actions of individuals (Croissant, 1999), non-heterosexual students faced their own identity contingencies. Whether or not written policy forbade homosexual behavior, the threat of negative repercussions was perpetually in the air and, therefore, likely to be continually on the minds of gay and lesbian students. Non-heterosexual students continued to be routinely expelled and faculty fired based on

allegations of homosexual relations or simply being associated with individuals who were caught or accused of same-sex relations (Dilley, 2002).

### **Current Status of Diverse Representation in Higher Education**

A long-standing goal of diversity efforts within higher education has been to increase inclusion of women and racial/ethnic minorities among the student body at both undergraduate and graduate levels so that eventually the faculty could also begin to diversify (National Science Foundation, 2009). Various diversification methods have been used in engineering academia to date, with uneven success across engineering sub-disciplines. Early efforts to engage women and underrepresented racial/ethnic minorities used activities that could be viewed as attempting to change or fix *the person* (deficit model). Activities included high school-to-college summer bridge programs for underrepresented students that brought them to campus earlier than their majority peers to initiate them into what was assumed would be a foreign culture. This deficit model focused on providing them with supplementary academic tutoring and social services to make up for the fact that they were deemed to be missing the social and academic capital of their majority/privileged peers (Ayre et al., 2011; Bastalich et al., 2007; Blickenstaff, 2006; Guido, Chávez, & Lincoln, 2010). Current diversification efforts have transitioned to the concept of *changing the environment* so that it was more attractive to a wider range of people, but there would still be much work to be done in that culture shift (Bastalich et al., 2007). Even today, most diversity programs have aimed to support women and racial minorities without regard to their other identities that also make them underrepresented. One reason for this may be that, until recently, students have had few opportunities to

identify as sexual minorities on official admissions documents and funding for most diversity programs have not explicitly allowed a focus on the LGB community.

### **Differences between Science, Technology, Engineering, and Mathematics and Engineering**

The acronym STEM, short for science, technology, engineering, and mathematics, was first used by Judith A. Ramaley, a former director of the National Science Foundation's education and human-resources division (Teaching Institute for Excellence in STEM, 2016). The terminology was widely adopted and STEM fields have been considered “fundamental to American competitiveness in the global knowledge economy” (Delbanco, 2012, p. 576). Yet, the category of STEM has included a wide variety of disciplines ranging from biological and life sciences, to specified disciplinary areas within engineering, to psychology, to social science (Big Ten Academic Alliance, 2014; Koonce, Zhou, Anderson, Hening, & Conley, 2011). The National Science Foundation has included psychology and other social sciences in their definition of STEM, whereas other federal agencies such as the Department of Homeland Security Immigration and Customs Enforcement have excluded social sciences (Gonzales & Kuenzi, 2012).

Individuals within these disciplines have held strikingly varied worldviews/paradigms (Biglan, 1973b), including fundamental beliefs of how knowledge was discovered or created (epistemology), and collaborate with colleagues in fundamentally different ways. Paradigms “serve as an important organizing function; [they] provide a consistent account of most of the phenomena of interest in the area and, at the same time, serve to define those problems which require further research” (Biglan, 1973b, pp.



201-202). Natural science and engineering disciplines have continued to value positivistic/post-positivistic paradigms based on the teachings of August Comte that said knowledge could only be acquired using methods of direct observation and experiment, and a singular truth was obtainable and reproducible by value-free researchers who used strict protocols based on scientific method (Guba & Lincoln, 1994; Mastin, 2008). The paradigm had allowed these academics to start on shared ground regarding content and method for collaborative efforts (Biglan, 1973a). Social scientists, on the other hand, have moved towards constructivist or interpretivist approaches to knowledge and have held assumptions that inquiry could never be truly value-free because truth was based on “culturally and historically-situated interpretations” (Radden, 2010, p. 8). This has required scholars in these non-paradigmatic fields to “work out a common definition of problems and methods of approach before they can begin to work together” (Biglan, 1973b, p. 210).

### **Different Values**

These fundamental differences in worldviews has led each of these professions, as a whole, to value different skills in their practitioners including social connectedness, which have included preferences for collaborating with others in both teaching and research (American Civil Liberties Union, 2016a; Biglan, 1973a). Surprisingly, Biglan (1973b) found that academics in the hard, applied sciences such as engineering have been more likely to collaborate with others in the realms of research and teaching than their counterparts in non-paradigmatic, soft sciences. Therefore, it was unclear whether or not the findings of cultural studies in STEM overall were comparable to individual segments of STEM such as engineering. For these reasons, it was difficult to suggest that the

experiences of faculty within those varied disciplines would have similar experiences within their academic cultures. In relation to this study, Biglan's findings suggested that a faculty member's privileged identities or skillsets in one STEM field may differ significantly from those of a faculty member in another STEM field.

### **Uneven Demographics**

Another reason for significant culture differences across the STEM fields has been that the diversity within those fields has remained uneven. Although attempts to increase the representation of women and underrepresented minorities in science and engineering education have been in place for decades, results have been modest at best (Blackwell et al., 2009; Ferrare & Lee, 2014-2015; Hill, Corbett, & St. Rose, 2010; Seymour & Hewitt, 1997). In 1995, underrepresented minorities earned 13% of all bachelor degrees earned in science and engineering, whereas by 2014 that number had risen to 20% (National Science Foundation, 2017). For women, the numbers declined from 41% to 40% (National Science Foundation, 2017) during the same timeframe. Representation of women varied dramatically by major, however. For example, 73% of employed psychologists were women whereas only 15% of employed women were engineers. And within engineering, "Women earn larger proportions of degrees in chemical, materials, industrial, and civil engineering than in aerospace, electrical, and mechanical engineering" (National Science Foundation, 2017, p. 1). The difference in percentages of women across majors could be relevant to this study because, as J. B. Yoder and Mattheis (2016) demonstrated, LGBTQ openness within STEM fields has been significantly related to the number of women employed in an area.

## **The Culture of Engineering**

In the words of Leonardi (2003), “engineers carry distinct traces of engineering culture with them” (p. 4). For at least the last 85 years, engineering has been portrayed as a White, middle class, masculine, and heterosexual profession (Ayre et al., 2011; Chase, 2001; Faulkner, 2000b; Hacker, 1981; Pawley & Tonso, 2011). Therefore, it should not be a surprise that engineering culture has been heteronormative, masculine, and resistant to change (Cech & Waidzunas, 2011; Riley, 2008; Trenshaw, Hetrick, Oswald, Vostral, & Loui, 2013). Engineering culture has been filled with “differentially valued binaries” (Cech & Waidzunas, 2009, p. 3) including male/female, technical/social (also called “hard/soft” by Biglan, 1973b), research/teaching, mind/body (Hacker, 1981), and others.

Those who do not fit the stereotypical image of an engineer (white, middle-class, heterosexual male) not only experience stereotyping and exclusion, but their minority status may mean they are simultaneously visible as “different” and invisible as engineers. (Cech, 2013b, p. 2)

Over the past two decades, engineering culture has been the subject of a large body of literature. Findings have shown that the engineering culture has included a technical/social dualism that categorized anything technical as “real” engineering and anything social as irrelevant to “real” engineering (Cech, 2014; Faulkner, 2000b, 2007). In addition, an image of meritocracy, or “the belief that success in life is the result of individual talent, training, and motivation” (p. 4) was also frequently seen within descriptions of engineering culture (Bilimoria & Stewart, 2009; Cech, 2013a, 2014). Hegemonic masculinity (Faulkner, 2000b; Leonardi, 2003; Pawley & Tonso, 2011), instances of heterosexism and heteronormativity (Bilimoria & Stewart, 2009; Cech & Waidzunas, 2011). Finally, several studies described the hierarchical and gendered nature of engineering work, where there were clear divisions of labor and women’s work

was less highly valued than men's work (Faulkner, 2000b; Hacker, 1981; Pawley & Tonso, 2011). Throughout those studies, stable and recurring themes have appeared: engineers have valued theoretical over practical (Faulkner, 2000b), and technical over social (Cech, 2014; Faulkner, 2000b, 2007); they have thrived on the perception that they were independent experts in their fields (Leonardi, 2003); and have believed in the meritocratic system of academic hierarchy (Cech, 2013a; Cech & Waidzunus, 2011; Leonardi, 2003).

### **Theoretical Over Practical**

Engineering has been defined as “the application of scientific and mathematical principles to practical ends such as the design, manufacture, and operation of efficient and economical structures, machines, processes, and systems” (American Heritage Dictionary<sup>®</sup>, 2016). What started out as a trade learned through hands-on experience has become an academic endeavor focusing on science after the beginning of the Cold War and the growth of a military-industrial complex (Pawley & Tonso, 2011). The accrediting body for engineering and engineering technology has separated the two disciplines by explaining that engineering requires advanced theoretical math and science coursework whereas technologists need “courses that are more practical than theoretical in nature” (ABET, Inc., n.d., p. 1). Engineers have been expected to take mathematical and scientific concepts and apply them to materials, systems, or processes to design tangible technologies that benefit humankind. Technologists, on the other hand, have often taken the designs and processes made by engineers and turned them into reality. Even though engineers and technologists have frequently worked side-by-side, the annual mean wage for engineers is 67% higher than for engineering technicians (U.S. Bureau of Labor

Statistics, 2015) and salary has typically been correlated to occupational prestige (Volti, 2008).

### **Technical Over Social**

Stereotypes of engineers as socially awkward, detached, prodigies have abounded within United States society. Recent examples in mainstream media have included Howard Wolowitz from *The Big Bang Theory* (Big Bang Theory Fan Site, 2016) and the Dilbert cartoon series (Petroski, 2007). In these examples, an engineer was an intelligent, White, heterosexual male and socially inept. On *The Big Bang* television show, Howard is an aerospace engineer with a master's degree from the Massachusetts Institute of Technology--the number one ranked engineering school within the United States. Howard spent the first several seasons making inappropriate passes at just about every female character. He lived with his mother, even after marrying an intelligent and beautiful microbiologist, and constantly wondered why his wife married him (CBS Interactive, 2016; Big Bang Theory Fan Site, 2016).

Dilbert was a cartoon character developed by Scott Adams. In Adams' (1996) tongue-in-cheek book, *The Dilbert Principle*, Adams clarified that:

It's totally unfair to suggest--as many have--that engineers are socially inept. Engineers simply have different objectives when it comes to social interaction. . . . "Normal" people expect to accomplish several unrealistic things from social interaction [including] important social contacts [and] a feeling of connectedness with other humans. . . . These goals are irrational and stupid. (pp. 180-181)

This quote fits the stereotypes mentioned by Faulkner (2006) who noted that engineering "has an image problem" but the true work of engineers requires both technical and social skills (p. 5). In her study, she found that both male and female engineers demonstrated

reasonable interpersonal skills but some men preferred to play up the stereotype of social ineptitude--was demonstrated above.

### **Campus Culture Versus Climate**

An organization's culture is comprised of the "the shared basic assumptions, values, and beliefs that characterize a setting and are taught to newcomers as the proper way to think and feel" (Schneider, Ehrhart, & Macey, 2013, p. 362) and is frequently gendered (Acker, 1990; Croissant, 1999). As hierarchical, political, and bureaucratic institutions (Birnbaum, 1988; Loss, 2011), universities have been "male-created and male dominated structures of control" (Acker, 1990, p. 141). Climate can be defined as, "the cumulative attitudes, behaviors, and standards of employees and students concerning access for, inclusion in, and level of respect for individual group needs, abilities, and potential" (Rankin, 2005, p. 17).

### **Culture Within Higher Education**

In their early years, institutions of higher education were gendered masculinely, both literally and figuratively (Perkin, 1997; Schuster & Finkelstein, 2006). Throughout the intervening centuries, certain disciplines and professions have shifted towards gender parity or have become feminized by number, but not necessarily by culture. For example, based on National Science Foundation statistics of earned doctorates, women earned 1,128 out of 10,413 total doctorates nationwide in 1961 (Reis, 1999) but, by 2014, they earned 30% more doctorates than men in fields outside of science and engineering (National Science Foundation, 2016b). Women's share of doctorates outside of science and engineering fields has increased from 52% in 1994 to 57% in 2015, and that percentage has remained stable since then (National Science Foundation, 2017b). Inside

science and engineering disciplines, women have made great strides over the last few decades regarding the number of doctorates they have received, but their percentage of overall doctorates earned has remained relatively flat at 42% since 2009 (National Science Foundation, 2017b). In many sub-disciplines of engineering, however, the percentage of women who earned doctorates has remained below 20% (National Science Foundation, 2016b). Again, since the doctorate was the typical entry credential into a faculty position at U. S. research institutions, the lack of progress towards closing the gender gap meant that the composition of the engineering faculty would remain gender skewed for many more years to come. For that reason, the climate that many engineering faculty experience will likely remain based on masculine ideals.

### **Climate**

Climate has been more malleable than culture because it could change based on the individual-level attitudes (Schneider et al., 2013). Extrapolating from Schneider et al.'s (2013) findings, leadership on a topic was an important antecedent of organizational climate change. This was relevant to my study because currently there appeared to be a small groundswell of espoused support for improving the culture and climate of engineering academia from deans of colleges and schools of engineering within the United States (American Society of Engineering Education Deans Council, 2015). With my current study, I intended to expand this discussion to include culture and climate changes that specifically responded to the needs of LGBQ faculty and staff.

### **Faculty Roles, Responsibilities, and Interactions with Students**

At one time, the standard faculty appointment was tenure-track, with a professional development path to promotion and tenure (Boyer et al., 2015; Kezar &

Maxey, 2012; Schuster & Finkelstein, 2006). Starting in the early 1970s, the number of non-tenure-track and part-time faculty appointments increased dramatically (American Association of University Professors, 1993; Benjamin, 2002; Boyer et al., 2015). Even as the number of Ph.D. degrees earned by women and underrepresented racial/ethnic minorities has increased over the past two decades, these groups remained over-represented among the lowest rank of tenure-track appointments, instructional non-tenure-track positions, and part-time work (Curtis, 2011; National Science Foundation, 2017; Park, 1996). The National Science Foundation (NSF) Science and Engineering Indicators 2012 report noted that only 16% of Ph.D. recipients in science, engineering, and health related fields earned within the prior 3 years held tenured or tenure-track academic appointments. In engineering, the percentage has decreased from 15% in 1993 to 9% in 2008 (National Science Foundation, 2012). These data indicated the highly competitive nature of academic positions in science, engineering, and health related fields. Therefore, the lucky few who held these limited positions tended to want to do everything that they could to succeed in them.

### **Faculty Responsibilities**

The National Center for Educational Statistics (n.d.), a division of the U.S. Department of Education, stated on its website that, “Faculty are the pivotal resource around which the process and outcomes of postsecondary education revolve” (p. 1). As professionals, higher education faculty have enjoyed great freedom in terms of both scheduling and performance of contracted job expectations which, for most tenure-track positions, was vaguely categorized into research, teaching, and service (Bila & Miller, 1997; Park, 1996; Schuster & Finkelstein, 2006; Tilcsik et al., 2015). Responsibilities for



non-tenure-track faculty positions have varied by appointment type but may have required a greater focus on teaching and service, especially at doctoral institutions where a primary goal for tenure-track faculty was to bring in research dollars (American Association of University Professors, 1993). Coincidentally, Tilcsik et al. (2015) theorized that occupations such as university faculty, with a high degree of task independence and/or social perceptiveness attracted lesbian and gay workers. A high degree of task independence was the autonomy to do one's work without depending on others and social perceptiveness was the ability to accurately assess or predict the reactions of others (Tilcsik et al., 2015).

For faculty, course preparation and instruction has primarily been an independent task whereas research endeavors were typically team efforts especially for engineering faculty who have, on average a larger network of research connections than social scientists (Biglan, 1973b). Social perceptiveness has been a key for faculty because within faculty ranks, studies have shown that faculty cultures were "stratified by discipline, faculty rank, tenure status, and productivity" (Bila & Miller, 1997, p. 3). E. P. Harper, Baldwin, Gadsneder, and Chronister (2001) concurred with this when they said, "Status within the university community is heavily influenced by credentials" (p. 239). Assistant, associate, and full professors each have had different rights and responsibilities and all have had more status and power than non-tenure faculty (Boyer et al., 2015). This status differential has had the potential to leave those who were lower in the hierarchy, especially pre-tenure assistant and associate professors and non-tenure-track faculty, more vulnerable to negative employment outcomes if their stigmatized identity became known. Often the fear of potential negative outcomes outweighed the realized

discrimination (Embrick, Walther, & Wickens, 2007). This underlying fear could have a chilling effect on discourse between individuals with lower rank within a hierarchy and those above. It would be reasonable to assume then, that individuals with lower rank would filter what they say to those above them, and those with higher rank would filter what they discuss with others to maintain their high level of social capital. This was shown to be the case for participants in this study.

### **Faculty/Student Interactions**

With respect to the importance of this study to students, an extensive body of literature stated that student learning was positively related to interactions with faculty, both inside and outside the classroom (Astin, 1993; Chickering & Gamson, 1987; Pascarella & Terenzini, 1991; Tinto, 1993; Umbach & Wawrzynski, 2005). Faculty may also have acted as role models (Gibson, 2004), mentors, or advisors (Kuh, 2008a). Astin's (1993) discussion of student involvement noted that frequent interaction with faculty, both inside and outside the classroom, might have led to higher levels of student performance and retention. Students who did research with faculty were "more likely to persist, gain more intellectually and personally, and choose a research-related field as a career" (Kuh, 2008b, p. 27). The influence of faculty on students could not be overstated (Kuh, 2008a). Faculty relationships with students could be mutually beneficial and/or fraught with perceived professional danger. For individuals who were expected to cover and compartmentalize their lives outside of the classroom or laboratory, interactions with students in one's office or elsewhere could lead to stress (Bilimoria & Stewart, 2009) and paranoia regarding the potential for allegations of improper behavior.

### **Population of Lesbian, Gay, Bisexual, and Transgender (LGBT) Individuals in the United States**

An accurate estimate of the LGBT population within the United States has been difficult to obtain because there was no universal dataset that included sexual identity. In 2015, the Gallup Daily Tracking poll showed that 3.8% of participating individuals identified themselves as LGBT (Gallup, Inc., 2015). Various surveys from the U.S. Census Bureau began tracking households with same-sex, unmarried partners in the mid-1990s to early-2000s (U.S. Census Bureau, n.d.). A Census Bureau report issued in September 2011 stated that approximately 1% of all coupled households in the United States were same-sex, with percentages ranging by state from 0.29% (Wyoming) to 4.01% (District of Columbia). These figures included only a subset of the overall LGBT population because they only took into consideration those households with same-sex couples that lived together. Bisexual and transgender individuals with partners may have same-sex or opposite-sex partners, further obscuring their representation. In addition, differing marriage/civil union/domestic partnership laws by state could have led to errors in data because same-sex couples were integrated into data of married couples at different times in different states (U.S. Census Bureau, 2011). With an estimated 3.5% of adults self-identifying as lesbian, gay, and bisexual in an anonymous study, the Williams Institute at the University of California, Los Angeles Law School found similar rates as other studies. However, their findings of adults who admitted any type of same-sex sexual experiences during their lifetime (8.1%) or any same-sex attraction (11%) were much higher (Gates, 2011).

## **History of Modern-day Fight for Gay Rights in the United States**

The modern-day fight for gay rights in the United States began in 1969 in response to a police raid at a gay club in New York City called the Stonewall Inn (A&E Television Networks, LLC., 2016; Carter, 2010; Robinson, 2011). As was typical for the times, police raided a bar where homosexuals were known to gather and attempted to arrest people. This time, however, the bar patrons fought back. The riots lasted for 6 days but, more importantly, they set a precedent for LGBTQ people in the United States deciding to stand up for their rights openly and to demand fair treatment in social, political, and legal milieus (Carter, 2010; Davis & Heilbroner, 2015).

The American Psychiatric Association classified homosexuality as a mental disorder until 1973 (American Psychiatric Association, 1973). Homosexuality was stigmatized (Mays & Cochran, 2001) and LGBTQ individuals had no protections against discrimination in areas including but not limited to employment (Badgett et al., 2007; Bennett Garner, & James, 2013; Ryniker, 2008) and higher education (Dilley, 2002; Perkin, 1997).

Fast forward nearly 50 years and one could see both significant progress as well as stagnation in the efforts to provide individuals who identify as sexual minorities with full equality in the United States (American Civil Liberties Union, 2016b; Rowen, n.d.; Washington Post, 2010; White House, n.d.; Witherspoon Institute, 2015). For example, as of 2016, all 50 states have elected officials who have openly identified as LGBT (Reese, 2012). Major governmental and industry decisions, actions, and inaction within the past few years brought the discussion of legal rights of sexual minorities to the forefront of

United States social and political discourse (American Civil Liberties Union, 2016b; Rowen, n.d.; Washington Post, 2010; White House, n.d.; Witherspoon Institute, 2015).

For example, Title IX of the Education Amendments of 1972 (“Title IX”) was originally passed to prohibit discrimination based on sex in federally funded education programs and activities (U.S. Department of Justice, 2015). In 2014, the U.S. Department of Education Office of Civil Rights issued a Dear Colleague Letter (DCL) explained that the office would consider complaints of Title IX violations that included harassment based on sexual orientation and gender identity or expression for investigation (U.S. Department of Education Office for Civil Rights, 2014). However, on February 22, 2017, the same organization, now under the Trump Administration, issued a new DCL that withdrew the guidelines enacted in May 2016 (Kreighbaum, 2017; U.S. Department of Education, 2017).

For a brief period, it appeared that the 2020 Census might include questions about sexual orientation and gender identity. When the list of topics to be included on the 2020 Census was initially revealed, an appendix of the report indicated that sexual orientation and gender identity questions would be included. Within one day, Census Bureau Director John H. Thompson labeled this information an “error.” In his press release on March 29, 2017, Thompson indicated that, in response to a request of more than 75 members of congress received in 2016, members of the Census Bureau:

Carefully considered this thoughtful request and worked with federal agencies . . . to determine if there was a legislative mandate to collect this data. Our review concluded that there was no federal data need to change the planned census and American Community Survey subjects. (Thompson, 2017, para. 4)

Based on this decision, at least another 13 years will pass until the next opportunity to obtain accurate federal data on the LGBTQ population within the United States.

### **Experiences of Lesbian, Gay, Bisexual, and Queer (LGBQ) Employees in the United States**

Employment non-discrimination laws based on sexual orientation have received greater attention in state legislatures across the United States. However, to date, fewer than 50% of states within the United States have implemented laws that protect workers from discrimination based on sexual orientation (American Civil Liberties Union, 2016b; Movement Advancement Project, 2017). With one exception (the 109th Congress from 2005 to 2007), a federal Employment Non-Discrimination Act that would prohibit discrimination in the workplace based on sexual orientation has been proposed by members of every U.S. Congress since 1994 but has never been passed by both houses (Library of Congress, n.d.). This has left millions of LGBQ employees open to discrimination. Sexual orientation has remained one of the last acceptable factors for discrimination in employment within the United States (Ozeren, 2014).

Employees who identified as sexual minorities faced both overt and covert discrimination in the workplace (American Civil Liberties Union, 2016b; Bilimoria & Stewart, 2009; Blackwell et al., 2009; Cech, 2013b; Cech & Waidzun, 2011; Dolan, 1998; Dozier, 2012; Embrick et al., 2007). Overt discrimination is observable, such as limiting access to certain positions or institutions solely based on gender. Although

overtly discriminatory actions had decreased over the past several decades, covert discrimination has remained insidious and, therefore, has been more difficult to pinpoint or prove. Sexual minority employees in a variety of industries and settings frequently reported covert discrimination exclusionary behaviors, homophobic jokes, and general heterosexist assumptions (Cech, 2015; Ozeren, 2014; J. B. Yoder & Mattheis, 2016).

Other concerns for LGBTQ professionals included that

- they might not be considered for advancement;
- the possibility of losing connections/relationships with co-workers;
- the possibility of rejection if they shared their sexual identity with co-workers;
- the concern or belief that talking about sexual orientation might be considered unprofessional; or
- a belief that a person's sexual identity was not the business of co-workers (Fidas & Cooper, 2014).

For those who were out, another concern was the phenomenon of tokenism. Tokenism is when an organization hires or promotes an individual to act as a symbol of fair treatment of all those with similar identities (Heery & Noon, 2008). In other words, one person was used as an example to avoid criticism over discriminatory practices. On occasion, tokenism may be a result of good intentions such as wanting to have the female or ethnic minority voice on a committee. While having access to decision-making roles was important, early studies of tokenism in the workplace demonstrated negative personal consequences of being a token in a field, especially in the context of occupations “stereotypically defined as masculine” such as engineering (J. D. Yoder, 1991, p. 180). Tokenism may be one reason why individuals chose not to make their sexual identity known in their work environment (LaSala, Jenkins, Wheeler, & Fredriksen-Goldsen,

2008) because they did not want to be seen or used as “the voice of the gay or lesbian community.” Common coping mechanisms for LGBTQ employees have included passing as heterosexual, covering, or compartmentalizing their personal and professional lives (Fidas & Cooper, 2014). These techniques are described in detail in the stigma theory section of this literature review.

### **Lesbian, Gay, Bisexual, Trans, and Queer Professionals in Science, Technology, Engineering, and Math**

News stories and web blogs regarding the experiences of lesbian, gay, bisexual, trans, and queer (LGBTQ) individuals in STEM careers have become more plentiful in recent years (for example, see <https://lgbtstem.wordpress.com/>, <http://diversity.asee.org/lgbtq/lgbtq-in-stem/>, <https://www.elsevier.com/connect/lgbt-in-stem-progress-but-still-many-obstacles>). However J. B. Yoder and Mattheis (2016) were the first to publish research based on their “broad national survey . . . of advanced graduate students, postdoctoral scholars, academic faculty, researchers, and industry professionals in STEM fields who identify as lesbian, gay, bisexual, trans\*, queer, or asexual (LGBTQA)” (pp. 1-2). Their study found that sexual minority faculty who were out more likely reported that their workplace was safe and welcoming. These results contradicted the research findings of Patridge et al. (2014) that showed that lesbian and gay STEM faculty who were out to their colleagues was less comfortable within their department due to having observed or experienced statistically higher rates of exclusionary behaviors (EBs). Specifically, Patridge et al. (2014) found that “faculty members who reported being not comfortable were 14 times more likely to be out, 2.5 times more likely to observe EB, and 7.2 times more likely to experience EB” (p. 89). The differences between the



participant groups within these two studies could explain the discrepancies. The Patridge et al. study included only 133 faculty members total, both in STEM and non-STEM fields, whereas J. B. Yoder and Mattheis (2016) evaluated data from more than 1,400 responses. Nevertheless, this contradiction in findings supported future studies in this area.

### **Experiences of Lesbian, Gay, Bisexual, Trans, and Queer Individuals on Campus**

Since institutions of higher education began as sites of religious training and were often affiliated or controlled by a church, it was reasonable to assume that the institutions followed church doctrine regarding same-sex relationships (Perkin, 1997; Smith, 2015). Even when institutions of higher education moved away from having a religious purpose and towards secular research and vocational technology institutes, rules of current society' regarding same-sex behavior shaped campus policies and actions (Dilley, 2002). Research over the past two decades has continued to demonstrate that the campus environment has remained rife with hostility towards LGBT individuals (Bilimoria & Stewart, 2009; Cech & Waidzunus, 2009, 2011; Dolan, 1998; Dozier, 2012; Leonardi, 2003; McNaron, 1997; Mintz & Rothblum, 1997; Rankin, 2005). However, as Vaccaro (2012) noted, "most LGBT climate studies have focused on undergraduate students, with little or no attention given to the experiences of LGBT campus employees" (p. 431).

Undergraduate students' perceptions of climate on campus have tended to mirror the overall campus-wide environment whereas the greater driver of climate for faculty and staff appeared to be at the department or work-unit level and was associated with campus role (Vaccaro, 2012). As an example, Hughes' (2017) study of gay male

engineering undergraduate and graduate students demonstrated how silence on the topic of LGBT issues within their college of engineering was perceived differently by the undergraduates compared to the graduates. Specifically, undergraduates felt like the silence had a neutral impact on their environment--suggesting that at least there was not outright "homophobic harassment among their peers" (p. 392). On the other hand, the graduate student participants who frequently doubled as teaching or research staff, perceived the silence and lack of sexual orientation in the college's diversity statement to be exclusionary or, at the very least, made it difficult to determine the true climate.

Non-discrimination policies that included sexual orientation and gender-identity have become more common on campuses across the United States (Campus Pride, n.d.), yet "institutional policies offer little protection against hostile colleagues, supervisors, or students" (Vaccaro, 2012, p. 441). Campus-wide policies, procedures, and practices have affected faculty and staff but their day-to-day experience of the university was at a work-group or department level (Chase, 2001; Lindholm, 2003; Reinert & Yakaboski, 2012; Vaccaro, 2012). For instance, once the U.S. Supreme Court passed marriage equality in 2015, universities were required to allow newly married, same-gender couples access to benefits offered to other marital couples. Unmarried partners of any gender combination remained in limbo. But new laws, policies, and procedures have not necessarily or instantly changed people's beliefs or behaviors (Bos, Pryor, Reeder, & Stutterheim, 2013). In other words, even if the espoused culture of an institution was inclusive and affirming, it did not mean that an individual's work climate was supportive. An espoused value or culture is one that "is reported by management as core to the organization but

that may or may not reflect the reality in the organization for members” (Schneider et al., 2013, p. 371).

### **Theoretical Perspectives: Social Identity Theory and Stigma Theory**

For this study about tenure-track faculty members’ relationships with co-workers and students based on their constant negotiation of both marginalized and normalized social identities, I blended concepts from stigma theory and social identity. These theories were appropriate because within the particular context of engineering academia and industry in the United States, White or Asian, heterosexual, able-bodied males have long been envisioned as the normative expectation of what it meant to be an engineer (Croissant, 1999; Faulkner, 2006). That situation was problematic because not all engineers fit that description (National Science Foundation, 2015). In 1996, Congress passed a law to support efforts to identify and remove barriers to expand access to science and technology careers for those who have been underrepresented. For more than 20 years, the Science and Engineering Equal Opportunities Act (Public Law 96-516) mandated that researchers at the National Science Foundation study sub-populations within engineering. Those subpopulation included women, underrepresented minorities, and people with disabilities in an effort to identify ways to better integrate the full range of people who could direct their talent and skills towards the nation’s scientific efforts and technological needs (National Science Foundation, n.d.). However, the manner in which these studies have been conducted has given an impression that individuals have additive identities that could be separated into such categories of sex, race, and physical ability. Yet, in recent studies of identity, researchers have theorized that people did not consider their identities as separable into neat categorizations such as those shown in the

data tables of early NSF reports, nor did they limit their perception of identity to these few categories. The National Science Foundation has acknowledged this by now including cross-tabulations of data for Asian women, Black women, and American Indian or Alaskan Native women in their reports of Women, Minorities, and Persons with Disabilities in Science and Engineering (National Science Foundation, 2017).

### **Social Identity Theory**

A social identity “describes those aspects of a person’s self-concept based upon their group memberships together with their emotional, evaluative and other psychological correlates” (Turner & Oakes, 1986, p. 240). According to social identity theory, people’s self-concepts are constructed based on interactions with the world surrounding them including group memberships (Brown, 1999; Tajfel & Turner, 1979). Individuals improve their own self-image by comparing themselves to others and categorizing others in ways that make them feel better about themselves--a process called social categorization (McLeod, 2008). Social identities have included those that were constructed based on one’s surrounding environment or domain. As shown in Figure 1, Brewer used the visual of concentric circles, like a bull’s-eye, to describe a person’s layers of identity. The center of the bull’s-eye represented the “individual self--those characteristics that differentiate one individual from others within a given social context” (Brewer, 1991, p. 476).

For this study, I expected that each of my participants would partially identify their personal self as a faculty member in a particular discipline or sub-discipline within engineering because research faculty have been found to maintain their primary alliance and affiliation to their disciplinary field (Baker & Zey-Ferrell, 1984). For example, “I am

a professor in Environmental Engineering who studies . . .” Each slightly larger concentric circle would represent a social category that moved the individual self towards being a common part of a greater social community, such as being a member of a particular workgroup of environmental engineers. Each progressive layer of social context would incorporate others into the identity. The next larger circle would represent one’s role within a slightly larger social context such as a department of Civil and Environmental Engineering. Each consecutively larger circle would represent an expanded social group that would make the person less distinctive--such as an engineering faculty member within a College of Engineering or a faculty member at a particular university. Brewer (1991) noted that people tended to identify with small groups so that they could maintain an individual distinctiveness that would otherwise be lost in larger groups.

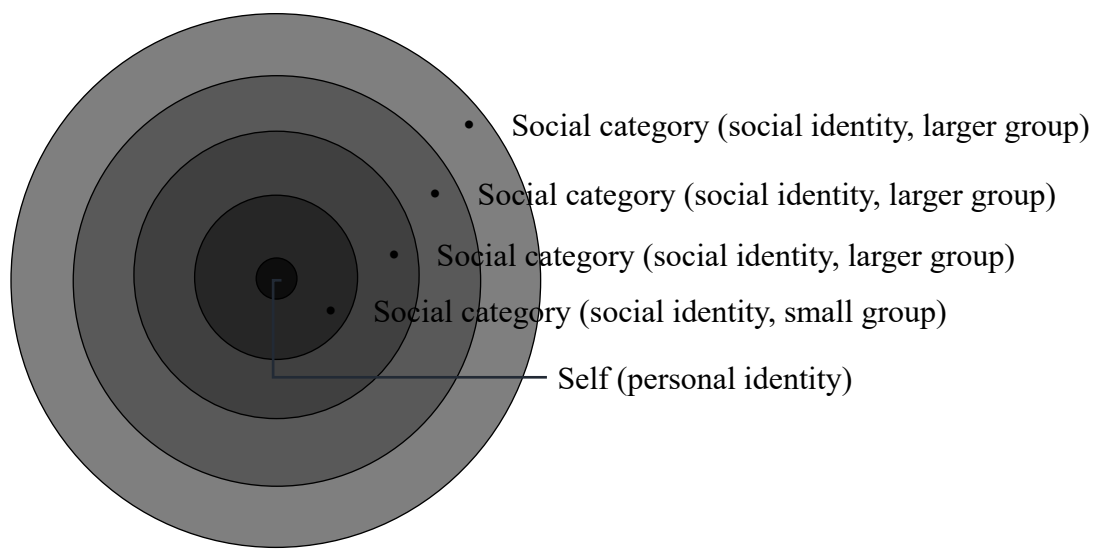


Figure 1. Layers of Identity (modified from Brewer, 1991).

People simultaneously have held many identities and physical traits that shaped a their self-concepts and social interactions with others (Quinn & Earnshaw, 2013). Characteristics such as height, weight, body type, eye color, apparent age, apparent gender, and apparent race are immediately visible. Other traits and identities such as religion, physical and mental ability, education, work background, nationality, and familial status (Weaver, 1998) may be concealed but are nonetheless vital to a person's identity and still shape that person's interactions with others (Matheis & Sugie, 2015). Some researchers have assumed that sexual identity could be concealed (Bilimoria & Stewart, 2009; Goffman, 1963; Newheiser & Barreto, 2014), whereas others have suggested that attempts at concealment were only partially successful (Sylva et al., 2010). In either case, individuals who have identified as sexual minorities may feel compelled to attempt to hide this aspect of their identity lest they be subjected to stereotypes or stigmatized (Bennett Garner & James, 2013; Bilimoria & Stewart, 2009; Cech & Waidzunus, 2011; Goffman, 1963; Ragins et al., 2007; Riley, 2008; J. B. Yoder & Matheis, 2016). Stigmatized identities are those that are "socially devalued and negatively stereotyped" (Quinn & Earnshaw, 2013, p. 40).

### **Stigma Theory**

Stigmas come in many forms, are nationally and regionally variable, and relate to social interactions rather than individual traits (Bos et al., 2013). They are "socially undesirable, deviant, or repulsive characteristics that discredit or spoil an individual's social identity" (Ragins et al., 2007, p. 1104). In his classic work on stigma theory, Goffman (1963) clarified that stigmas could be visible or invisible and related to relationships rather than personal attributes. Visible stigmatized identities have included

race, obtrusive physical disability or malformations, and other characteristics that were immediately obvious to others on first encountering a person. Invisible stigmatized identities have been those that were not obvious upon first inspection. Depending on an individual's context, stigmatized identities may have included sexual identity, past history of incarceration, mental illness, political affiliation, and religious affiliation that did not include specific dress that would make the affiliation obvious such as a Muslim woman wearing a hijab or a Jewish man wearing a yarmulke (Goffman, 1963; Ragins et al., 2007; Smart & Wegner, 1999). A timely example would be the social stigmatization of two men with their arms around each other's waists who were laughing jovially together in the rural Southern United States as compared to those same two men, in the same configuration, in San Francisco, California. In one context, the situation would be more likely to garner a negative response than in the other context.

**Stigma is in the eye of the beholder.** Goffman (1963) explained how, in some social situations, a certain attribute could be desirable or expected, whereas in other situations, that same attribute could lead to deep disgrace of the holder. For example, amongst faculty at doctoral institutions, everyone was assumed to have a doctoral degree. Individuals with only a master's degree were likely to withhold that information from their colleagues for fear that their lack of appropriate academic credentials might lead others to devalue their contributions. On the other hand, if the work environment was one where the typical employee did not need academic credentials, then the worker with the graduate degree might withhold that information for fear of being considered overqualified. In this way, the same attribute--holding a doctoral degree--could be viewed as a benefit or a discrediting stigma with relation to the social situation at hand. The key

would be the social situation in which the person was viewed and what was expected of people within that particular situation, whether that was a physical venue or professional occupation.

People could determine if they were members of a stigmatized group if their successes or failures became the bases of news headlines: Can a Black man become President of the United States? (King, 2008); Kristen Bell discusses dealing with anxiety and depression (Rayne, 2016); Anderson Cooper is first out gay man to moderate presidential debate (Grindley, 2016). The unstated bases of these stories were that, somehow, these individuals overcame their discrediting attributes (race, mental illness, or sexual identity, respectively) to achieve great success. Yet, by referring back to that which sets them apart from others in their fields, these accomplished individuals retained their membership among others with the same discredited social status (Goffman, 1963).

**Passing as “normal”.** Depending on the stigma, individuals may be “highly motivated to engage in a deliberate effort to conceal the stigma” (Smart & Wegner, 1999, p. 474). Typical methods that stigmatized people have used to hide their stigmas included passing, covering, and compartmentalizing (Cech & Waidzunas, 2011; Goffman, 1963; Smart & Wegner, 1999; J. B. Yoder & Mattheis, 2016). Individuals who felt the need to completely hide their stigmatized identity in at least some discrete portion of their lives typically chose a technique called passing. Passing is only an option for people who have unobtrusive stigmas. Unobtrusive stigmas may include physical deformities that could be hidden by clothing, mental illness with manageable symptoms, and identities such as sexual minority status (Goffman, 1963), although, as mentioned above, there was some disagreement between researchers regarding whether or not sexual minority status could



be hidden effectively (Bilimoria & Stewart, 2009; Goffman, 1963; Newheiser & Barreto, 2014; Sylva et al., 2010). Passing involves playing a role in society that hides one's status as a person with a stigma. The person may even engage in activities that actively attempt to separate themselves from their similarly stigmatized peers. For instance, a closeted gay man or lesbian woman may choose not to object when colleagues or acquaintances make insensitive or offensive remarks about homosexuals or gay rights stories in the news. Someone with a concealable mental illness might choose not to engage when a friend, acquaintance, or stranger started describing those "crazy people."

**Covering the stigma.** Covering, on the other hand, is an attempt to make a known stigmatized identity less obvious (Erickson, 2012; Goffman, 1963). Franklin D. Roosevelt covered the fact that he was unable to walk unaided and used a wheelchair by sitting behind his desk in the Oval Office when he had meetings and using a custom-designed wheelchair made out of a dining room chair (Berish, n.d.). Although it was common knowledge that he was physically disabled, he carefully downplayed his need for his wheelchair and discouraged the press from photographing him sitting in his chair (Clausen, 2005). Reports suggested that, although he was not ashamed of his disability, for political reasons, he chose not to be obtrusive about it (Clausen, 2005). With regards to sexual identity, the typical demand for covering has been stated as, "I don't care if you are gay, but don't flaunt it." However, "flaunting" was evaluated by the "normals" (Goffman, 1963) and was typically unevenly enforced for members of a stigmatized group compared to the so-called normal group (Bilimoria & Stewart, 2009; Cech & Waidzunas, 2011; Embrick et al., 2007; Riley, 2008). For example, in American society,

it was considered appropriate for someone to wear a wedding ring or have photos of a spouse or family in the office as long as that spouse is of the opposite gender.

Faculty who have identified as sexual minorities have been faced with frequent decision points regarding whether to “come out” in their professional workplace. This has led to expending emotional energy that their heterosexual peers did not have to expend (Bilimoria & Stewart, 2009; Cech & Waidzunas, 2009, 2011; Goffman, 1963; McNaron, 1997; Ragins et al., 2007). The emotional toll of dealing with hidden stigmas has presented a burden on some faculty that may distract attention from their primary professional duties of research, teaching, and service.

The issue is of . . . managing information about his failing. To display or not to display; to tell or not to tell; to let on or not to let on; to lie or not to lie; and in each case, to whom, how, when, and where. (Goffman, 1963, p. 42)

The cognitive effort involved in managing one’s invisible stigma could be significant (Ragins et al., 2007; Smart & Wegner, 1999; Tilcsik et al., 2015).

Bilimoria and Stewart (2009) interviewed engineering faculty and found that their respondents tended to remain closeted due to fear of career repercussions including failure to be retained or achieve tenure, or facing the potential loss of professional respect. In their study on factors impacting the academic climate for STEM faculty who identified as LGBTQ, Patridge et al. (2014) noted the frequency of faculty observing or experiencing exclusionary behaviors led them to feel excluded from full participation in their academic community. These behaviors included a lack of invitations to departmental events, student or peer avoidance after discovery of the faculty member’s sexual orientation, and loss of mentoring opportunities (Bilimoria & Stewart, 2009; Dozier, 2012). All of these behaviors could influence faculty members’ relationships with

colleagues and students and, therefore, affect their retention, promotion, or tenure processes as well as their feeling of comfort within their chosen career and institutional setting (Bilimoria & Stewart, 2009).

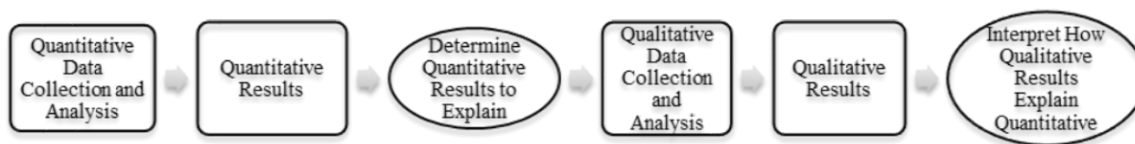
### **Chapter Summary**

Within the last decade, the limited empirical research focused on STEM professionals and academics has shed some light on specific experiences of workplace climate and how LGBTQ individuals experience similarities and differences from the general population of academics, from LGBTQ students in engineering and from LGBTQ employees in various fields. What has not yet been studied has been how engineering faculty perceived that their sexual minority identity, among the many others that they hold simultaneously, affected their relationships with their colleagues and students. This study would start to fill that gap. Since little has been known about the multiple identities of individuals who meet the basic criteria for this study, this investigation needed to be intentionally broad to provide participants with an opportunity to share unique aspects of their multi-faceted identities and their lived experiences. Understanding the breadth of experiences of sexual minority faculty in engineering would lay the groundwork for a new perspective on ways to continue efforts to improve the environment for current and future engineering academics and practitioners.

### CHAPTER III

#### RESEARCH METHODOLOGY

The purpose of this mixed-methods sequential explanatory study was to gain insight into the multiple dimensions of identity that tenure-track engineering faculty members hold and then to investigate how they believed that the interplay of those identities shaped their interactions with colleagues and students in their academic workplace. Given the difficulties in identifying and connecting with hard-to-reach populations such as this one, and the personal nature of asking them to share their experiences based on social identities, an explanatory sequential mixed-methods approach was necessary. Figure 2 visualizes the explanatory sequential design used in this study.

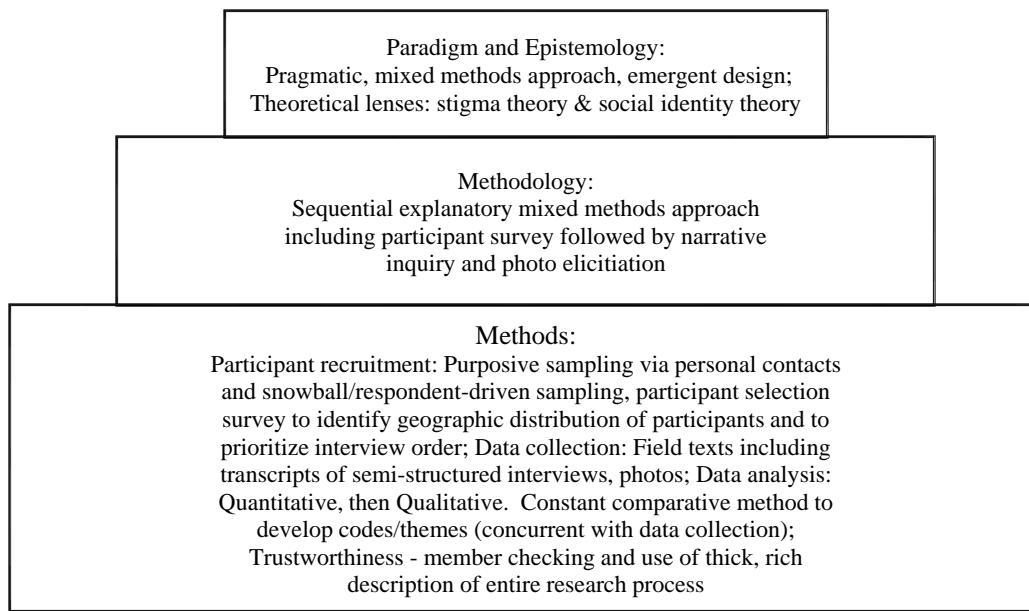


*Figure 2.* Procedural diagram for explanatory sequential mixed-methods design (modified from Creswell, 2015, p. 56).

This pragmatic approach was designed to collect data necessary to answer the research questions while simultaneously allowing anonymous participation by those who were not comfortable or able to commit the time to the interview portion of this study. The brief quantitative portion of the study included a participant selection survey, which

served multiple purposes. Its first purpose was as an inclusion filter, filtering out those individuals who did not meet the study's purposive inclusion criteria. Next, I used the survey to collect demographic and geographic distribution data of eligible participants for the purpose of gathering a general overview of where in the United States these faculty members were working. I did this to identify if responses centered on any particular region that might limit experiences to certain socio-political cultures affiliated with geography. I included several open-ended questions about social identities and whether individuals felt the need to deny dimensions of their identity at work to allow those who wished to participate anonymously to do so. Information collected through the participant selection survey was summarized and used as a baseline for Phase II of the study that included a qualitative inquiry into the open-ended survey responses with a specific focus on how the faculty members perceived that their social identities shaped their interactions with colleagues and students. This study included a coherent research plan designed to provide data needed to understand the experiences of the participants.

Crotty (1998) identified four elements for development of a research project: epistemology, theoretical perspective, methodology, and method. He stated that there must be congruency and thoughtful consideration of each of these components to ensure an appropriate research process has been enlisted. Figure 3 shows how I designed and implemented a cohesive research plan by selecting appropriate methodologies and methods based on the paradigm and epistemology that I used.



*Figure 3.* Research component coherency.

### **Epistemology, Ontology, and Axiology**

For this study, I used pragmatism as the epistemology, or “way of knowing what we know” (Crotty, 1998, p. 8). Pragmatism allows researchers the freedom to focus on the research question rather than strictly on the research methodology. It also “avoids the philosophical questions about what is truth, and focuses on the practical application of the research (Jones, Torres, & Arminio, 2006, p. 144). Cherryholmes (1992) noted that pragmatism was situated between positivist/post-positivist epistemologies and phenomenological/interpretivist epistemologies. Positivist/post-positivist epistemologies encourage quantitative analysis in order to find a singular, real Truth (with a capital “T”) and generalize findings across populations. They are intended to be bias-free and expect a researcher to remove themselves to the extent possible from the study (Lincoln & Guba, 2000) using methods typically seen in science and engineering disciplines such as quantitative experiments and qualitative grounded theory methodologies (Charmaz, 2006;

Lal, Suto, & Ungar, 2012; Riessman, 1993). In contrast, interpretivist epistemologies are based on assumptions that “*All meaningful reality . . . is contingent upon human practices, being constructed in and out of interaction between human beings and their world*” (Crotty, 1998, p. 42, emphasis in original). The goal of interpretivist studies is to understand people’s experiences and interpret how “human beings make sense of their subjective reality and attach meaning to it” (Halloway & Wheeler, 2002, p. 7).

As a compromise between those worldviews, “research in a pragmatic tradition . . . seeks to clarify meanings and look to consequences” rather than to base understanding on antecedent “descriptions, theories, and explanations [that] precede values, social policy, and educational practice” (Cherryholmes, 1992, p. 13). In other words, pragmatic research decisions have been driven by “where we want to go in the broadest of senses. Values, aesthetics, politics, and social and normative preferences are integral to pragmatic research, its interpretation and utilization” (Cherryholmes, 1992, p. 13). Pragmatism allows a researcher to “adopt both objective and subjective points of view” and “values play a large role in interpreting results” (Dudovskiy, n.d., p. 1). A pragmatist’s focus is on “the kind of community he or she wishes to promote” and “the kind of [people and skills] such a community would value and require” (Cherryholmes, 1992, p. 14). Pragmatism also provides a compromise for an analytically trained researcher, such as me, to extend her ontology, or understanding of what exists, beyond what could be proven using the scientific method without having to stretch so far as to having to embrace the concept that reality was solely determined by a person’s perception. This compromise fits well with my positionality. As far as axiology, I valued the ability to be honest about identities in all aspects of life. I did not think that people

should have to actively suppress any of their facets to fit into a particular discipline or environment. Instead, I believed that people should be allowed to be true to themselves and that the environment should change based on those within it.

This perspective fits well with the recent attempted change in diversity expansion efforts within engineering academia from a deficit model to an asset model (S. R. Harper, 2010; Louie et al., 2017). The deficit model that has been employed for decades was based on an assumption that individuals who were not currently succeeding within engineering and engineering academia were the problem and they were the ones who needed to be changed. Those individuals had some deficit of knowledge or skills and, therefore, could succeed simply by being provided with that remedial knowledge. In other words, the assumption was that there was nothing about the engineering environment itself that had created the ongoing lack of diversity. Therefore, by providing additional tutoring or life skills or somehow filling the deficit that diverse others held, those individuals would automatically be able to succeed in the existing engineering environment that had been built, literally, by and for those in the dominant and normative majority. In this manner, “the field itself is unexamined and unchanged because discourses that locate the causes as masculine biases within engineering itself are not considered” (Beddoes, 2011, p. 1118).

In comparison, the asset model, or “anti-deficit” model as phrased by S. R. Harper (2010, p. 67), recognized the knowledge, experiences, and skills that a broader population could bring to an environment and works to change all participants in the environment so that the skills were recognized and valued and change in the field was a solution to be considered. Focusing research and reframing questions so that they focused on those who



succeed rather than those who failed could provide valuable insight into how underrepresented individuals navigated their environments in ways that led to positive outcomes. This concept was relevant to my study because the faculty members who I interviewed were clearly succeeding in their roles either despite of, or possibly in part because of, how they managed their underrepresented social identities.

### **Researcher Positionality**

Like all other humans, I am a product of my culture--having incorporated a lifetime of experiences and learned behaviors based on my environment. I have grown up in the culture of engineering, literally and figuratively. My father was a quality control engineer, and he expected us children to perform as if we were capable of meeting the hundredths-of-an-inch tolerances that were standard at the aviation company where he worked. Simultaneously, I attended a Catholic grade school where rigid gender roles were enforced and perpetuated from the uniforms we wore to the activities that we could and could not partake in during religious services based on gender, religious, and other identities.

### **My Social Identities**

As a child, I experienced being considered “the other” in several ways (Zevallos, 2011). First, since my mother was Jewish, I identified as Jewish even while attending Catholic grade school. As non-parish members, my tuition was higher than most of my classmates and, along with a few other non-parish member students or non-practicing Catholics, we were singled out of participating in the rituals of the Catholic Church. My gender expression differed from all other female members of my school in that I refused to wear the mandatory uniform jumper that all girls were expected to wear. Every other

girl complied. Instead, I wore custom-made pants crafted from the uniform fabric. This was an allowable option that was included in the uniform guidelines but not utilized by anyone else. I was the only girl allowed by the boys to play football with them during recess. I am not sure how I came to earn that right, but it continued throughout my grade school years. I was not one of the popular children amongst my peers, but due to my excellent academic abilities and general good behavior when it came to following most rules without question, I was considered by other students to be a favorite of several teachers. These experiences taught me that it was possible to stay true to oneself and maintain social identities outside the normative culture of one's environment, but it did take substantial cognitive energy to do so on a daily basis and required self-confidence and resilience. Both my self-confidence and resilience were tested when I entered engineering academia. I was no longer the "smart kid." Instead, I struggled to make average grades during my first two years, and began to wonder if I was smart enough to become an engineer. However, since I had dreamed of being an astronaut since I was 10-years old, I could envision no self-identity other than as an aerospace engineer. Therefore, I persisted in my studies.

### **My Privilege**

Outside of the academic environment, I came from a place of privilege. I am a White, cisgender, highly educated, able-bodied, middle-class woman from a two-parent family that did not abandon me when I came out to them in the early 1990s. Through the years, my family has supported my long-term partnership with a woman in a manner equivalent to my siblings' heterosexual partnerships such as sending us anniversary cards and monetary gifts, including her in all family celebrations and family photos, etc. That

was not to say that I was always encouraged to share my sexual minority status, however. Like so many others, I was strongly encouraged to keep that aspect private, at least in the early years, for fear of it damaging my career as a young employee working for a Women in Engineering Program at my alma mater.

I also recognized the privilege bestowed upon me because of my whiteness throughout my educational experiences. I spent 8 years attending a private, Catholic grade school with few non-White students followed by 4 years at an inner city high school where I was a racial minority among my classmates except in my advanced classes. From there, I attended college at a state flagship research institution where, once again, the number of minority students was significantly lower than the representative populations within Colorado. I was educated in, and worked at, a predominantly White institution in a College of Engineering and Applied Science that has struggled to enroll an ethnically/racially diverse student body. For that reason my recent experiences with people of color has been limited more than I would like. This was relevant to my study focused on the intersectional identities of individuals because I have not had significant professional experience interacting with those whose ethnic minority status and identity may have played a significant role in shaping their experiences as engineering faculty.

With the exception of my high school, these academic venues provided me with opportunities to ignore my racial identity unless I actively wished to consider it by allowing me to be surrounded by others who looked like me for the majority of my time. I attempted to keep that racial privilege in the forefront when I sought participants who were racially underrepresented in engineering. I worked to avoid making assumptions about the ethnic or racial backgrounds or identities of my participants. Instead, I have

continued to seek out literature regarding the experiences of persons of color in engineering as well as those who face so-called double- and triple-jeopardy such as individuals with multiple minority status such as Black lesbian women (Bowleg, 2008; Cross, Clancy, Mendenhall, Imoukhuede, & Amos, 2017).

I have been tremendously lucky and blessed by the reactions of family, friends, and colleagues. I have never personally experienced the types of extreme negative reactions that I read about in newspapers or literature. On the other hand, I have had to deal with some people's discomfort with my openness and their obvious desire for me to keep my personal life to myself. This particular reaction demonstrated the inequity of heterosexism. Even though my life has been similar in almost every way to many of my friends and family members in the sense that I have been in a stable, monogamous relationship for decades, we own a house, have a dog, and both work, the one detail that has set me apart has been that my partner is a woman. Due to that one detail, my life becomes a *lifestyle* and until recently, I was excluded from serving openly in the U.S. military or gaining the rights and responsibilities associated with the institution of marriage. These experiences have both benefitted and challenged my ability to conduct this research project.

### **My Role Within the Study Environment**

I was academically trained as an engineer, having earned both a bachelor of science (BS) degree and a Master of Science (MS) degree in Aerospace Engineering Sciences. As such, my educational foundations were based on a positivist paradigm and I was trained using the scientific method to seek a singular Truth through the vehicle of engineering education. I have worked closely with engineering faculty for more than 2

decades in a professional support-staff role, as an advocate for women and underrepresented faculty and students in a Women in Engineering Program, and occasionally as a temporary lecturer/peer. During that time, I have watched many faculty members struggle through the tenure process and have observed the gender-based biases differentiating success in and out of the classroom. Yet, it was not until recently that I began to consider the depth of the challenges that faculty who identify as sexual minorities face.

As an engineering student and staff member who was silent about my sexuality for many years, I have watched with great interest the different levels of openness demonstrated by the few queer faculty members I have met throughout my 25-year career in academia. However, until recently, I did not have the same fire in my belly to actively fight inequality as I did when I was younger. A newfound (or rediscovered) consciousness was ignited in September 2015 when I was forwarded an email requesting applications for leadership positions in a newly funded NSF project to promote lesbian, gay, bisexual, transgender, queer, and others (LGBTQ+) equality and change the climate in science, technology, engineering, and mathematics (STEM) academic programs. As described, the grant was designed to create professional development trainings for faculty on the topic of gay and lesbian issues. I was not sure if I would even be eligible to participate since I was a staff member, not faculty. However, I was selected and I will be forever grateful to the colleague and friend who forwarded that email to me. She unknowingly changed the course of my dissertation research by simply asking if I would be interested in the project. After reading the recruitment document, I realized that not only was I keenly interested in being part of a movement to improve the climate for

sexual minority faculty in engineering, but also I felt compelled to focus my dissertation on the topic.

I have held a unique role, straddling the line between being an insider (emic) and an outsider (etic) to this research. Although I am immersed in an academic department, and frequently interact with faculty on both a professional and personal level, my job expectations, role as a staff member, and (lower) position on the academic hierarchy meant that I was not subjected to all of the social and professional obligations of tenure-track faculty. The advantage of my dual role was that I was keenly aware of the environment in which my participants existed on a daily basis, at least in one geographic setting in the Western United States. I have held multiple identities within that environment including a White female with a hidden and then open sexual minority identity. Additionally, I have held several roles including a student, a temporary faculty member/lecturer, and an academic staff member and, therefore, have had a breadth of experience that a less engaged researcher would not have available to her. As someone who has personally felt the stigma surrounding a sexual minority identity and the expectation to compartmentalize all non-technical aspects of my identity within the field of engineering academia, my ultimate role in this research was as spokesperson for individuals who may or may not be in a position to speak for themselves.

### **Incorporating Social Identity and Stigma Theories**

As described in the literature review chapter, individuals who hold stigmatized identities such as sexual minorities within heteronormative, masculine environments have tended to hide their sexual identities from their co-workers (J. B. Yoder & Mattheis, 2016), making it difficult to contact them via professional networks. To engage

individuals who hold both stigmatized and privileged social identities within an academic setting, I designed a study using concepts from social identity theory and stigma theory. Those theories each include aspects that were relevant to this study of individuals who maintain multi-faceted social identities, some of which may differ from the norm of those working in their profession. As a reminder, a social identity is “a person’s sense of who they are based on their group membership(s)” and includes those that are constructed based on one’s surrounding environment or domain (McLeod, 2008, para. 1). Stigma theory suggests that individuals tend to try to hide their stigmatized identities through passing as members of the dominant group, covering their known affiliation with a stigmatized group, or compartmentalizing aspects of their identities (Goffman, 1963).

I used these theories as a starting point for my study; however, neither would suffice to fully guide my investigation. For instance, research using social identity theory has generally focused on an additive perspective rather than an intersectional perspective of a person’s identity (Jones & McEwen, 2000), such as women and minorities, without explicitly considering the perspectives of minority women. Studies that included a focus on multiple dimensions of identity tended to focus only on multiple oppressions (A. L. Reynolds & Pope, 1991). Goffman (1963) also described stigmatized identities in a manner that overlooked the fact that individuals may simultaneously hold privileged and oppressed or stigmatized identities. For example, in the masculine, heteronormative culture of engineering (Bilimoria & Stewart, 2009; Cech & Waidzunus, 2011; Faulkner, 2006), a White male who identified as gay would hold both privilege due to his whiteness and his masculinity, and stigma due to his sexual identity. In addition, passing was not an option for persons of color or for individuals who displayed “sex-atypical speech patterns

and motor behavior” (Sylva et al., 2010, p. 141), so those faculty members’ experiences could not easily fit under the stigma theory lens. Goffman’s work also predated social changes within the United States that have led to more individuals maintaining a positive self-identity in spite of what remains a devalued social identity in particular contexts (Riggle, Whitman, Olson, Rostosky, & Strong, 2008).

I used these theoretical lenses to develop my research questions, my participant survey and interview questions, and as a starting point for the data analysis portion of my study. Although I started my data analysis process by considering these issues a priori, I remained open to the idea that a more appropriate theory could emerge. What I discovered was that these theories were still relevant and provided a strong basis for evaluating the data that I collected. To fully investigate the experiences of my participants and uncover the consequences and implications of engineering faculty expending cognitive energy to manage their social identities, I employed mixed methods.

### **Methodological Framework**

A methodology is a “strategy or plan of action” to conduct research (Crotty, 1998, p. 7). It provides a road map for the specific methods or “concrete techniques or procedures” to be used to collect and analyze data (Crotty, 1998, p. 6). The pragmatist epistemology that I employed was coherent with the selection of a mixed-methods research methodology because the goal of pragmatic research is to find an answer that works. The goal is not necessarily to find the only answer (the Truth) or even the right answer regarding how the study findings fit within existing knowledge bases and “antecedent phenomena” described by Dewey (as cited in Cherryholmes, 1992, p. 13), but one that produces the intended outcomes. Mixed methods research involves collection



of both qualitative and quantitative data (Creswell, 2014). It is appropriate for situations when quantitative or qualitative designs alone are insufficient to gather the data necessary to fully answer the research questions or hypotheses posed in a study (Creswell, 2014). It also provides a compromise for an analytically trained researcher, such as myself, to extend her worldview beyond post-positivism (Post-positivism, 2007). In other words, it allowed me to engage my participants in ways that did not simply try to count their experiences or obtain “the” singular truth of their lives. Adding a qualitative approach allowed me to gain insight into “the subjective nature of social reality” as determined by the participant (Holloway & Wheeler, 2013, p. 6).

### **Methods**

Methods are “the techniques or procedures used to gather and analyze data” (Crotty, 1998, p. 3) and must match philosophically with the overall study methodology, theoretical perspective, and epistemology (Crotty, 1998) to create a coherent investigation into the research topic. This study engaged a population that lacked representation in current literature, frequently maintained anonymity or confidentiality within their workplace, and did not appear in any existing sample frame. To gather meaningful data using constructs such as social identities that were not often included in discussions with engineering academics, it was important to employ a variety of methods. Those methods needed to allow me as the researcher to gather insight into how the participants perceived themselves and engage the participants in sharing their interpretations of how those varied identities fit or did not fit within their role as an engineering faculty member who regularly interacted with colleagues and students.

Methods could include tactics to identify study participants and explain recruiting techniques, the study setting, and the exact manner in which data were collected, analyzed, and presented (Creswell, 2014). Certain research questions were best answered using a combination of methods, also known as mixed-methods designs. The advantage of mixed methods was that they allowed a researcher to combine the strengths of quantitative and qualitative methods while mitigating or overcoming the weaknesses. As Creswell (2014) noted, “the core assumption of this form of inquiry is that the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone (p. 4). Rather than placing primary emphasis on the methodology, mixed methods would allow the researcher to place the primary focus on the research question and then bring all appropriate methods to bear on answering the question (Grand Canyon University, n.d.).

In this study of a hard-to-reach sample, I obtained quantitative data through demographic and open-ended survey questions of 11 purposively sampled participants and then conducted 60- to 90-minute personal interviews with 6 individuals who were willing to explore their identities and experiences in more depth. Individuals who continued to the interview phase were asked to take photographs of their workspaces and submit those photos to me before the interview took place. The subject of the photographs was supposed to be something that the participants felt had some relevance to aspects of their personal identities. From a research perspective, the photos had several purposes:

- They identified which social identities faculty members were comfortable displaying at work (tied to social identity theory and relating to both qualitative and quantitative research questions);

- They alluded to whether or not the participants attempted to pass, cover, or compartmentalize aspects of their identities (tied to stigma theory); and
- They provided a different type of discussion prompt for the otherwise semi-structured interview, allowing the interviewee more flexibility in directing the topic of discussion.

Data from the survey were collected and analyzed then findings were used to direct interview questions and dig into the links between the identities listed on the survey and what was displayed in the photographs. The semi-structured interviews then provided the information necessary to develop narratives and interpret life events in ways that have, to date, been excluded from the literature. The methods for each portion of the study are described in detail below.

### **Phase I: Quantitative**

The purpose of quantitative research is to explain phenomena by collecting and analyzing numerical data (Mujis, 2011). Data collected using quantitative methods could include numeric data in its native form such as, “How old are you (in years)?” or categorical data that could be transformed into numeric representations, for example, “Yes” equals 1 and “No” equals 0 or Likert-type scales where “Strongly agree” equals 4 and “Strongly disagree” equals 1. The quantitative, first phase of this study focused on gathering information to answer the overarching research question for the study and the study’s first two sub-questions:

- Q1     How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities experience working in Doctoral Universities as defined in the 2015 Carnegie Classification?
- Q1a    How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities describe their identities?

Q1b At what types of institutions and in what regions of the United States do full-time, tenure-track engineering faculty members who self-identify as sexual work?

**Participant recruitment.** No sample frame (list) existed from which to randomly select tenure-track, engineering faculty who identified as sexual minorities. This represented both a limitation of the study and part of its significance. In contrast to women, racial/ethnic minorities, and persons with disabilities, sexual minorities have not been provided with any systematic way of identifying themselves should they wish to do so. Therefore, I used my personal and professional networks to identify potential participants. To augment my existing professional networks, I presented my research plan at the 2016 Out in Science, Technology, Engineering, and Mathematics (oSTEM) conference, a forum for self-identified sexual minorities in STEM fields, in an attempt to share information about my upcoming study and to make personal contacts with potential participants and students who might have access to potential participants.

**Dissemination of study information.** In November 2016, I attended the 6th Annual oSTEM conference that was held in Denver. This national conference represented an *information-rich site*--one in which it would be likely that I could gain information that would be useful for my study (Schreiber & Asner-Self, 2011). Most of the 300 to 400 attendees were involved in the oSTEM chapter at their universities, so the venue provided an opportunity to connect with individuals who could then take the information back to their home schools and share the participant recruitment information with their faculty advisors and any other eligible faculty participants whom they might personally know. I presented a poster highlighting my dissertation study and provided business cards with a QR code that linked to a Qualtrics page where individuals who wanted additional

information about my study could enter their email for further contact with no obligation. See Appendix A for a copy of the information card and a screen shot of the linked participant recruitment webpage. Although I did not receive any email contacts from this website, I did make several personal contacts at the conference, some of which led to further collaboration and dissemination of recruitment emails during the snowball sampling/respondent driven sampling described next.

*Snowball sampling/respondent driven sampling.* Snowball sampling/respondent driven sampling (SS/RDS) begins with a convenience sample of individuals who fit the inclusion criteria from among the researcher's personal network. Those participants are called the first wave respondents in SS/RDS terminology (Biernacki & Waldorf, 1981). In early January 2017, after receiving Institutional Review Board approval to begin data collection (see Appendix B), I emailed 38 individuals whom I knew personally as either eligible to participate or who indicated a willingness to share details of my study. I asked these personally known individuals to participate if they were eligible and/or to contact others whom they knew personally or professionally. I asked my contacts to share a brief introductory note explaining the purpose of the study that included a statement of participation confidentiality and an anonymous link to an informational website. Individuals who were referred to my site by members of the first wave were considered second wave respondents in sampling terminology. Second wave individuals were also encouraged to share the study information to their personal and professional contacts, potentially leading to a third or later wave of respondents. The text of these email are included in Appendix C.

All respondents were able to anonymously participate in my study through completion of an introductory participant survey before entering any identifying information. Eleven of the 19 individuals who accessed the survey met participation criteria and fully completed the survey. At the end of the anonymous survey, respondents chose whether to further their participation by submitting an email and pseudonym for use in scheduling a confidential web-based interview. I was aware that this sampling method was unlikely to reach numbers necessary for inferential analysis so my goal was simply to include enough participants to portray a breadth of experiences across the varied identities within my demographic sampling criteria, as described in the participants section of this chapter.

The primary difference between SS/RDS in hard-to-reach populations and SS in not hard-to-reach-populations is that the initial sample in hard-to-reach populations requires a convenience sample whereas true snowball sampling methods start from a random sample from a given population frame (Goodman, 2011). This SS/RDS method is based on a requirement that the researcher knows members of the intended respondent pool and an expectation that individuals from each wave of participants knew at least one or more other eligible participants (Goodman, 2011). The fact that I knew, or believed that I knew, at least a dozen potential participants was an advantage of my insider status. To maintain the highest level of confidentiality possible, I did not ask individuals to share with me the names or contact information of their connections. I simply asked them to share the research description and the participant demographic survey link. A significant drawback of this method of recruitment was that I had no way to follow up with potential participants other than first wave participants whom I knew personally. As expected, the

most effective method of recruiting participants was through my known connections. Four of the six interviewees were recruited through my professional network. The second most effective contact turned out to be the chair of the Women in Academia committee of the Women in Engineering ProActive Network, Inc. (WEPAN) who was referred to me by one of my first wave connections. By coincidence, I contacted the committee chair the morning that her committee was having a teleconference so she mentioned my study in their nationwide meeting and sent a follow-up email to the committee email list that same day. Four women responded within a few hours and two of those four eventually participated in interviews.

*Additional purposive sampling.* In addition to the snowball sampling method, I contacted members of two additional groups via purposive sampling. To expand the reach of my study beyond the colleagues-of-colleagues pool available via the SS/RDS method, in late March 2017, I emailed a personalized request to 157 deans at doctoral institutions who signed the American Society of Engineering Education (ASEE) diversity initiative letter. That letter stated that they, as deans, would actively work towards “ensuring that our institutions provide educational experiences that are inclusive and prevent marginalization of any groups of people because of visible or invisible differences” (American Society of Engineering Education Deans Council, 2015, p. 1). Based on that pledge, I asked each dean to forward a brief introduction about my study and the URL to the participant selection survey website along with a personal note of encouragement for faculty to complete the survey (see Appendix D). This request was consistent with my purposive sampling technique because these individuals were not randomly selected from among a pool of all engineering deans from schools within the

United States. These individuals had made personal commitments to support diversity efforts within their school or college and could, therefore, reasonably, be considered as allies in this research effort. Within the first week after sending the request, deans from five institutions responded to me via email to state that they would forward my request to their full faculty or to a segment of their faculty to whom “they believed the survey was relevant.” Shortly thereafter, five people clicked the survey link; however, I did not receive any additional completed anonymous surveys after sending the initial email to the deans. All five potential respondents who entered the survey inclusion criteria page indicated that they identified as heterosexual so were excluded from participating. In response to a forwarded request to disseminate information, the IRB coordinator from one institution asked me to complete a full IRB submission at the school before allowing distribution of my participant recruitment email. I chose to not have my study reviewed at the current time but do intend to modify my selection criteria at a later date and attempt to engage both heterosexual and non-heterosexual members of that particular institution as part of a follow-up study to this dissertation.

It was not surprising to me that a single mass request to the deans did not result in additional respondents because one of the findings from the literature review was that individuals who identify as sexual minorities frequently hide that aspect of their identity from their co-workers. Hence, some deans may have believed that there were no sexual minorities employed within their faculty and, therefore, did not forward the message. Others may have felt that it was inappropriate to share an email broadly that was relevant to only a small portion of their faculty. Still others may have simply filtered out my request as junk mail because it was sent by a student and was not backed by a research



organization such as the National Science Foundation. Without following up with all deans who received my email, it was impossible to determine how broadly my request was shared.

I employed a third method of recruiting by sharing information about my study when participating in planning meetings sponsored by the American Society of Engineering Education's Diversity Committee and when conducting or facilitating Safe Zone webinars and workshops. The LGBTQ+ Equality Virtual Community of Practice was initiated in 2015 and involves a group of volunteers who were trained to facilitate Safe Zone workshops (Farrell, Cech, Guerra, Minerick, & Weidzunas, 2016).

**Study settings.** As described in the participant recruitment section above, I recruited via email, in person, and via webinars in which I presented. The study was intended to include individuals located across all geographic regions of the United States who work in schools or colleges of engineering at public or private non-religiously-affiliated doctoral research institutions as categorized by the 2015 Carnegie Classification system (Indiana University Center for Postsecondary Research, n.d.). Participants who decided to submit contact information via the participant survey website were approached via a personal email message from my University of Northern Colorado BearMail account. The text of these emails is included in Appendix C.

**Data collection method.** For the first, quantitative, phase of my study, I employed a participant survey to gather data about individual participants as well as, if necessary, prioritize which participants to interview based on my study's time and resource limitations. The first page of the survey instrument, shown in Appendix E, included the required Institutional Review Board wording for informed consent. Potential

participants were required to indicate their consent in order to move forward in the survey flow. Those who indicated that they did not consent were immediately directed out of the survey.

I distributed the participant selection survey using an anonymous link to a webpage maintained on the Qualtrics survey software website for the University of Northern Colorado. That system used encrypted data transfer protocols, was firewalled, and access to data required an active University of Northern Colorado account and password. The participant survey website included an informed consent page that described the study and individuals had the option to complete the survey anonymously or identify themselves at the end by submitting a contact email and preferred pseudonym for use during the confidential interview portion of the study. The survey is shown in Appendix E. Interviews were conducted via ZOOM videoconferencing software and participants selected where they wanted to be during the interview (in their office, at home, or in another preferred location).

Nineteen individuals indicated consent to participate by clicking on the “I consent” button at the bottom of the study information page. Five of those individuals did not respond to any of the inclusion questions and, hence, were excluded immediately due to lack of information. Of the 14 who answered the 3 inclusion questions (currently employed, at doctoral research institution, and do not identify as heterosexual), one was disqualified due to lack of current employment and two others were ineligible because they responded that they identified as heterosexual. That left 11 individuals who completed the survey anonymously and, of those, 7 provided contact information for further participation. Six people completed interviews and the seventh indicated that she

was no longer interested in participating. Interviewees were geographically dispersed across the mainland United States and each was employed at a public institution.

**Participants.** Table 1 summarizes information collected from the 11 eligible survey respondents, using the exact terms participants provided. Due to the low number of respondents, certain data that were collected, including the engineering departments/disciplines in which faculty members were employed, were excluded from the analysis to maintain anonymity of those who interviewed. Given the characteristics shown in Table 1, this pool of participants demonstrated a breadth of potentially intersectional identities in some categories (age, gender identity, sexual identity within mainstream LGBTQ categories, religious identification, and tenure status), whereas other desired diversity characteristics were missing, specifically with regards to race/ethnicity. All but one survey participant identified as White/Non-Hispanic.

Table 1

*Survey Participant Demographics*

Name	Race	Gender	Sexuality	Age	Faculty Rank	Tenured?	Location	Interviewed?
Bea	Asian	Female	Lesbian, Gay	40 to 49	Associate Professor	Yes	New England	No
Marcie	White	Female	Lesbian	30 to 39	Associate Professor	Yes	Southeast	No
Morgan	White	Female, Genderqueer	Lesbian, Queer	30 to 39	Assistant Professor	No	South	No
Noah	White	Male	I do not wish to specify	50 to 59	Professor	Yes	Midwest	No
Susan	White	Female	Lesbian	50 to 59	Professor	Yes	Midwest	No
Alex	White	Male	Gay	30 to 39	Assistant Professor	No	Midwest	Yes
David	White	Male, but moderately so	Gay	50 to 59	Professor	Yes	Midwest	Yes
Evelyn	White	Female	Lesbian (but probably bisexual)	50 to 59	Associate Professor	Yes	Northwest	Yes

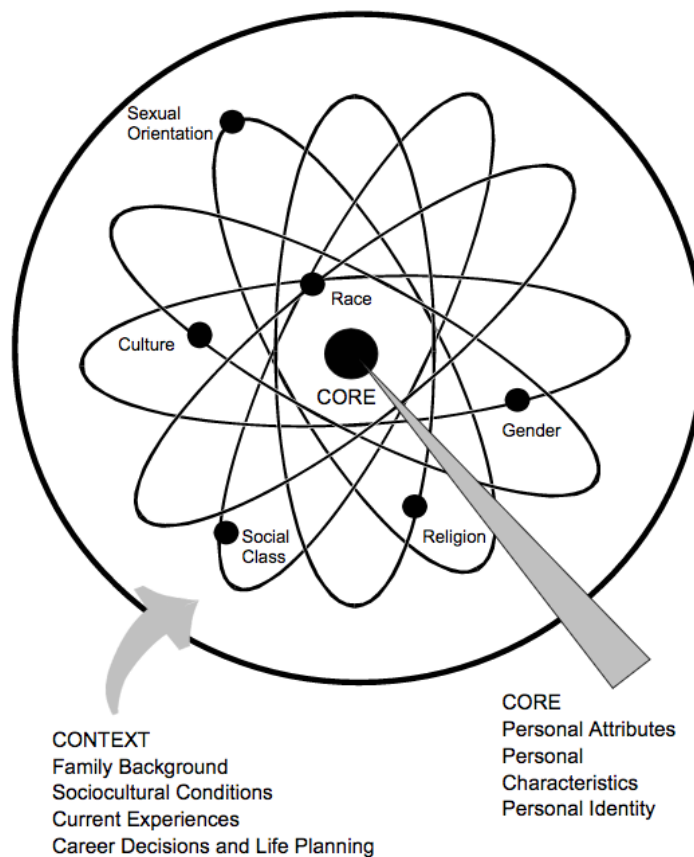
Table 1 (continued)

Name	Race	Gender	Sexuality	Age	Faculty Rank	Tenured?	Location	Interviewed?
Jane	White	Female	Lesbian, Gay, Queer	60 to 69	Professor	Yes	Great Lakes	Yes
Nick	White	Male	Gay	30 to 39	Assistant Professor	No	Southwest	Yes
Phyllis	White	Female, Genderqueer	Bisexual, Queer	40 to 49	Professor	Yes	Great Lakes	Yes

**Survey content.** The survey used to answer the quantitative subquestions was separated into sections, beginning with inclusion questions, followed by questions designed to elicit each participant's self-described identity (in response to Research Question 1a), and ending with demographic data about the participant's work location (in response to Research Question 1b).

***Inclusion questions.*** The survey began with three inclusion questions to ensure that potential participants met the study inclusion criteria of being currently employed in a full-time, tenure-track position at a Doctoral University within an engineering college, school, program, or department within the United States and who identified as a sexual minority. Immediately before the inclusion questions, the terms "engineering faculty" and "Doctoral University" were explicitly defined. For the purpose of this survey, "engineering faculty" was individuals who had earned a graduate degree in a designated engineering field that leads to the professional practice of engineering and who work in a program that awards degrees in designated engineering fields. Participants were provided with a link to the Uniform Resource Locator (URL) of the 2015 Carnegie Classification website to verify if their institution met the Doctoral University categorization. Those who did not meet one of the inclusion criteria were directed out of the survey.

***Open-ended questions regarding identities.*** Those who indicated that they met all of the inclusion criteria were forwarded to a page that included Figure 4, the Model of Multiple Dimensions of Identity by Jones & McEwen (2000).



*Figure 4.* Identity suggestions for interview discussion. Adapted from “Model of Multiple Dimensions of Identity” by Jones, S. R., & McEwen, M. K. (2000). A conceptual model of multiple dimensions of identity. *Journal of College Student Development*, 41(4), 405. Copyright 2000 by the ACPA College Student Educators International. Reprinted with permission.

To provide my participants with ideas regarding the breadth of identities that I sought in the open-ended survey questions, I provided them with the graphic shown in Figure 4. Providing this graphic lessened the cognitive load, or “the amount of cognitive effort required for someone to respond to a survey instrument” (Sweet, 2016, p. 8) by presenting a list of potential identities that they may or may not have previously considered relevant within their professional lives. The open-ended question format allowed these anonymous participants to “describe their identities” in rich detail as they

understood them by using concepts from the graphic shown “or any others you consider important,” and note whether they felt “that [they] had to deny dimensions of your identity in the workplace.” Separate questions asked them to “describe the community surrounding their university, including their opinions of the social and economic status, attitudes and values of residents, or any other factors you feel might impact discourse with your colleagues and students.” These questions fulfilled two purposes. First, they allowed individuals who would not continue on to complete a personal interview the opportunity to provide detailed input regarding their impressions of their work environment, and second, for those who did continue on to complete a personal interview, the data provided me as the interviewer a starting point to personalize the conversation about relevant identities.

*Demographics.* The next section of the survey included closed-ended scalar questions designed for collection of uniform data regarding the participants’ personal demographics and the size of the institution, college/school, and department in which participants worked. An example of the scalar questions included on the personal demographic portion of the survey included, “What is your age range?” with response options for decades between “20 to 29 years old” through “70 to 79 years old,” (then options for “80+ years old” and “I do not wish to specify”). Scalar questions pertaining to the participants’ institutions included, “Approximately how many undergraduate students are enrolled in your university?” with a drop-down list of options broken into 5,000 person bins. University demographics are typically available on a university’s website, but each question included an option for “I don’t know” if the respondent did not know and did not wish to search for the information. The goal of these questions was to attempt



to further characterize the types of institutions where participants were employed in response to quantitative Research Question 2.

*Choice to continue or not.* The survey ended by allowing individuals to choose whether they wanted to know more information about the second phase of my study. Participants were presented with three options: “Yes--tell me more;” “Maybe--tell me more;” or “No.” Those who answered “No” were directed out of the survey to a page thanking them for their participation. Those who asked for more information were provided with details about expectations and timelines involved with participating in the interviews. Specifically, they were told that they would be required to complete and submit an additional (confidential, but not anonymous) informed consent form; participate in one 60- to 90-minute interview; submit 3 to 5 photographs of items within their workspace that identified some aspect of their identity; and be willing to review the transcripts and draft narratives produced. If, after reading this information they no longer wanted to participate, they were directed out of the survey to a thank you page. If they indicated willingness to interview, they were asked to choose a pseudonym and provide a contact email for follow-up by the researcher.

The survey allowed anonymous participation in my study, providing data that have been described in recent literature as being relevant to faculty openness regarding their sexual orientation (Bowleg, 2008; J. B. Yoder & Mattheis, 2016). It simultaneously provided a method for me to prioritize interviewees in case a large number of participants responded and wished to continue into the personal interview phase. That situation did not occur.

**Delayed response to potential participants.** I want to acknowledge a mistake that occurred in my data collection process at this point. I had programmed a notification into Qualtrics that was supposed to automatically send me an email whenever a participant completed a survey and indicated an interest in continuing on to the interview phase of my study. During the first few days after sending my recruitment emails, I checked the survey results diligently several times per day. Then my academic semester started and I relied on the Qualtrics reminder email to notify me if someone required follow-up contact. For some reason that reminder did not work, so there was a delay of almost two weeks after the first potential interviewees noted an interest in participating and my first follow-up email to those individuals. One woman who completed the survey and indicated that she was interested in being interviewed notified me after several follow-up email attempts that she was no longer interested in participating. She did not give a reason, but it could have been the timing of the academic year, shortly after winter breaks ended for most schools (late January).

**Data analysis method.** In explanatory sequential mixed-methods designs, the quantitative and qualitative data were analyzed separately (Creswell, 2014). The quantitative data were collected and analyzed, and then those findings were used to plan what data should be collected during the qualitative research phase (Creswell, 2014). In both phases, data analysis should focus on answering the research questions. All information for this portion of the analysis was collected from the 19-question participant selection survey. Since the initial survey was primarily used to gather demographics and provide a method to prioritize interview order, and the number of overall respondents to the survey was small ( $n = 11$ ), descriptive statistics were used to summarize the data. I

graphed the results to demonstrate the age and geographic distribution of participants. I also graphed the participants by faculty rank, showing how many faculty members in each rank completed the survey compared to how many of those completed interviews. Participant demographics were categorized by age range and ethnicity. Institutional demographics were provided in summary form.

### **Phase II: Qualitative**

Qualitative research is an inductive undertaking that allows individuals to share their stories in their own words (Creswell, 2007; 2012; Jones et al., 2006) and is appropriate for “understanding how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences” (Merriam, 2009, p. 5). The assumption was that there were multiple realities, and qualitative studies allowed a researcher to engage and collaborate with her participants in order to make sense of the emergent patterns of the realities they describe (Creswell, 2007; Patton, 1990). Qualitative research provides the freedom to use an emergent design that allows for simultaneous data collection and analysis and provides flexibility to change study procedures mid-course based on what is learned during each step of the study (Merriam, 2009; Morgan, 2008). Given the exploratory nature of this study, where little prior empirical research has been completed, the opportunity to modify protocols mid-study was important so that I could ensure that I followed the stories to where my participants led me.

**Narrative format.** I used a narrative format for data presentation in this phase of study, whereby I created brief narratives to introduce participants using their own words and stories. After the individual narratives, I presented several common refrains that

appeared throughout the “stories lived and told” by the participants (Clandinin & Connelly, 2000, p. 20). Next, where appropriate, I linked those refrains to concepts presented in the study’s literature review, theoretical frameworks, and concepts generated through my researcher field notes.

**Research questions.** This second phase of the study sought to gather further details about which identities were privileged within the engineering academic environment, which the participants felt were stigmatized or considered irrelevant, and which, if any, the participants chose to display in their workspaces. I used semi-structured interviews to gather responses to the overarching research question for the study and the second two sub-questions:

- Q1 How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities experience working in Doctoral Universities as defined in the 2015 Carnegie Classification?
- Q1c How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities perceive that their identities influence their relationships with their professional colleagues?
- Q1d How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities perceive that their identities influence their relationships with their students?

**Participant recruitment.** The researcher-participant relationship is situated differently in a narrative inquiry than in those methodologies that are based on positivist and post-positivist epistemologies typical of science and engineering disciplines such as quantitative experiments and qualitative grounded theory methodologies (Charmaz, 2006; Lal et al., 2012; Riessman, 1993). Positivist methodologies are intended to be bias-free and expect researchers to remove themselves to the extent possible from the study (Lincoln & Guba, 2000). In a narrative inquiry, “relational issues are meant to be at the

center at every phase of the process, for example negotiating entry into participants' lives; discussing consent; relating with participants during data collection; and in relation to the representation of findings" (Lal et al., 2012, p. 9). Therefore, it is appropriate in narrative inquiry studies for the researcher to explicitly describe her relationship to the topic of the study (Lal et al., 2012). I briefly situated my relationships to the participants in Chapter I and will continue to clarify my role later in this chapter.

Seven participants volunteered for this portion of the study by fully completing the initial survey and indicating a willingness to be interviewed. I sent each of them a personal email thanking them for their willingness to continue and included both the IRB-approved consent form for interviews (shown in Appendix B) and another copy of the Model of Multiple Dimensions of Identity by Jones and McEwen previously shown in Figure 4. I shared the Jones and McEwen graphic because engineering faculty were rarely the subjects of studies seeking reflection into one's own multifaceted identity and the influences those identities might have on their relationships with their peers and students. Therefore, it was important to help them become familiar with the terminology of social identities prior to the interview phase.

If the individual did not respond within 2 weeks of my initial follow-up email, I sent one additional email asking the person to re-affirm interest in participating. It was at this point that one of the initial seven indicated that she was no longer interested in being interviewed. Four of the remaining six individuals scheduled an interview within a few weeks of my follow-up email. The remaining two individuals required face-to-face follow-up at a conference that we all attended in early summer 2017. Each of them subsequently scheduled and completed their interview the week after that conference.

**Data collection methods.**

*Photo submissions.* Pragmatic research recognizes the importance of the setting in which a participant exists. However, for time and financial reasons, I could not travel to each participant's location to observe the immediate surroundings, so I requested that the participants photograph items within those surroundings that the individual believed held significant meaning with respect to their identities. Then, as an integral portion of the semi-structured interviews, I asked participants to describe the importance of the items shown in the photographs of their workspaces. These photos provided one of the links between the quantitative and qualitative portions of this study. In the quantitative phase, participants described important aspects of their identity and used words to describe which aspects they felt free to share in their workspaces. The photos helped me as the researcher to visualize whether participants' words and actions seemed congruent. In other words, if they said that they were fully open regarding their sexual identity, did they display anything within their workspaces that could be tied to that status such as a photo of a same gender partner, if gay or lesbian, or a safe zone poster indicating status as an ally of the LGBTQ community?

To more deeply engage my interview participants and to elicit whether they displayed objects that matched their descriptions of their identities (tying back to qualitative Research Questions 1a and 1b), I asked them to take photographs of three to five objects in their workspace. The directions asked them to photograph items that they felt captured expressions of any of their dimensions of identity as they described during the participant selection survey. Interviewees submitted photos to me by email or secure file transfer before the interview and we discussed each photo in detail during the second

half of the interview. The photographs provided additional data regarding what aspects of the individual's identity they shared with their colleagues and with their students (in response to research questions Q1c and Q1d) and helped situate the context of each participant's experience (E. P. Harper et al., 2001).

In the end, individuals submitted between 0 and 15 photographs. The individual who did not submit photos was in the midst of switching institutions at the time that she interviewed, and therefore, did not have an office to photograph. She did, however, describe what items were in her previous office and what items she intended to place in her new office.

Table 2

*Tally of Photographs Shared with Interviewer*

Name	Number of photos from work environment that supported identities
Alex	4
David	3 (plus 2 that caused discomfort)
Evelyn	5
Jane	15
Nick	4
Phyllis	0

According to D. Harper (2002), “images evoke deeper elements of human consciousness that [sic] do words,” [and] “evoke a different kind of information” (p. 13). Using photo elicitations during interviews allowed a participant to connect “‘core definitions of the self’ to society, culture and history” (D. Harper, 2002, p. 13).

Researchers have examined aspects of social identity by looking for what was seen or not seen in photographs (D. Harper, 2002; Harrison, 2012). Harrison (2012) proposed that, “the meanings of photographs are constructed, both by producers and by viewers” (p. 858). The key to eliciting deep narratives from photographs was to present images that “break the frame” (D. Harper, 2002, p. 21) of the participants by changing the focus, changing the angle of how an object is typically viewed, or changing the distance from where an item is typically viewed. For example, when someone took a photo from an overhead view of their lab rather than ground level, they might notice different prominent features of the space that they had not noticed before. By allowing participants to take photos of items within their work environment, it ensured that they choose what was meaningful to them, rather than visually interesting to me as the researcher (Clark-Ibáñez, 2004). I attempted to help participants break their standard frame of reference by asking them to describe the items within their office in terms of their identities rather than simply describing them and how they came to be placed in their office. This was intended to make the participants consider what they may have taken for granted as far as what the item portrayed about them.

*Semi-structured interviews.* Semi-structured interviews provided an opportunity for participants to discuss, in-depth, the identities that they listed in their participant surveys as well as share stories that exemplified times when they felt that their identities influenced particular relationships or interactions with their colleagues or students in the academic environment where they worked. The interviews began by my verifying the pseudonym that the participant wanted to use and answering any outstanding questions about the consent form. Then I explained that the interview was intended to encourage



participants to discuss their whole identity, beyond the sexual identity that was used as an initial inclusion criterion. The interview protocol loosely followed the concept of broadening layers of social identity described by Brewer (1991) as concentric circles of progressively larger social categories. This meant that I started by asking questions that inquired about the person's personal identity and broadened out to questions that explained their placement within progressively larger social groups that provide less differentiation. Interview questions were grouped into sections. The first section focused on the personal identity and how it led them to their professional role within engineering academia; the second section focused on their relationships and interactions with colleagues within their workgroup; the third section changed the focus to their interactions with students inside and outside the classroom; and the final section related to the photographs they shared.

*Personal identity.* The first three interview questions asked participants to describe their path to their current faculty position and some of their joys and stresses of their current position. In essence, I was seeking a direct response to my study's main research question: How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities experience working in Doctoral Universities as defined in the 2015 Carnegie Classification. If they did not do so in their response, follow-up prompts were used to ask them to consider how their current position fit with their personal social identities. These questions were intended to build rapport with the respondents and to gather a sense of how the participants identified themselves within their professional environment.

*Relationships and interactions with colleagues.* The next block of questions asked the participants to identify their workgroups and note similarities and differences between themselves and their closest colleagues. These questions were used to get the respondent to consider their interactions with the people whom they collaborated most closely at work, in response to research Q1b: How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities perceive that their identities influence their relationships with their professional colleagues? and Q1c: How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities perceive that their identities influence their relationships with their students?. For example, this section included the questions: “How would you describe your relationships with people in your immediate workgroup?” and “How much do you know about your workgroup peers’ lives outside of work?” followed by “How much do they know about your life outside of work?” This block of questions was used to determine whether or not participants felt that they had to pass, cover, or compartmentalize facets of their identities and, if so, which ones. It also provided insight into whether the participants had reciprocal levels of knowledge about their peers’ lives or if there was some evidence of privilege for those who identified in the majority, based on sexuality, gender, religion, political affiliation, or any other identity discussed. These questions also situated the data within the framework of social identity theory by asking participants to compare themselves to others within their social groups.

*Interactions with students.* The final block of six questions asked participants to consider what aspects of their identities they shared with students either inside or outside the classroom. Questions in this section included: “What aspects of your identity do you

intentionally bring into the classroom?” “How would you describe your relationship with students in the classroom,” and “How would you describe your relationships with your students outside the classroom?” These questions tied to the research questions of how the faculty member’s intersectional identities influenced their relationships with students, and again were used to identify instances of passing, covering, and compartmentalization.

*Discussing the photographs.* After the 19 structured questions, participants were invited to discuss the importance of the photos that they had submitted. This was done last so they had the opportunity to integrate what we had just discussed about their relationships with colleagues and students and reflect on ways that their office and lab spaces were congruent or incongruent with the relationships and identity characteristics that they just described. If necessary, I prompted participants to explain why they chose the subject of the photo, what was its significance, how it demonstrated some aspects of their identity, and what they said about the items in the photograph if asked. As described in my institutional review board (IRB) approved consent form, and reiterated verbally during the interview and prior to our discussions of the photographs, I chose not to publish any of the images that the participants shared. The reason for this was so that the participants felt completely comfortable sharing images of their workspaces with me, some of which contained a significant number of their family members and students. Although the images provided rich data that might have been easier to share had I asked to publish them, my concern for participant confidentiality had to be the overriding factor in that decision. Instead, I used thick, rich descriptions of representative photographs within my narratives of each participant.

***Researcher journal.*** I maintained a researcher journal throughout my proposal and dissertation writing process to document my thoughts and emotions brought to the forefront from my discussions with participants and to create an audit trail (Smith-Sullivan, 2008). I also used this journal to keep notes while participating in relevant events such as the oSTEM conference; a lecture on intersectional identities by Charles Blow, a prominent New York Times Op-Ed Columnist; and the TRANSforming Gender conference at the University of Colorado Boulder. Each of these events helped me to better understand the impacts of intersectional identities on people's personal and professional lives by allowing me to hear, first-hand, experiences of others with identities dissimilar to mine and dissimilar to ones I had previously heard based on my career at one doctoral institution in the Midwest.

***Documenting research design decisions.*** Prior to data collection, this journal included notes that I jotted down while working to hone my participant inclusion criteria and early data collection methods. For example, in my first research journal entry, dated Summer 2016, I documented a revelation I had that, if my focus expanded beyond tenure-track faculty, then I should not focus on collegiality as a so-called fuzzy component of tenure because it would be irrelevant to any of my participants who were not tenure-track faculty. My second entry questioned why I should limit potential respondents only to those who taught at *public* research institutions. I wrote that entry as I was compiling the email list of signatories to the ASEE Deans Diversity Initiative Letter that I knew would factor into the explanation of why my study would be timely. In a moment of reflection I noted, "Don't I want to hear from engineering faculty across the spectrum of institutional

contexts?” (Sandekian research journal, 09/07/2016, p. 1). As Daiute (2014) said repeatedly, the context of the narrative matters as much as what was said or was not said.

Third, I questioned my initial thought to limit my study to so-called Research I institutions rather than to all doctoral institutions. Upon reflection, I recognized that this limitation was based on a post-positivist perspective, where I believed that I should try to homogenize my participant pool as much as possible. However, once I decided on a pragmatic perspective, and upon discussion with my doctoral committee during my proposal defense, it became clear that I should not limit my pool beyond the category of doctoral university.

In the end, my inclusion criteria remained limited to tenure-track faculty but included those who worked at either public or private, non-religiously affiliated institutions. I maintained an exclusion of faculty at religiously affiliated engineering colleges because of the concern that I would be unable to maintain their anonymity because of the small number of programs nationwide. These two entries demonstrated how my research journal was used to document significant changes during the proposal development.

*Journaling during data collection.* During the 3 months that I spent interviewing participants, I used the journal to document my initial thoughts, reactions, and connections or disconnections to my participants’ stories and to work through methodological questions that arose. I documented lines of thought regarding how to describe participant experiences in relation to their multiple identities and how those experiences seemed to follow or diverge from the theoretical lenses I initially used in this study. For example, I noted my pleasant surprise that I received kind responses from first-

wave allies who received my request for assistance recruiting participants but was unable to provide leads because “they don’t know anyone who fit the criteria.” In some ways this shocked me because these individuals had worked in engineering academia for at least 30 years and was vocal allies for diverse populations within engineering. Yet it reinforced my gut feeling and published research that stated that individuals who identified as sexual minorities did not discuss their status with their engineering colleagues (Cech, 2013b; J. B. Yoder & Mattheis, 2016).

*Documenting participation in inspirational and educational events.* My journal also included notes from attending relevant activities during the months that I spent preparing and implementing this dissertation study. During this time, participation in several events helped further ground me in the experiences of sexual minorities both inside and outside of engineering. In November 2016, I attended the 6th Annual oSTEM conference that was held in Denver. Before engaging in this study, I had never heard of oSTEM. I was amazed to see several hundred scientists and engineers of every gender expression and sexual identity in one place because it was not something I had ever seen before. As I people watched at the main plenary events and as people moved between sessions, I noted that we represented people of every shape, size, and skin color. I vowed to myself that, without being intrusive, I would interact with as many people as I could to learn about their experiences. My goal was to learn how their experiences were similar or different from mine, especially now that I am 25 years past being an undergraduate and would never have had the courage to attend an oSTEM conference even if the organization had existed back then. For the most part, the weekend was affirming and

enlightening. But even within our LGBTQ in STEM communities, there were acts of exclusionary behavior such as pointing and laughing at some peoples' appearance.

The next event I documented in my research journal was a lecture by New York Times columnist Charles Blow during which he described his perspectives of sexual attraction and life as a Black, bisexual, father, and survivor of childhood sexual abuse. On the surface, Mr. Blow's identity and mine had little in common. However, his description of how he came to understand his sexuality and how his primary interest was in the person inside, not the physical body, resonated deeply with me. I, too, fell in love with a person without regard to the body that surrounded that person. It took considerable deliberation on my part to decide that I simply could not deny the fact that I was deeply in love with the person and that I would not allow the fact that she was female stand in my way. More than 26 years later, that person is now my lawfully wedded wife.

The third event that I attended helped further ground my understanding of the concept of intersectional identities. The opening session of the TRANSforming Gender Conference at the University of Colorado Boulder provided insight into the importance of tailoring messages when doing advocacy work and the usefulness of coalition building among advocacy groups. In other words, at times, advocacy could be more effective when groups banded together, recognized their shared challenges, and worked towards increased social justice for coalitions of underrepresented minorities rather than splitting energy and impact by focusing on "single issue struggles," using the words of Audre Lorde. Willy Wilkinson, a Chinese-American transgender writer, father, activist, and public health consultant followed the opening session with a lecture titled the "TRANSformational Resistance with an Intersectional Lens" (Wilkinson, 2016). During

his keynote lecture, he read excerpts from his latest novel to share, poignantly, life experiences that he has faced. Although his discussion focused primarily on healthcare access and coverage challenges of transpeople, which was beyond the scope of this dissertation, he presented everyday examples from his life when his intersectional identities led to sometimes awkward, sometimes funny, and sometimes thought-provoking interactions with others.

*During interviews.* I recorded each interview but I also wrote notes in my research journal. So as to not interrupt interviewees, I jotted down questions that arose in my mind while listening to respondents. If the questions were not answered during the course of the interview, I then circled back to ask the participant. After each interview, I jotted down additional notes that I felt might be important when it came time to develop open codes. For example, after my interview with Jane, I noted three themes that seemed to permeate her stories including the imposter syndrome, pervasive experiences of sexual harassment throughout her career, and fear for her physical safety. I noted that experiences of imposter syndrome also appeared during Alex's interview. Reviewing my notes, I noted the irony that two of the female participants referenced Watson and Crick, famous male researchers who used Rosalind Franklin's findings to make their breakthrough discovery regarding the double-helix structure of DNA and then never gave her the credit she deserved. The story struck a chord with me because it was a vibrant example of how women in engineering and science had been made invisible within the disciplines.

*Consulting with engineering faculty who were not eligible for study.* Since I knew that the pool of potential participants was small, I did not want to conduct a pilot



study that would then exclude those individuals from my main study. Therefore, I consulted with engineering faculty who did not meet study criteria regarding their experiences working as tenure-track faculty. All of these individuals were subject matter experts regarding engineering faculty experiences, because each of them have lived experiences within that role and were, therefore, intimately familiar with the compartmentalization that was the norm within the environment. In addition, some of them held other potentially discrediting identities such as being underrepresented ethnic minorities, first-generation college students, or sexual minorities. I primarily interacted with female faculty because they were the ones who had to constantly manage their public identities within the masculine environment of engineering. In addition, I consulted with members of the American Society of Engineering Education Virtual Community of Practice on LGBTQ+ Equality, of which I am a member.

**Data analysis methods.** In qualitative studies, data collection and data analysis occur concurrently (Creswell, 2012; Merriam, 2009; Nieswiadomy, 2012). Qualitative data was collected between February and July 2017 and analysis began immediately. To keep the interview contents fresh in my mind, I transcribed, verbatim, each interview as soon as possible after it was recorded and then immediately began to review the transcripts. Verbatim transcription was important because the key to narrative studies is in the telling of the participant's story including the words used and the style of storytelling (Merriam, 2009). After transcribing each interview using Express Scribe software, I uploaded the transcript into the qualitative analysis software, NVivo for MAC version 11.4, to ease the process of open and axial coding.

I used Creswell's (2008) process of analyzing textual data and the constant comparative method to identify patterns within the responses (Glaser & Strauss, 1967; Jones et al., 2006) while using lenses of social identity theory and stigma theory to guide my analysis. Employing these theoretical lenses allowed me to begin the coding process with a small number of a priori categories and assumptions including individual and group identities from social identity theory and seeking examples of covering, passing, and compartmentalizing professional and personal lives from stigma theory. Once initial (open) codes were completed, I reviewed the list and created axial codes that categorized the concepts identified. Finally, I used selective coding in an attempt to construct a story that connected the codes found throughout the interviews (Jones et al., 2006).

First, I coded each transcript with the participant's demographic information as provided in the participant survey. Next, I read each transcript and identified instances of passing, covering, or compartmentalization to determine if the concepts from stigma theory were evident. Afterwards, I continued my analysis by using an open-coding process that involved re-reading each transcript multiple times and making shorthand notes or terms for data that related to social identity theory and the research questions. In NVivo software terminology, these open codes were called "nodes." Each subsequent statement that appeared relevant to a coded node was then highlighted and tagged as a reference for that node. While coding each subsequent interview, I first attempted to link statements back to existing nodes or else created a new node. The process of identifying nodes and references was circular. With each new transcript that I coded, I returned back to previous transcripts to identify additional instances of the node. Ultimately, the first interview led to identification of 75 unique nodes and 189 references to those nodes.

Subsequent interviews led to progressively fewer nodes, partially because I began to limit my coding to focus more closely on responses directly related to the research questions rather than the totality of each participant's experience as an engineering academic.

While coding the interview transcripts, I also reviewed the photographs submitted from each participant and attempted to organize them, noting how the items highlighted the participant's full range of identity characteristics including, as a starting point, gender, race/ethnicity, age, discipline within engineering, and sexual identity. I carefully noted if and how the subjects of the photographs appeared to present integrated or compartmentalized aspects of the participant's identity, listened again to the recordings of the participants as they described each photo, and re-read transcripts to glean as much from the participant's words and emotions as possible. My intent was to place myself, to the extent possible, in the setting alongside the participant. I did this by relating the experience as was being described to any similar experience I may have had.

In addition to reading and re-reading the interview transcripts and reviewing the photographs that had been submitted, I reviewed entries in my researcher journal throughout the dissertation writing process. My process spiraled from transcripts, to journal entries, to narratives, and back to ensure congruency among the raw data and the results as I was interpreting and presenting them.

**Trustworthiness and verification.** The purpose of this study was to provide useful information to academic administrators and faculty who identified as sexual minorities, not so that the findings could be generalized. Qualitative research should be evaluated using dependability, credibility, and transferability measures that require enough detail throughout the entire process so a reader could follow what was done and

come to the conclusion that the analysis and findings seemed reasonable (Merriam, 2009). This would require “ensuring methodological coherence, sampling sufficiency, developing a dynamic relationship between sampling, data collection and analysis, thinking theoretically, and theory development” (Morse, Barrett, Mayan, Olson, & Spiers, 2002, p. 11). Data triangulation and member checks have been typically used to authenticate qualitative findings (Creswell, 2007). Data triangulation occurred through comparisons of the participants’ survey responses, interview transcripts, and photographs that were shared during interviews. I also provided my participants with opportunities for member checking the draft narratives written from their interview.

Three of the four initial interviewees returned comments that were incorporated into revised narratives. Responses I received included, “It hit way too close to home, but I guess that is a given, since they are my words” and “Nice summary and analysis.” Neither of the later interviewees responded with comments to their narratives. In addition, I asked the respondents to verify that I protected their personal identities adequately. One participant was particularly responsive when I asked for review and input on two separate versions of his narrative. He requested several changes to blur my thick, rich description of his story and his office. In particular, he asked that I change wording regarding his employment location even though it was already lumped into a multi-state region of the United States. He also asked me to remove the description of a particular type of storage container in his office and change a couple of quoted words that he felt were too identifiable. He felt “[that story had] become sort of a legend around here.” He was quick to clarify that the word that I selected was appropriate but not something he would want put in writing in case “reporters got ahold of it.” Finally, he

corrected one of my interpretations regarding the compartmentalization he demonstrated noting that, “He would hate for people to think that as a gay faculty member he didn’t have time or space for students.” Shown in the next chapter, my research findings included rich, thick description that was sufficiently detailed so the reader could follow my process and feel comfortable with my findings which establishes transferability.

Lastly, I used my research journal as another method of ensuring trustworthiness. The journal provided an opportunity for researcher reflexivity, where I could describe my experiences to those of the participants and note reactions to what was being said. During subsequent phases of this study, I would return to the journal and re-read the entries while actively considering if my experiences or reactions might have led me to stray from what was reported by my participants. This exercise led me to spiral back into the data and analysis sections to ensure that I was portraying the words and experiences as shared with me.

### **Chapter Summary**

This mixed-methods sequential explanatory research filled a void in the scholarly discussion of personal identities of engineering faculty members at doctoral institutions in the United States who identified as sexual minorities. The paradigm and epistemology used were appropriate due to my close relationship with potential respondents and my insider status within engineering academia. Purposive sampling criteria and snowball/respondent driven sampling techniques that included privacy measures to ensure confidentiality of all participants and an introductory participant survey provided opportunities for individuals to be heard and counted anonymously or confidentially. The quantitative portion of the study provided baseline data for the geographic distribution of

participants and initial talking points regarding interviewee self-identities. The qualitative portion of the study allowed for collection of greater depth into how those participant identities influenced individuals' relationships with their colleagues and students. Mixed methods allowed me to investigate how participants' social identities were or were not shaped by themes expected from my theoretical lenses of stigma theory and social identity theory.

Since data collection and data analysis occurred concurrently for the qualitative portion of the study, I was able to use emergent findings to change the content of latter semi-structured interviews. The photos that participants introduced led to more free-form discussions where individuals could control the direction of the conversation to ensure that their self-image was accurately portrayed beyond those identities listed as participation criteria. By incorporating member checks at several points, and triangulating emerging findings from each step of data analysis, I ensured dependability and creditability of my findings. Together these study characteristics allowed me to use my personal networks and a larger group of deans and other allies who have publicly supported diversity in engineering education to collaboratively identify individuals who were willing to share their workplace experiences. Those experiences are described in the next chapter.

## **CHAPTER IV**

### **FINDINGS**

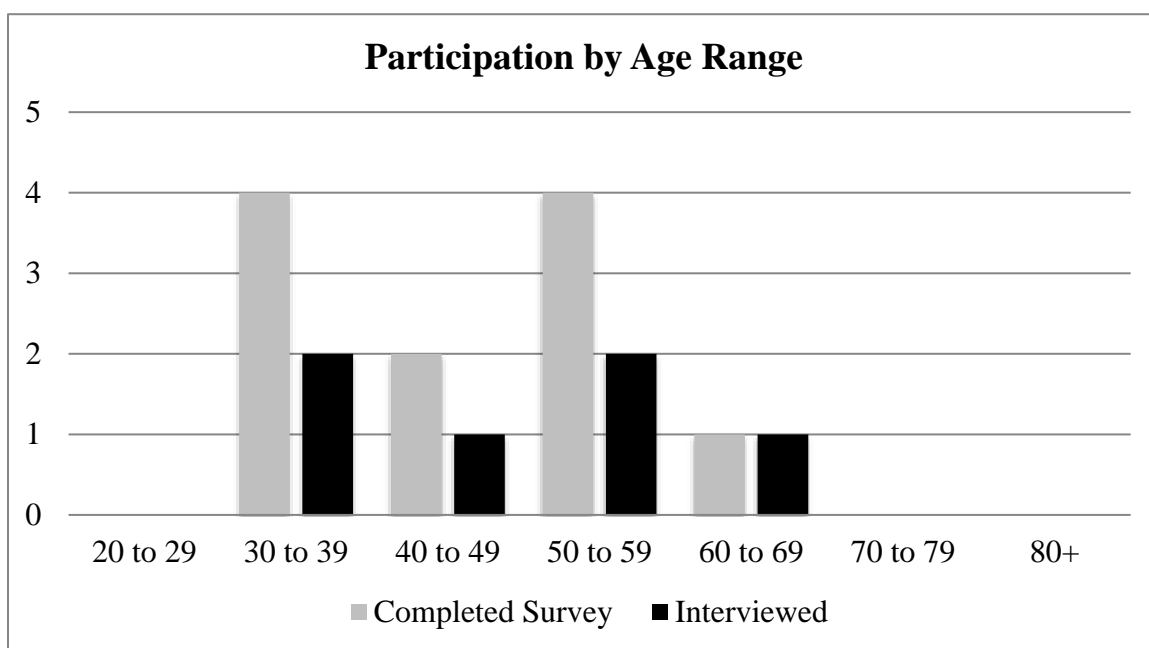
The findings from each phase of this study are described in this chapter, beginning with the quantitative data then followed by the qualitative data. The participant selection survey provided individuals an anonymous option for the 11 participants. Findings from the quantitative study are summarized and an explanation of how those findings informed the qualitative study is presented. The descriptive analysis of the quantitative findings is followed by narrative analysis of data gathered from the six semi-structured interviews and photo elicitation. Finally, answers to the research questions are presented.

#### **Phase I: Quantitative**

##### **Survey Participant Demographics**

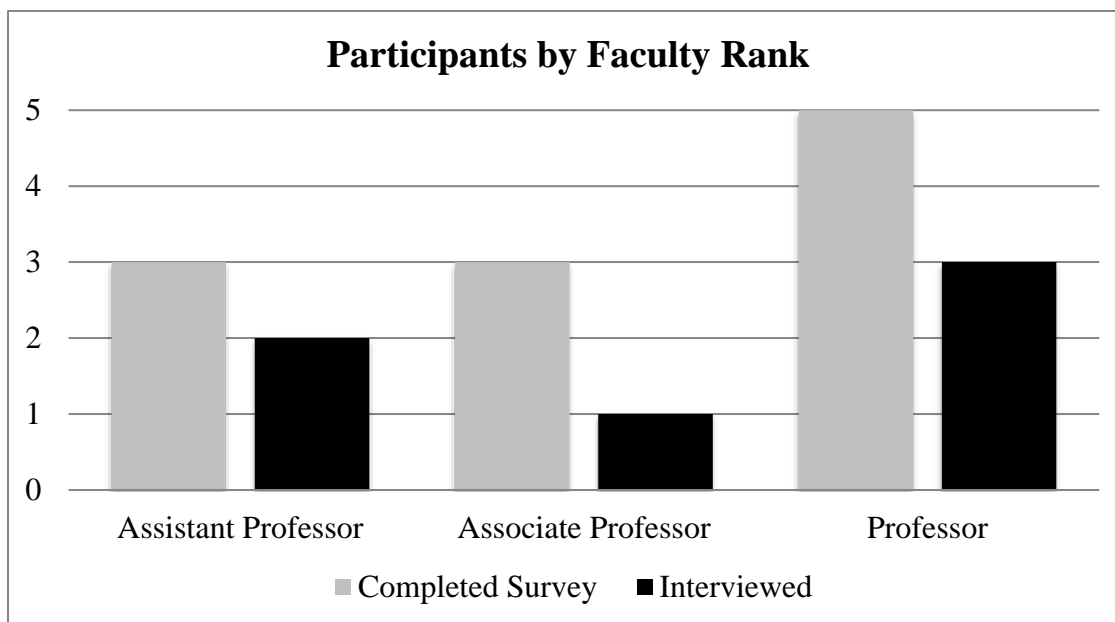
Nineteen individuals entered the online participant survey. Eleven of those met study inclusion criteria and completed the full anonymous portion of the survey. Each of the participants had earned a terminal degree in engineering, either a Doctor of Philosophy (Ph.D.) or a Doctorate of Engineering (D.Eng.). There were four male, five female, and two female/genderqueer respondents with ages ranging from 30-to-39 up to 60-to-69. The age distribution of respondents is shown in Figure 5. Three assistant, three associate, and five full professors participated from a variety of disciplinary specialties and. Geographic locations across the mainland United States. I am not listing the disciplinary specialties in order to maintain confidentiality of participants, primarily of

those few who completed interviews. The geographic distribution of respondents for the survey and for the interviews is shown in Figure 6. Participants' religious affiliations ranged from "atheist," "lacking any religious affiliation," or "spiritual but not religious," to "mainline Protestant" and "Unitarian Universalist."



*Figure 5.* Distribution of participants by age.





*Figure 6.* Distribution of participants by faculty rank.

Given these characteristics, this pool of participants demonstrated a breadth of potentially intersectional identities in some categories (age, gender identity, sexual identity within mainstream LGBTQ categories, religious identification, and tenure status), whereas other desired diversity was missing, specifically with regards to race/ethnicity with all but one participant identifying as White/Non-Hispanic. The basic demographics of the participants were shown in Table 1 in Chapter III.

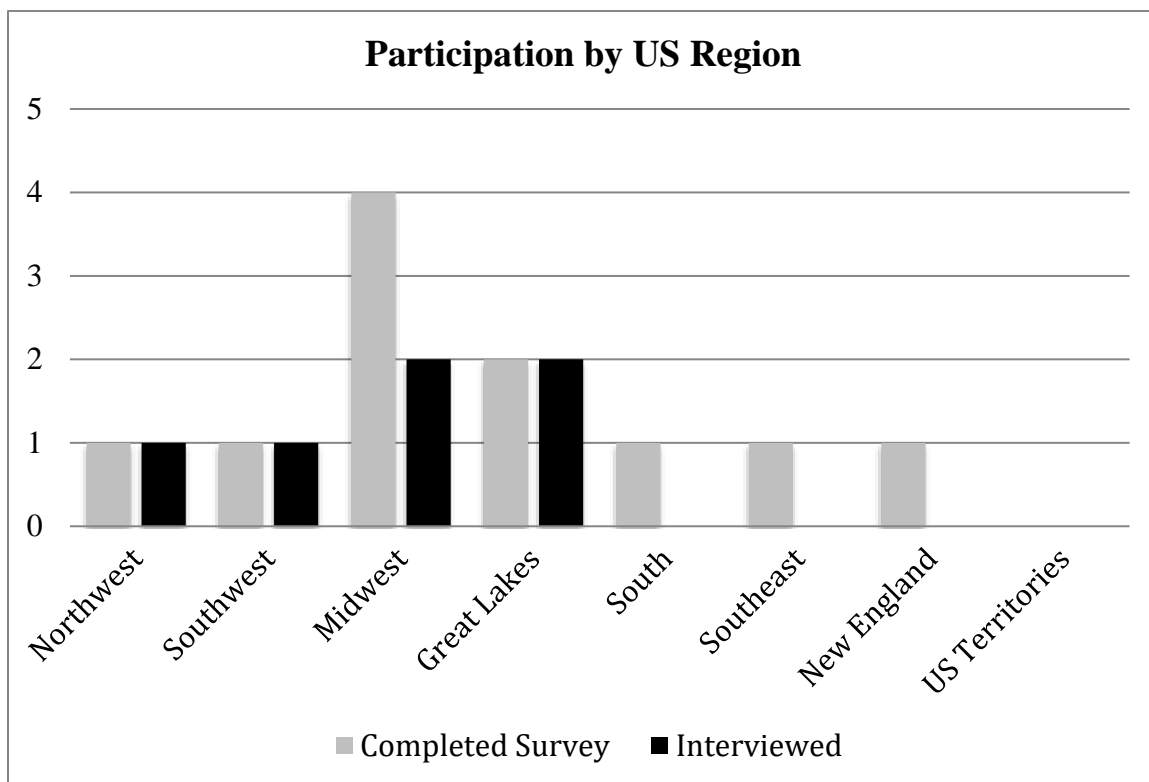
### **Geographic Distribution of Respondents**

While recognizing the limitations of purposive sampling, my goal was to contact individuals who were geographically dispersed across the eight regions of the United States (Northwest, Southwest, Midwest, South, Southeast, Great Lakes, New England, and U.S. territories) with the intention of seeking participation of multiple participants from each region. These regions were selected to maintain anonymity for participants

who wished to participate without identifying themselves or their institutions. The 11 complete survey responses included at least one eligible faculty member employed in seven regions. The only areas that were not represented were the U.S. territories. Twenty-seven percent of respondents worked in the Midwest region; 18% were from the Great Lakes region; and 9% came from each of the other mainland regions (see Figure 7). One individual each from the Northwest and Southwest regions completed an interview, as did two individuals each from the Midwest and Great Lakes regions (see Figure 8). No participants from the South, Southeast, or New England regions participated in an interview.



*Figure 7.* United States divided into geographic regions.



*Figure 8.* Geographic distribution of respondents.

### **Institutional Demographics**

All respondents were employed at public doctoral institutions, and as shown in Figure 9, all of those institutions had enrollments of greater than 15,000 undergraduates. Two survey respondents were employed at schools with undergraduate enrollments between 15,000 and 19,000. Three were employed at schools with between 20,000 and 24,999 undergraduates enrolled, and the remaining six were employed at schools with more than 25,000 undergraduate students enrolled. Three of those schools enrolled fewer than 5,000 graduate students; two enrolled between 5,000 and 9,999 graduate students; four enrolled between 10,000 and 14,999 graduate students; one enrolled between 15,000

and 19,999 graduate students; and the remaining respondent did not know how many graduate students were enrolled at the institution.

### **Departmental Demographics**

Faculty gender distributions among respondents' departments ranged between 5% female and 45% female, with the mean representation slightly under 20%. Seven of the departments where respondents were employed had fewer than 750 undergraduate students and one had more than 2,000 enrolled graduate students. Eight of the employing departments had fewer than 500 graduate students and the remaining three respondents did not know how many graduate students were enrolled in their departments. Figure 9 includes graphs of the breakdown of undergraduate and graduate enrollments at university, college/school, and department levels for all survey participants.

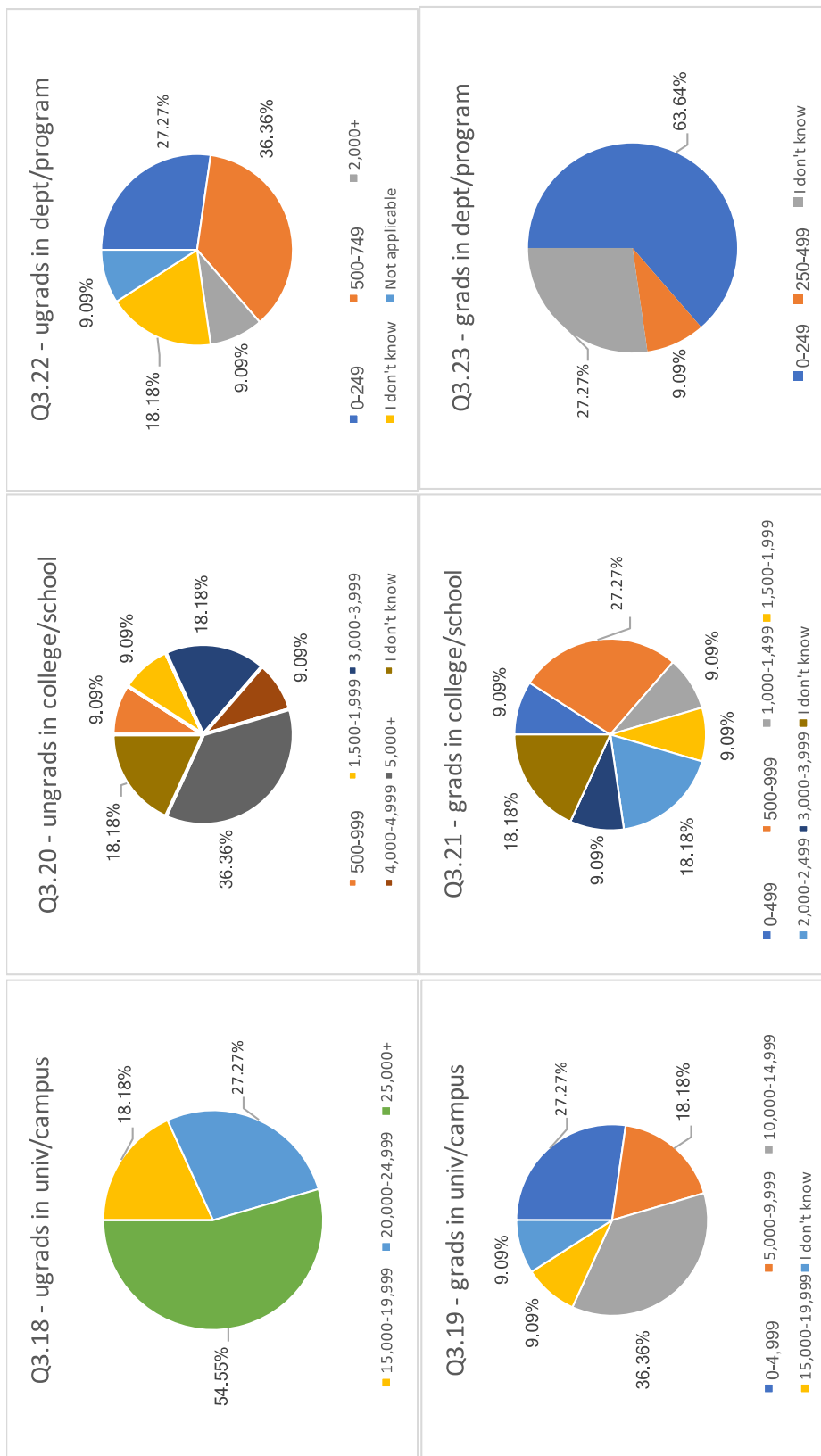


Figure 9. University-, college-, and department-level enrollment.

### **Answer to Research Question 1a: Survey Participants' Descriptions of Their Identities**

Respondents were provided with an open-ended text box and asked to describe their identity. In addition, respondents were provided with a graphic (Figure 4, shown in Chapter III) by Jones and McEwen to help them consider some of the various potential aspects of identity. Ten of the 11 respondents provided details, naming a minimum of 3 and a maximum of 11 identity traits. Those traits included sexuality and ethnicity/race, each mentioned by 9 of 11 respondents; gender, mentioned by 8 respondents; religious affiliation or lack thereof, mentioned by 7 respondents, other personal identifiers, mentioned by 6 respondents; and socioeconomic class, mentioned by 5 respondents. Those who identified as “female” or a “woman” described their sexuality using various terms including “lesbian,” “queer,” “bisexual,” “probably bisexual but in a long-term monogamous lesbian relationship,” and “gay.” The male participants, if they included sexuality in their descriptions, identified solely as “gay.” Two of the women noted their roles within family units, as “mother,” “daughter,” or “wife.” None of the men mentioned any family connections although from the follow up interviews at least two of them were married or partnered.

**Feeling the need to hide identities.** Participant responses to the survey question of whether they felt the need to hide their identities were mixed. Four of the 10 respondents to this question indicated that they did not feel the need to hide any aspect of their identities in their current positions. One woman noted that while working at her previous institution, “she did not know [she] was a homosexual” and she was “not in an environment that helped [her] to come out to herself.” The other six respondents noted

that they felt the need to hide at least one aspect of their identity, but it was not always solely their sexual minority status. For example, two women (one of whom identified as a genderqueer female) explicitly mentioned that they downplayed their gender. One man noted that he “made sure to enter into my workplace completely open about my identity.” On the other hand, one woman noted that, “Everything except whiteness and upper middle class gets left behind. Femaleness, sexuality, religion, politics are all unwelcome in my place of work.” She went on to say, “Being a woman is tolerated as long as I don’t point out sexist attitudes or behaviors among colleagues, or try to change policies or cultures accordingly.” The example she gave regarding pushback involved asking other faculty to use the term “first year” student instead of “freshman” in order to be welcoming to students of all genders.

**University community demographics and the link with social interactions.** A few of the participants made connections between the socio-political environment of the community in which their employing institution was located and the types of interactions that they had with colleagues and students. For example, one survey respondent noted that her institution was “located in a working-class/ lower-class city surrounded by suburban [*sic*] communities” with “immigrant working/lower class students [who] are first-generation college students.” She went on to say that the “students from the suburbs that are also first-generation college, also tend to be more socially-conservative and may not be as open to having a lesbian college professor.” However, she felt that the middle-class students with college educated parents who lived in the same suburbs tended to have “more socially liberal and accepting views.”

Alex described the community where he worked as “liberal-minded and open to alternative values and lifestyles” which made “it easier to navigate a same-sex partnership and integrate it into the community.” However, he also noted that “the liberal, heteronormative culture of the town does depress LGBT culture--for example, there are no LGBT bars or social spaces in the town.” The lack of LGBT bars or social spaces made it less likely that Alex would accidentally bump into any other faculty or staff coworkers, or students, who might also have identified as sexual minorities. On one hand, that might have removed a potential stressor of accidentally running into someone. On the other hand, it limited potential social connections based on a shared identity.

Phyllis indicated that her institution sat inside a “bubble” that separated the institution from the rural, conservative, and “deeply racist” environment. The college town included “a tight community with a strong sense of protecting our own and welcoming all people to our university setting” and the “LGBTQ faculty-staff organization has for decades served as a resource to the wider LGBTQ community in the region because there are so few resources in the surrounding area.” She noted that the state where the institution was located was so conservative that they did not offer domestic partnerships, let alone recognize same-sex marriage, until forced to do so by the passage of the ruling by the Supreme Court in 2015. As a bisexual woman who never intended to marry, the lack of same-gender or opposite-gender domestic partnership benefits was a financial burden on her.

The common thread throughout the responses to this question was that the actual city or town in which each university was located was significantly more liberal than the surrounding areas. Therefore, faculty had to navigate relationships with some students



who came from rural and/or conservative backgrounds that differed significantly from the urban, liberal environment where they attended school.

**Age-related experiences.** The participants' stories described distinct age-related experiences, I would describe Jane and David, the two oldest interviewees, as pioneers in their fields and mavericks who had to blaze trails to succeed in their careers despite significant challenges put in their way because of their identities. Evelyn and Phyllis were the second wave of settlers. They certainly did not have an easy time of making their way in engineering as females or as sexual minorities, but the prior generation had made inroads and society in general was becoming more accepting. Alex and Nick were the beneficiaries of the work done by the two prior generations of sexual minority trailblazers. By the time they entered the profession, their universities had included sexual orientation in the non-discrimination clauses and both institutions offered partner benefits.

### **How Quantitative Study Was Used to Inform Qualitative Study**

In explanatory sequential mixed methods studies, the quantitative results are used to inform the design of the qualitative study. Following that methodology, I used the qualitative semi-structured interviews to delve further into the participants' responses to three of the survey questions: "How would you describe your identity?," "Do you feel that you have to deny dimensions of your identity in the workplace?," and "How would you describe the community surrounding your university?" The semi-structured interviews were designed to allow participants to share their thoughts beyond listing their identities and those that they felt that they had to deny. Interviews allowed individuals to share stories of how those social identities surfaced or did not surface in their work

environment and how, if at all, they believed that those identities influenced their relationships with colleagues and students as asked in the primary qualitative research question that guided this study.

### **Phase II: Qualitative**

Seven of the 11 individuals who completed the participant survey provided contact information necessary to complete semi-structured interviews immediately upon completing the survey. Of those, one individual indicated willingness to complete an interview, but after I contacted her to schedule the interview, she indicated that she was no longer willing to participate in the second phase of the study. I did not ask any of the respondents why they decided to continue or not. Therefore, the qualitative data described here included narratives from 6 of the 11 participants who completed the participant selection survey. In addition, reflections from my research journal that describe my emotional responses to what I heard during participant interviews and what I heard during events that I attended during the last year were also included as part of the qualitative findings.

### **Participant Narratives**

The quotes presented here were used as the basis for the development of themes and analysis described in detail in Chapter V. Although the initial study selection criteria required individuals to self-identify as sexual minorities, both the survey and the interview focused on the participants' intersectionality of identities and how they perceived that their identities influenced their relationships with both colleagues and students. Individuals had free reign to highlight any or all of the varied aspects of their identities throughout the research process. This section includes the in-depth narratives

garnered from one-on-one interviews with those who participated in that phase of the study. All names used were pseudonyms chosen by the respondents.

**Alex: I'm busy thriving on my own little island.** Alex identified himself as a 30 to 39 year old, White gay male from the South. He was an untenured junior faculty member at a public, midwestern institution in a department where approximately 90% of his colleagues identified as male. In his participant selection survey, he noted that he:

Do[es] not discuss [his] religious attitudes or beliefs (agnostic) or freely discuss [his] sexual identity, partly because [he] does not believe others are comfortable with such topics and partly because [he does] not necessarily think it essential to discuss personal details with professional colleagues.

However, during his interview he said that he had mentioned his “partner” and “significant other” on multiple occasions at work and even clarified that he had a partner during one of his first meetings with the dean who “asked if he had a wife” shortly after he was hired. He described the community where he worked as “open to alternative values and lifestyles . . . [and] almost liberal to a fault--so much so that there are heteronormative [and elitist] pressures even for same-sex couples.” Those pressures included an expectation that he and his partner would “marry, have kids, send them to the best schools in town, and the best colleges in the U.S.” These interactions and expectations demonstrated how much had changed for Alex between his current environment and the environment in which he grew up.

**Alex's story.** Alex relayed a pivotal experience in his life that changed his self-perception and helped him recognize that he did not need to be ashamed that he was gay:

In the application to [the school], there's a section that says, “What makes you different in your discipline?” I had done an internship when I was [a master's student] in a structural engineering firm. And I wore crazy ties and my hair was weird. And I didn't fit in, at all. And they let me know it, for sure! And so I wrote about being a gay engineer, and how there was no one in the field that I wanted to

be. So, I needed to be that person for others. . . . After I finished it and I sent it off, I was almost in tears. I called my mom and my dad, and I was like, “I’m going to get into [my dream school] and they’re even going to read this application and probably rate me even higher than it would have been because I’m gay, because I’m different.” And it was the first time that I realized that it was a strength, and not a disability and a weakness.

Alex was frequently bullied for his perceived sexual orientation while growing up in a small town in the rural south, especially during high school. That trauma likely led to his perception that being gay was a defect. He kept to himself and initially rejected the possibility that he was gay--feeling offended that others would perceive him as such.

Even during our interview, more than a decade after his high school graduation, he reacted viscerally when describing how his classmates used to call him “faggot.”

I was definitely not “out,” but there was a perception that I was gay. And it was a horrible thing! It was like a disease. Like, I can’t [believe] that people would say that about me. Um, and it was the worst, and even that word today, I just have a hard time saying it without having some negative feelings about it. Kids are cruel, but um, my personality, my confidence didn’t come out until college.

Alex embraced the philosophy shared during his college freshmen orientation that a person did not have to bring one’s previous self to college. In essence, orientation leaders told the new students, “If you are happy with who you were before setting foot on campus, great. If you want to reinvent yourself, that is also great! Now is the time.” Even though Alex considered his undergraduate alma mater to be a conservative school with traditional, conservative values, he felt that there were students there with whom he could identify. He reported that it was during his early college years that he gained self-confidence and was able to publically acknowledge to himself and some peers that he was gay. During our interview, Alex excitedly shared these stories and “the other things about me that makes me, *me*.”

*Seeking excellence to quiet his imposter syndrome.* Throughout his interview, Alex stated that his main goal as a young faculty member was to prove to everyone that he was “excellent at my job.” He recognized that this drive had a lot to do with the imposter syndrome that he had been struggling against his entire life. From my perspective as a researcher, it certainly appeared that he was excelling. In his first 3 years as a faculty member he had already been awarded nearly \$5 million in sponsored grant funding--a level that was not expected at his institution until a faculty member was working towards the level of full professor. He had also received a student-selected, departmental teaching award and he performed sufficient service to earn ratings of “meets expectations” or “exceeds expectations” on his merit reviews. He noted that, “When I’m on campus, I’m an engineering faculty member [and] . . . every minute of my day is taken up by something that is technical, something that I need to do for this committee, so there’s very little free time” to socialize or discuss personal topics.

*Collaborators.* Alex’s research topics spanned workgroups within his multidisciplinary department in a college with more than a half dozen departments, so he had frequent opportunities to connect and collaborate with other faculty at all professional levels. He noted, however, that, although he was a “collaborative individual” by nature, most of his grant proposals were submitted with junior faculty in other workgroups or with him as the sole researcher primarily because of what he considered unethical behavior by a previous co-investigator who took his idea and then submitted subsequent funding proposals without his involvement. When asked how much he knew about his workgroup colleagues, he seemed surprised by his revelation that he actually knew very little considering they had worked together for 3 years. He assumed that they

were all heterosexual because each was married to a woman, and they each had children. He knew some of their spouses' names and a few details about their children, but, overall, he realized that he knew very little about them. He could not pinpoint whether his age, his status as a junior faculty member among full professors, and/or possibly his sexual minority status were factors in the lack of personal interactions or if it was simply a byproduct of the typical engineering faculty culture that tends to enforce a separation between technical and social. His office also demonstrated this separation.

*Office décor.* Alex shared a photograph showing his office, which was tidy and sparsely decorated. With the exception of the dead plant sitting on a corner of his desk, every item in the office was thoughtfully associated with his role as an engineer. His Ph.D. diploma from Dream College (a pseudonym) and four black and white photographs of famous engineering structures from around the world were the only items hung on his office walls. The diploma was a reminder, both to him and all others who entered his office, that he graduated from one of the most prestigious engineering programs in the world and that he earned on his own merits the coveted tenure-track position that he held. In his words, "Being an engineering faculty member at an R1 research institution is an incredible intellectual accomplishment in and of itself," and the fact that he accomplished that as a first-generation college student from a small southern town made him proud. He selected the photo series of engineering structures to demonstrate his personal cosmopolitan worldview and show his students that they could use their engineering skills anywhere in the world. Each structure demonstrated outstanding engineering and design achievement using a different type of material (metal, masonry, or concrete). He noted that his experience as a world traveler was especially important to him because he

was the only member of his large extended family who had moved away from the family's homestead. In addition to his continuous striving for excellence, Alex explained how he valued his identities as a passionate teacher who tried to connect with his students and as a mentor who wanted to pay it forward for the excellent mentoring that he received as a student.

*An outstanding researcher on his own island.* As far as his research, Alex felt that he was “blowing it out the water.” He knew that he was “publishing in the best journals he possibly could . . . and bringing in way more money than any other junior faculty [member in his department] had ever brought in,” so he felt comfortable that he would be retained after his third year and should receive tenure without question when the time came. He noted that his research straddled topic areas within his department, and he was “happy doing [his] own thing and in carving [his] own path.” Although collaborative by nature, Alex became cautious about what research ideas he shared with his colleagues. In his short career, he had already come to realize that “professors live and die by their ideas.” He had experienced situations where faculty who were struggling to generate fundable ideas on their own would collaborate with him on a small project and then use that as the basis for a new-to-them research investigation without including Alex in follow-up work. He immediately froze collaborations with two colleagues who demonstrated their willingness to “poach” his research ideas.

Alex described his attempts at collaboration as “trying to . . . have some sort of tie to the mainland [with his disciplinary group],” but given the negative experiences with colleagues taking ideas and students, he chose to move forward by remaining on his own research “island.” The only concern he had about his research agenda was that “my island

could easily float away.” I asked him to explain what he meant by that statement and he said that he did not have any particularly strong attachment to his current institutional peers and, therefore, would be open to pursuing opportunities elsewhere. To date, he had not “tested the waters” regarding other positions, but “there’s blood in the water. I know that people are going to [try to] poach me, for sure.” The blood in the water reference seemed fitting for Alex’s description of the seemingly shark-infested competitive environment in which engineering faculty navigates. Alex was determined not to transmit that grim metaphor to his students, however.

*Passionate and hip teacher.* Alex volunteered to teach fundamental undergraduate courses in his department so that he could connect with young students and help them develop academically and socially. He was intentional about setting a positive classroom environment.

From day one, from day one, I go through a laundry list of things that I expect. And one of the bullet points that I always hit on is *teminos*, which is a Greek word for “safe space,” like temple. It’s really important. It’s really important because that, just saying that, sets the classroom climate in a way that is open and non-judgmental and supportive!

Alex recalled that, when he was in school, he “was always pushing [himself] to be perfect in other aspects of [his life] because he always felt like something was not right with him.” That something was his sexual identity and it made him feel like he had a “disability” compared to his peers. So, he pushed himself to be excellent and was disappointed when his “professors [would] get up in front of students and give very mediocre performances where they had the ability to inspire and to mentor and to give a lot of confidence to young students.” His immediate reaction at the time was, “Wow! I could do such a better job of that!”



Today he has used those experiences as motivation to be an excellent professor who engages students in class and works to ensure that his students understand concepts before moving on to the next concept. He had an unconventional way of keeping his students engaged, by including photos of pop icons looking confused when they were discussing a particularly difficult concept, or a random photo of a drag queen or reality television star in the middle of his PowerPoint presentations to liven up discussions. Alex has received emails from students who said that they “really loved the photo” of the drag queen and, “Thank you for showing that in class.” Alex choked up while sharing that story because he believed that it would have made him realize that it was okay to be different if one of his faculty members had done something similar. It would have given him a glimmer of hope that it was okay to be an engineer and do things a little differently.

Another time when Alex inserted pop culture into his class discussion was when he discussed different perceptions of the aesthetics of engineered structures and then referred to the “the blue and black or white and gold dress” that led to an uproar on the Internet. He said something like, “I think it’s Kim or maybe Chloe. I’m not really sure.’ And what engineering professor would say that in front of their [*sic*] class except me?” He felt like these interludes gave his students a glimpse into his personality, where they might think, “Oh, this guy’s kind of into pop culture. Like, he knows what’s going on!” Alex hoped that these instances in class would encourage students to recognize him as an approachable human being rather than some “almighty god” like he used to think his professors were. Alex wanted his students to think that he was “a little hip with the times [laugh]. It’s going to get to the point where I’m too old to do that stuff and they’re going to be like, ‘This guy is ridiculous!’ But it hasn’t happened yet, hopefully.”

*Does not explicitly mention that he is gay.* Alex made it clear, however, that “I “definitely don’t intentionally try to communicate to my students that I am gay.” He “wants the students to know that [he’s] an expert of the subject matter, first and foremost,” and that “he’s there to guide them and mentor them to becoming experts.” Regardless, “along the way, there are aspects of my personality that may allude to the fact that I’m gay. But I let that naturally come out.” Both he and I giggled at the double entendre of that statement.

*Mentor and role model.* Throughout his graduate school career, Alex had great mentors, all of whom were women. Since women faculty members have always been a rarity in his specialty area, he now has recognized how unlikely that was. He said that it “was just something that he naturally gravitated for. And it worked out extremely well for [him] because those mentors were incredible” and helped guide him to push himself and recognize that he could succeed in academia. Alex has worked to emulate those women by supporting his students to be their best.

From what he described, Alex’s relationship with his students inside the classroom flowed seamlessly into the type of relationship he maintained with them outside his classroom. One of the photos he shared of his office was his Safe Zone poster indicating that he has “made a commitment to supporting lesbian, gay, bisexual, transgender and queer people.” The sign was not posted, however; it was laying visibly on his bookshelf. When I asked him about it not being posted either inside or outside his office, Alex admitted that he has struggled with his decision to not post the flier. He recognized that, for some students, having it posted would make a positive impression or impact on their feeling of safety. However, he believed that, since he explicitly verbalized

to his students on a regular basis in class that “[his] office is a safe space and I want you to feel comfortable talking to me about anything,” therefore, he did not feel the need to conspicuously display the symbol that was frequently affiliated with the LGBTQ+ community label. “I hate labels! I just want to provide students that support.”

*Faculty advisor to Out in Science, Technology, Engineering, and Mathematics (oSTEM) student chapter.* One additional way in which Alex mentored students was as the faculty advisor to the school’s oSTEM chapter. Interestingly, that role was not listed on the department’s roster of faculty service assignments. Optimistically, this could have been because the document posted on the departmental website was two years out of date and actually pre-dated the formation of the oSTEM chapter. Pessimistically, it could have meant that his college was similar to others where the oSTEM chapter was allowed but not publicized alongside other student groups. It was while speaking on a panel of gay and lesbian faculty at an oSTEM-sponsored event that Alex first met another engineering faculty member who was gay. It was an enlightening moment for him because both of the other speakers on the panel were tenured, so he had proof that a person could be both gay and tenured in engineering. His response was, “Oh my gosh, they’re my people! That’s excellent!” He said that it was the first time in a long time that he did not feel out of place or like an imposter.

**David: Walking a tightrope between advocating and flaunting.** David’s journey to becoming a full professor has revolved around his identities as a gay engineer, a passionate teacher and mentor, an adequate but “not great” researcher, and an increasingly vocal advocate for various underrepresented minorities in engineering. Every career decision he has made has been influenced by his identities, and his sexual

identity has been front and center. For instance, he carefully weighed his decision of going into industry or academia and where to apply for jobs based on his identity as a gay man. Then, through the years, mentors repeatedly told him to cover his identity as a gay man lest he make people “uncomfortable.” In contrast, his few openly gay students, more of whom are in science than engineering, and some of his more openly gay non-engineering colleagues have encouraged, and sometimes demanded, that he use his privilege to push boundaries and make a positive difference for those who remain underrepresented in engineering and academia. David has always walked a tightrope between expectations by colleagues that he completely cover his sexuality while at the same time being expected by students to be vocally and visibly supportive of all gay rights initiatives on campus. To maintain balance on that tightrope, David has had to continually negotiate with himself and others regarding integrating his social identities into his daily existence.

*David’s story.* David described himself as a “middle class, White, cis-gender, moderately male” individual in his 50s. He identified as a “quasi-Christian” who was on “indefinite hiatus” from participating in his local church. He stopped attending church because he did not feel that the members of his liberal Christian denomination were standing up publicly enough against the conservative Christian denominations that still disparaged LGBT people and their supposed “lifestyle.” Unlike the other study participants, David provided no background explaining his reason for entering engineering as an undergraduate or graduate student. Rather, he began his narrative at the point in time where he was carefully weighing the decision to go into industry or

academia based on where he felt he could be more comfortable as an out gay man in the late 1980s.

Given what he knew about engineering industry, even in cities and states that he felt were gay-friendly, he did not feel that he could “survive or thrive” in an industrial setting. Thus, interested also in teaching, he applied for faculty positions. He received only two tenure-track job offers in locations that he felt would be “safe” and decided to take a chance on the school that was located in a conservative region of the country but in a city that had been described as fairly progressive. David found at that time some tolerance but also advice and expectation from mentors to conform to a “don’t ask don’t tell” approach. He did not find active allies promoting acceptance so he concentrated on cultivating good working relationships and educating prospective allies where he could.

David has always preferred to manage when and where he shared his gay identity. However, that has not always been possible. He indicated two critical instances when his sexual identity was shared more publically than he otherwise would have chosen, both times by campus newspapers. The first time that he was outed by a campus newspaper was during graduate school when he attended a Gay Pride Week Event with his then-partner. That article and photo have been enshrined in his “reminders of purpose” corner of his office described above. The second time he was outed in a campus newspaper was when he was pressured into participating in a gay pride event as an untenured professor at his current institution. Both instances have shaped his academic career.

*Office décor.* During our interview, David shared a photograph that provided a macro view of his desk and corner of his office that he titled “hectic joy and panic.” The

photograph was taken during early summer when there were few students on campus to advise and meetings typically took place outside his office. Every flat surface was buried with stacks of papers, books, 3” three ring binders, or file boxes. Only a small portion of his desk directly in front of his laptop remained clear. Documents buried the two white plastic folding chairs and would have to have been moved if someone were to actually want to sit down and talk to him while he was sitting at his desk. The books on the bookshelves were stacked in piles; most of them with the spines facing sideways rather than outward and visible for easy access. The lowest visible shelf held inboxes, stacked four high, because there was no place on his desk for an inbox. Near the windows were two columns of file boxes, stacked nearly four feet high. One of the stacks included five thick textbooks with three boxes sitting on top of the books and a heap of notebooks on top of that.

When I first saw the photo, I instinctively wondered aloud if he had just moved offices and impulsively joked that he obviously did not obsess about neatness. His reply to the question of whether this office was new to him was, “No, sadly.” He recognized that his office was “messier than most” and believed that might be:

A little bit of a symptom of how compartmentalized my life is. A lot of faculty offices you’ll go in an you’ll see a lot more that is personal. . . . Mine, there’s no, not much reflection of personality. I think, because I’m so compartmentalized that I view this as my workspace and not much of anything else.

He explained that he was not very well organized but the mess was indicative that “there’s stuff going on that I care about, that I am working [on,] and a little bit frenetically. But it’s also a bit of panic because it’s not nice and tidy and organized.” He

went on to say that sometimes thinking about work “makes me wake up in the middle of the night worrying about stuff that needs to get done.”

During the academic year, David spent 10 to 12 hours a day in this space or elsewhere on campus, but he tried to stay away from campus on weekends. On those days, he worked from home instead so that he could maintain some sense of being “away-from-campus” and take the time needed “away to breathe a little bit.” Being off campus also provided him the opportunity to enjoy the aspects of his life and identity that he was not supposed to bring to the office with him according to his professional mentors. During the member-checking phase of this study, David noted that his messiness was correlated with his busyness but wanted to be clear that the physical disorder in his office did not cause the hectic pace at which he worked. Nor would he allow the physical disorder to remain once the semester started and he had more frequent visitors to his office.

*A crack in the armor of compartmentalization.* Even though David had been frequently advised to keep quiet about his sexual identity, he maintained one small section of his office that he described as “reminders of purpose.” He shared those reminders with me via a photograph of a shelf in his office. On that shelf, he kept several items that clearly identified him as an ally of sexual minorities and, if people looked closely enough, they could see a copy of a newspaper article with a photograph that showed a much younger David attending a gay pride event more than 30 years ago. At the time, David was not a knowing or willing subject for that photograph that was published in a newspaper at his graduate school but he has obviously become comfortable enough now to display it openly in his office.

That newspaper article sat adjacent to another newspaper article, from approximately the same timeframe and same campus paper, about a change in university policy regarding whether employers who recruited at campus career placement centers were allowed to discriminate against students based on “sexual preference.” As a graduate student, David was an active member of the student-led advocacy committee that persuaded their university’s Career Services Office to require employers to sign non-discrimination clauses. These clauses have now become commonplace on campuses but, decades ago, this was a groundbreaking advancement towards equal rights for students of all sexual orientations. Alongside the two decades-old news clippings was an announcement that described a diversity project on which David was participating.

Ironically, these items were held in place against a wall using a thick textbook on the fundamentals of a scientific principle that was vital to David’s research discipline. When questioned about the importance of the textbook David said, “That’s just there to keep things from falling down!” This seemed ironic because the book was a literal example of the key technical expertise that David held but, when it came to what gave him purpose, it was simply a paperweight for documents that he considered personally valuable. Buried underneath the book was a painting of a large bird, with a brightly colored orange background. The print seemed as if it might possibly be a page from an artsy calendar. David kept it on his shelf to remind himself that some of his research was “about engineers do[ing] good stuff,” like fixing environmental pollution. It was the only item of importance shown that David attributed to his identity as an engineer.

Front and center on the shelf, a small white ceramic plate with a logo sat on a plate holder. The plate was a finisher’s medal, of sorts, for having participated in a



workshop. That workshop was designed to empower women in STEM and their allies to build personal resilience and perseverance to thrive in the academic jungle where too many individuals were chewed up and spit out rather than nurtured to become successful educators and mentors for the next generation. Each of those artifacts linked to a personal identity that David held--as a gay man, an engineer, and an ally. When asked to sum up this photo, David said that this display in his office was about “reminding myself of what I’m doing [in academia] and reasons for doing it.”

*As a gay man and engineer.* During graduate school, David selectively shared his gay identity among a close circle of friends and in limited public venues. For example, he was active in a student-led gay rights advocacy group that lobbied for domestic partnership benefits and policy changes at the campus career center so that companies who explicitly discriminated against gays and lesbians could not recruit on campus. However, since this was well before the Internet existed, his advocacy was known on more of a local level among fellow campaigners and some university administrators. Then, as described in the opening of this narrative, unbeknownst to him, a campus photojournalist captured David standing beside another man alongside two women with their arms around each other and that photo was placed directly above the article title that described the fair as part of the Lesbian/Gay Pride Week events. In David’s words, “people kind of knew a little bit about [my being gay] . . . so I was out to a degree. But not so much to be in the picture [in the campus newspaper].” David was unaware that he had been photographed so he was taken aback and confused when, on the way into the engineering lab where he worked as a graduate student:

I ran into somebody who was a very conservative Christian guy, and he just started laying into me. And I didn't know what in the world it was about. And had to gather from what he was talking about, you know . . . that there was something in the paper. I've kind of blocked out some of it. It was such a traumatic day. Then I ran into somebody else who was a more friendly person, who was more giggly about it. She thought it was funny. And she may have thought it was a mistake, too. But she said, "Oh you should look at the paper. There's a really funny picture!" And I was like, "What in the world is going on?" So then I got it.

This event initiated David to the fact that, even on what was considered to be an ultra-liberal campus, "that the engineering mini-culture had very, very conservative elements to it."

After that, people would come to his office and proselytize to him on a regular basis. David felt that the newspaper article was one of the reasons that the people who interviewed him for his current faculty position halfway across the country seemed to be aware of his sexual identity, even without him mentioning the topic. During his faculty job interview, "it seemed that [individuals were] adapting their normal discourse to deal with the fact that they were dealing with a gay person." For instance, he noted that, when people were making small talk during his on-site interview, "it seemed that folks kind of danced around the issue. They didn't say, 'Are you married? Are you bringing a wife?'" which were typical questions asked of other male faculty candidates at the time. Given that these were "the Reagan years," David intuitively felt that the lack of open hostility towards him during his interview might indicate that the "campus was going to be an open and affirming place." At first, David felt that he had made a good decision by accepting the tenure-track faculty position. He was able to connect with local, off-campus LGBT groups and selectively share his gay identity with allies on campus, albeit only outside of engineering.

*Collaborators.* In the early days of his faculty career, David worried about his colleagues being “mean to him,” “rejecting him,” or “withholding or withdrawing resources” because he was gay. In some cases, he was left wondering if his experiences were related to his identity as a gay man or “if it’s just I had the misfortune of being in fields that were just really sharp elbow, knock-em, block-em kind of fields.” Over the years, he became “tired of dealing with [mean people]” and, instead, chose to collaborate with individuals who indicated that they appreciated his work and wanted to collaborate with him. Consequently, rather than spending his entire career seeking to become the world-renowned expert in one subtopic within his field, as was typically expected of tenure-track faculty members, he followed a trail of collaborative support from peers and, hence, became a technical generalist. He freely admitted that being a “generalist” was not well respected among his faculty peers. As far as his role as a researcher, David considered himself “a worker bee”--someone willing to take on many service commitments and team commitments for causes he cared about. In response, he believed that he was more likely to eventually win an award equivalent to a “lifetime achievement for best supporting actor” rather than a Fellow membership grade in his professional society based on individual achievement.

When he collaborated with others whom he knew had strong, negative opinions about his identity as a gay man, he tried to focus on the importance of the work for the benefit of students and then hoped that the positive experience would somehow change that peer’s perspective of his value as a human being. He has always believed that two people do not have to accept all aspects of each other’s identity in order to work together professionally. In David’s words:

I like to pride myself on cultivating professional relationships even with some people who I knew were kind of, definitely actually, probably working against equal rights for LGBT people. I need to maintain a working relationship, and I hope that might change their minds a little bit.

Ironically, he noted that his research collaborators tended to be some of the most conservative members of his workgroup and discipline so, “It’s kind of important for me to have working relationships with folks who, I think, just really have a religious problem with me!” Maintaining strong working relationships throughout his career has always been important because those were some of the individuals who would vote on his tenure and promotion cases. Yet the effort required to maintain professional relationships and preserve the comfort of others has left David exhausted and asking himself if it was finally time to make a change.

*Planning to break the barrier of social engagement.* After 30 years of working endlessly to maintain good working relationships by denying important aspects of his identity, David has grown tired of compartmentalizing his life. Although he and his spouse have been together for 9 years, David has never brought his spouse to a work-related event and felt that he would be scorned for doing so. Finally, only in recent years has David felt that he has had some allies among staff in engineering and has vowed that he would bring his spouse to the next work function that included families. He did not expect it to go well, however:

I kind of made myself a promise that the next faculty social event I go to where spouses are being there, then my spouse is going to be there. And, that’s not going to be fun. We’re not going to do that in hopes of that we’re all just going to have a lovely time. It’s going to be one where, um, it’ll be awkward. And we will be perceived as the ones who are causing the awkwardness.

But as one of David’s staff allies reminded him, “Something has to happen so that they [the other faculty in his department and the college] can start getting used to it. And that’s

just how it is.” David believed that, if he managed to have the courage to bring his spouse to a work event, it would be paving the way for others to do so in the future. He has also grown tired of the double standard where he was supposed to keep his non-engineering identities to himself, but his colleagues have felt free to share theirs.

*The double standard.* David felt disempowered by years of having his supposed mentors advising him to keep his gay identity to himself because it was presumably not relevant to his role as an engineering educator. He acknowledged, however, that passing and covering his sexual identity may have been necessary to survive in his career back in the late 1980s and early 1990s. He has stretched beyond his comfort zone over the years, working with the faculty senate to advocate for campus policy changes such as domestic partner benefits in the decades before marriage equality was legalized in 2015. He was always careful, however, to separate his advocacy work from his teaching. On the other hand, several of his colleagues have felt empowered to share their identities as religious conservatives both inside the classroom and out. In fact, one of David’s co-workers was the faculty advisor for a campus-based religious organization that explicitly encouraged engineering students to “decry progressive values and political correctness as the downfall of humanity.”

David shared a screen shot of an email that had been sent by this colleague to the entire roster of students for a large class in which they each taught their own sections. Another colleague, who held the role of lead instructor that year, managed the overall course. At this university, the lead instructor controlled the course and “called the shots,” so to speak. The lead instructor was typically the one who was in charge of sending out most course announcements. However, one day last fall, one of David’s co-instructors

sent out an email informing the students that he would not be able to hold his regular office hours the next day. That portion of the email did not seem unusual. However, then the co-instructor added a postscript to the email reminding the students that he was the advisor of a faith-based campus organization and that the organization was hosting two special speakers in the next week and the students were encouraged to attend. This was the portion of the email made David raise his eyebrows and shake his head. For decades, David has been mentored to cover his identities outside his role as an engineer. Practically every move he made with his students was measured to ensure that it was clearly relevant to the technical topic in which he taught. Yet here was one of his senior colleagues, a highly decorated researcher within the department, announcing to David's class members that they were encouraged to attend an event sponsored by a religious organization.

David reflected that, if he were to send out the same type of event notice on behalf of the oSTEM chapter at his institution, he believed that he would face severe backlash from colleagues. Most of his colleagues would consider the announcement irrelevant to both his class and to the field of engineering in general, even though oSTEM was a professional organization focused on supporting STEM students. These types of events made David wonder if it was time for him to stop compartmentalizing his identities. At the time of his interview, he was not quite sure whether his colleagues would be open to hearing more about his identity beyond that of an engineer and how those other aspects played a role in his experience as a faculty member.

*As a teacher and mentor.* David had a passion for teaching and for helping students to build skills needed to “prepare them for the start of their career” as

undergraduates or their “professional reputation” for graduate students. He enjoyed helping upper-division students recognize that they have made significant progress from their neophyte explorations into the topic during their introductory courses. Knowing that he has helped launch young engineers into their careers was the most fulfilling part of his job. That said, he maintained emotional distance from his students both in and out of the classroom. He believed that he “would be more spontaneous and . . . would show [him]self a little bit more if [he] wasn’t so concerned” about having to hide his sexuality.

*As someone who was out, but not publically out.* Based on years of defensiveness and paranoia about being considered unprofessional, David carried a thick layer of padding that separated him from engaging with his students or peers beyond a solely professional relationship. As one of the side effects of this concern, David had never shut the door to his office when a student was present. He still remembered, vividly, the day back in the early 1990s when a member of the student government scheduled a meeting with him and shut the door upon arrival. That action put David on edge immediately, and the rest of the interaction did nothing to help him relax. The student government was going to host a National Coming Out Day event, and the student informed David that he was going to participate. It was clear that this was a demand, not an invitation. David responded that he was already out in many ways, to the point where he felt comfortable. The student’s response was, “Not as far as I’m concerned. You’re not out enough, and you’re going to be more out!”

With trepidation, David informed both his department chair and his tenure and promotion committee that it was clear that he would have to participate in this event or face being publically outed anyway. The consolation, he believed, was that the event was

going to include “a bunch of LGBT folks and supporters, and that was it.” He had no idea that the event coordinators had invited the campus press or that the campus newspaper would write an article including names of participants. From that moment forward, David felt that he was branded and that he could no longer choose when and with whom to share his gay identity because now, “everybody knew.” As had been the case after the photo was published in his graduate school’s newspaper, once again:

Some people were, you know, suddenly just like, “Well, we were friends last week but we don’t want to know you now.” And some of it was, “Uh, well, we’re high-minded, fair-minded people, so, that’s your business. But don’t bother us with it. We’re not necessarily going to have any reprisal here; it’s just that you’re weird.”

After that second outing, no one came to David to check on how he was feeling about what happened or tell him that things would be okay. The closest thing to support he received after that event was an engineering colleague who came to him and mentioned that his son was gay but seemed to want to keep that quiet.

*As an advocate and ally.* David recognized his privilege as a White, male, full professor in engineering and he has tried to use that social capital to advocate for changes to the system that far too often has limited the upward mobility of individuals who were not White or male. In his words, “he has a bit of an obligation as an out gay person to be an ally, particularly for women” and others, “but rising to that challenge is a little stressful sometimes.” He believed that, “We’re doing a horrible, horrible job at mentoring, encouraging, and recruiting people of color in faculty ranks in [our discipline]” so it is incumbent upon all of us to improve the environment. He has spent considerable effort over the years working behind the scenes to help get an oSTEM chapter approved at his university and in earlier years was working to help get a gender



and sexuality center and academic program started. He also helped bring speakers on campus such as the empowerment coach who trained women and their allies about successfully navigating the academic system to meet their goals.

Recently, David has faced a different kind of stress regarding being a sexual minority. David agreed that the students who had been out on campus “deserve to have a community that is inclusive” and has tried to support them when they asked him to actively improve their campus environment. They looked at him and said, “You know, you’ve got a lot of privilege. You have tenure. You are a White guy. You’re cis-gender. You have a lot of things working for you that are unearned privileges. What are you doing with them?” And as the students have noted, “There aren’t many of you around, so get to it!”

This pressure has led David to be more active in supporting sexual minorities on campus. He has conducted LGBT Ally Safe Zone trainings at his institution and has recently made a public statement in his discipline’s primary professional society that the discipline needs to adopt a more inclusive environment to recruit and retain the engineers of tomorrow. Gradually, David has become more comfortable taking his advocacy to a national level. After more than three decades in engineering academia, he finally perceived that the chilly climate was warming slightly, and he was less willing to continue the compartmentalization and covering of his true self.

**Evelyn: Ask for what you want and create the environment you expect.**

Evelyn described herself as a highly educated, White, possibly bisexual, lesbian-identified female in her 50s who considered herself part of a multicultural community. She further clarified that, since she has been in a monogamous lesbian relationship for 25

years, she simply stated “lesbian” as her sexual identity unless someone asked her for more detail. She has been a mother for 3 years, raising a child from her wife’s extended family. Although she personally did not consider herself to be religious or particularly political, she explained that she held high respect for the value of religion in other people’s lives and was outspoken whenever she heard bigotry directed at people based on their religious or political affiliations. She felt lucky to be living and working in a liberal enclave of the United States but also believed that her openness and willingness to integrate her wife and daughter into recruiting and holiday activities, when appropriate, created an environment that led to greater acceptance. She wondered aloud whether the fact that several high ranking academic leaders at her institution were gay or lesbian was the reason that the university seemed so inviting or if it was because the community was so liberal that the gay and lesbian leaders were able to thrive at her institution. Either way, she believed that by presenting many aspects of her identity in a genuine, warm, and inclusive way, she demonstrated that she expected others would accept who she was in the same way that she was willing to accept who they were.

*Evelyn’s story.* Evelyn did not have immediate family members who were engineers. However, her father, mother, and stepmother all had STEM-related doctorates and spent time in both industry and academia so she had role models and experience with the lifestyle expectations of both career paths. After earning her undergraduate degree in natural science, Evelyn was not sure that she wanted to go into the field in which she had graduated. As a 20-something, Evelyn made career decisions based on the fact that she did not want to do a lot of reading and writing and did not want authority over people. For those reasons, she first worked at a wilderness camp for delinquent children and then

spent a decade as a technician in her technical specialty area. By that time, she realized that having only an undergraduate degree was limiting her career options and salary earning potential.

She returned to school to earn a graduate degree in an area that combined her undergraduate science degree with a more quantitative and applied field. As an “older” graduate student, she realized that one of her greatest joys was her ability to mentor others. Thinking back, she recognized that she had been teaching since high school. In fact, after her high school geometry teacher had to leave for medical reasons, and since most of the substitutes assigned to her class were not math teachers, she basically taught the class herself. That was the point in time that she perceived that a faculty career was maybe the right direction for her. The “clincher” was when she “discovered that she enjoyed writing grants.” Evelyn accepted a tenure-track position at her Ph.D. alma mater after graduation, which initially made her worry that she might not gain the respect of her new colleagues who were previously her faculty instructors. However, she was pleasantly surprised that she had never felt a lack of professional respect within her department. When asked what made her unique, Evelyn remained silent for at least 10 seconds. When she did speak, she responded that, “I think that I have a high ability to put myself in the other person’s shoes, especially for an engineer.”

Flashing back to her younger self who avoided reading, writing, and authority over others, Evelyn laughed and noted that, “Ironically, two decades later, the very thing I had previously hated, I now love!” At the time of the interview, she held a departmental administrative role in academic affairs and oversaw all of the department’s academic programs including the academic advisors. In addition, she managed an active research

team. Even with all of these socially oriented assignments, Evelyn considered herself an introvert. In her mind, that was another reason that she did not feel like she had close personal friendships at work. Since a typical week involved at least 50 to 60 hours of work, she did not get together with colleagues for lunches or other social events that may have been occurring. While on campus, she focused on her professional duties so that she had time in the mornings and evenings to spend with her young daughter.

Evelyn did not feel that her identities had much influence on her relationships with colleagues because, for the most part, her relationships were almost exclusively professionally focused.

We're talking about how to balance work life. I mean, [in] my mentoring circle, we do discuss personal lives but it's really a professional [relationship]. Again, to me, the two always should merge! We aren't separate people!

She explained that most of the time she and her colleagues discussed issues related to work, and even when they discussed issues based outside of work, like childcare or schooling, it was primarily for the purpose of professional mentoring rather than personal camaraderie.

*As an engineer who is a woman.* From our discussion, however, it was clear that Evelyn's identity as an engineering professor who was a woman foregrounded in her day-to-day life. To survive as such, Evelyn created what she called a "space of resistance" against the hegemonic masculinity of engineering via what she called "an old girls' network." Together, her colleagues shared experiences of sexism that they faced as faculty who were women, but "there's not that many other gay women" so she did not feel that her identity as such had that much of an impact in her day-to-day work life. She was quick to point out that she also had close colleagues who were men that she also

enjoyed meeting with and partnering on administrative assignments and that she selected service assignments where she could avoid the men who were now faculty colleagues but who had subjected her to micro-aggressions as a graduate student at her current institution. She did this “by saying ‘yes’ to many more administrative assignments than the average faculty member.” Then when necessary, she went to “colleagues and [her] chair and negotiate[d] different assignments when [her] service or teaching assignments didn’t fit [her] interests.” During member checking of her initial narrative, Evelyn noted:

My point here is that you should try to get what you want in a proactive and positive way, instead of either assuming you have no say, or demanding someone else solve the problem. We have much more power than we think if we design solutions that work for everyone.

What I had initially termed as “privilege” due to her status as a mid-career faculty member, Evelyn corrected as “self-agency.” She went on to say that, “It’s really important that we don’t act like victims. This is just my philosophy; I even mentor my students to do this. It’s an aspect of managing up.”

*As a mentor.* Evelyn believed that people should ask for what they want and feel that they need to be successful, rather than assuming that they had little or no control. Her philosophy for both students and colleagues was to:

Encourage people always to . . . make [their] own world. Be proactive. If you don’t want to get stuck doing things you don’t want to do, then go after things that you do want to do! And then use it as an excuse not to do things that you don’t want to do.

Evelyn said that she constantly reminded her students that they had personal agency and should take control of their career and life paths. Evelyn particularly enjoyed mentoring students through the research process and working with them to identify what career path might be most appropriate based on their individual interests. She felt that students,

especially underrepresented minorities, sought her out because she had earned a reputation as a good mentor.

I've found that just by being a woman in an engineering field I can make a difference--as a role model and a mentor. And, I really enjoy that. So, I identify with that, and I mentor a lot of women who are trying to make their way in STEM fields. And then, the same thing is [true] being gay. So, one of my philosophies of mentoring is that um, and I mean this not just with me as a gay woman, but I think that it's really important when mentoring students to be out so that students feel comfortable . . . not of the details in a way that they are asked to support, but they are aware of the issues that we deal with in our personal life.

This quote highlighted the silence that has pervaded engineering culture regarding social identities in general, and specifically, sexuality. Evelyn's point was that she shared her sexual minority status, not in an attempt to force students to personally support that aspect of her life, but to acknowledge that it existed and had relevance and impact on her experience as a faculty member. To act on her belief that professional and personal identities were integrated, Evelyn's wife and young daughter participated in her research group's social outings. In addition, when appropriate during mentoring contexts, Evelyn shared details of her struggles getting pregnant and seeking work-life balance throughout the years. She discussed these topics with students of all genders because she felt that many of her students were "trying to figure out how to time their life and things." She went on to say that, because she demonstrated that she was willing to talk about "the hardest part" of her life, it opened up a discursive environment with students--both male and female--that "faculty are people and their faculty have families." Her point was to help student recognize that their faculty could be resources for discussing topics other than academics, including the struggle about balancing work and family obligations.

*Office décor.* Similar to other participants, Evelyn maintained a Safe Zone poster outside her door as an indicator to students that she was willing to discuss the topic of

“queerness” and “address prejudicial words and actions in an educational manner.” One unique point that Evelyn mentioned about having gone through Safe Zone training herself was that it helped her learn more about the experiences of her transgender friends and students. In general, she felt that her college town and environment was “a very safe place to be for gay and lesbian students.” On the other hand, she felt that “the world as a whole is much more challenging for transgender students. And that’s a pretty hot topic on our campus right now.” She believed that what transgender individuals were currently encountering was similar to “things that we encountered 30 years ago coming out as gay,” and recognized that she still needed to make changes to her educational habits to be inclusive of those who did not identify as either male or female. Specifically, she mentioned that she struggled with how to change from writing the phrase his/her. She knew that “the recommended pronoun [was] ‘they,’ which I just have such a grammar issue with! I’m still struggling with my old-fashioned grammar old lady hat.” She felt that it was important to acknowledge that even as a progressive LGBT person, she was still learning.

On her cabinets, she displayed student-generated art alongside drawings made by her daughter, niece, and nephew. She also posted several thank you notes she had received from students that were appreciative of her “awesomeness” and her being “such a kind mentor.” Her bookshelf held photos of her research group alongside a photo of her and her wife at a graduate student social event and a photo of a sports team for which she was a mentor and coach to a group of mainly underprivileged girls in a nearby town. In a corner of her office sat a small conference table with a decorative glass vase filled with dried cattail plants and curly stems next to a framed journal article. At first, I assumed

that the journal article was hers, but she clarified that it was actually written by her mother and was one of the most highly cited journal articles in her mother's field, with over 10,000 citations. Her mother had gone to graduate school after raising children and had invented a method for conducting a lab test that had previously used such toxic chemicals that nobody performed the test. Her mom had recognized a problem and set out to solve it. Evelyn used that story to encourage her students to realize that sometimes an opportunity would present itself and that they could make a great contribution to their field simply by finding solutions to everyday problems. The back-story that she shared with me, but not with her students or colleagues, was that her mother eventually dropped out of industry because she could not handle the constant microaggressions that she faced as a female scientist. That part of the story was a reminder to Evelyn to deal with inequity in a way that would not destroy her soul.

**Jane: “Oh, we thought that you were just eccentric!”** Jane described herself as a White, lesbian/gay/queer Unitarian Universalist engineering professor in a highly masculinized field where fewer than 10% of her colleagues were women. Although she has been open about her sexuality to some degree throughout her 30-year academic career, at times within the workplace, she still felt that she had to hide that she was lesbian or a member of a “liberal ‘church’” (emphasis hers). She has been employed at her current Great Lakes area public university for more than two decades but previously worked in the Southwest and New England regions. As a full professor in her 60s, Jane could be considered a pioneer both because of her field of specialty and because of her rank among the 7.5% of female full professors in engineering within the United States.



Jane's gender expression and wardrobe have tended toward the masculine and that has led some students to assume that she was "eccentric." For example, Jane has worn a tie everyday for several decades. The practice began because of a sexist or, at best, oblivious decree by the dean of engineering at an institution where she once worked. That dean visited what he considered peer institutions that had higher rankings than his own, and when he returned, he mandated a change from the casual dress code in place for years to a more business formal one where "all faculty members should wear ties." The point of the new dress code was for their college to increase its prestige among its peers. At the time, Jane was the only woman on the engineering faculty. To emphasize the gender assumption surrounding this decree, Jane began wearing ties to work, just as her counterparts did. In turn, her colleagues began to present her with ties as presents. Now, decades later, Jane has several hundred ties. From her perspective, the ties have become a big part of her identity, "but it also relates to [her] profession because it does say something that if you make up a stupid regulation that it's going to get mocked." Her appearance and personal traits have occasionally led to what Jane considered to be unfair job performance ratings and unsolicited fashion advice.

For years, Jane has received bimodal teaching reviews, and she believed that it was based on "who she is" rather than how she taught. The ratings split occurred most often when she taught large courses that included many students who did not really want to be there but had to enroll because the course was required or when she taught outside her specialty area. Although she admitted that there have been times when she has done a poor job of teaching, she believed that she was discriminated against because she was a woman and because, even though she was not out in the classroom, she dressed in a

“typically masculine fashion” and “some people just don’t like [her].” She believed that the reason for the dislike was that they perceived that she was gay or simply not feminine enough. Jane’s fashion decisions have also led to unsolicited fashion advice. Two years ago, one of Jane’s graduate student employees was a former model. One day the student came to her and said, “Professor, you need to dress in a more feminine manner and I think that you would look fine in a skirt if you wore a skirt below your knee.” Jane has not yet taken that advice.

*Jane’s story.* Jane was a top student in her undergraduate major and her family included several male role models who earned doctoral degrees and became faculty members. However, she still had to be convinced to go to graduate school because her primary motivation as an undergraduate was to graduate and get a job so that she could be financially independent. She also lacked confidence that she was good enough to attend a top engineering graduate school. Through what she described as “a circuitous route of building up confidence,” she eventually ended up enrolled in a top engineering graduate school, where she faced blatant sexism and sexual harassment including inappropriate and repeated requests to engage in romantic relationships with fellow students and her advisor.

Jane framed her career in terms of seeking to climb the ladder of professional prestige while simultaneously running from what she perceived to be negative work situations. She was a frequent target of sexual harassment, even when her harassers were fully aware of her identity as a lesbian. Although she was the top student in her graduate program, she did not receive tenure-track job offers from the prestigious institutions that hired her male classmates. At least one of her lesser-performing male classmates was

offered a job at an institution in their discipline where he has been able to spend the duration of his career. Jane would have strongly preferred that situation to the disjointed route where she had to move three or four times. Ironically, at the time of her interview, she was a colleague of the individual who graduated behind her with lower test scores. She estimated that “he makes \$50,000 to \$60,000 a year more than I do.” Jane described her professional path as “going low, going higher, going higher,” in order to get where she was--a full professor in a top-ranked engineering program. Jane felt that her being female was a significant reason why she had “to jump through institutions to get to the top program in the country” when her male colleagues did not. As one of the first females in her academic program at her graduate institution, she also received frequent unwanted attention based on her gender.

*As an engineer who is as a woman.* Similar to her male graduate student classmates, Jane spent long hours over many months working on experiments that were to be incorporated into her dissertation. During that time, she felt that her professional relationship with her research advisor grew stronger. Therefore, initially Jane did not think anything of it when he invited her to dinner. Then her advisor suggested, “If you want to finish your dissertation, why don’t you come with me to my place in the Bahamas where you can work on it and I will help you with that.” That set off alarm bells in Jane’s head and she recognized that the offer was more than platonic. On the advice of someone whom she considered a trusted mentor, she reported the harassment to the Office of the President and was then subjected to “an appalling situation where [she] had to publically confront her advisor” about the sexual harassment. At the time, he denied her claims.

She rushed to finish her dissertation in order to get away from the school. One day she was summoned to her department chair's office where he spent 45 minutes screaming at her. It was not until later that she was informed that her meeting with the department chair had supposedly been an interview for the open assistant professor position within her department. Shortly before graduation, her advisor asked her to stay on as a post-doc because the man who was being hired as the new assistant professor "wasn't as good [as she was]" and was going to need help setting up his research laboratory. She perceived the offer was made in an attempt to make amends for the blatant sexual harassment that she had reported. Therefore, she politely declined and, instead, took a research faculty position in a gay-friendly city where she felt that her personal life could thrive.

Jane enjoyed her job as a researcher at a prestigious research institute. She was aware that it was not the tenure-track job that she dreamed of, but she felt that her research group was working on worthwhile endeavors so she made the best of it. A few years after settling into that position in New England, she received a call from a faculty member at Wild West University (WWU, a pseudonym) asking her to interview for a position there. She ascribed that offer to being a woman in a time when affirmative action hiring was a priority for academic programs. Based on both her opinion and what she was sometimes explicitly told by recruiters, she was being sought out for tenure-track positions simply because she was a woman with a Ph.D. in engineering, not because of her particular qualifications for the jobs for which she was being recruited. Her immediate response to the individual who asked her to go to WWU and interview for a job was, "Hell no, I'll never move there. That's backwards from where I am now." Yet, he persisted by calling her nearly every day and eventually convinced her not only to

send him her resume but also to come visit the campus. He even offered to pay for a free vacation on the West Coast if she would “swing by his institution on the way home.” Clearly, this was not the typical recruiting process; at least not the process for tenure-track candidates today.

Jane maintained a physically active lifestyle while living in New England. She would run to and from work on a daily basis but tried to choose routes where she could run down the middle of the street as opposed to on sidewalks with adjoining alleys where someone could hide and potentially accost her. Even after taking what she considered reasonable safety precautions, she still fell prey to a guy’s indecent exposure while she was talking on a pay phone and, in a separate incident, being groped while running to work one morning. Shortly after the second incident, Jane decided it was time to take the offer from WWU. She simply packed her belongings, asked her girlfriend to move and live with her, and drove west with her girlfriend. She did not negotiate a start up package or investigate the laboratory resources at WWU before arriving on campus. That proved to be a mistake because the institution did not have a robust laboratory setup that would be needed to help Jane establish the type of research program necessary to eventually earn tenure. Trying to make the best of a bad situation, Jane started making plans to use the sparse equipment at WWU, but the lab manager said, “No, you can’t have a key [to the lab] because having a woman in the lab would distract the male students.” She immediately went to the department chair for advice and assistance and, instead, he propositioned her and told her that he would not help her obtain access to the department’s lab. Welcome to the Wild West, indeed!

*As a pioneer.* Since Jane and her girlfriend had just moved halfway across the country for her new job at WWU, she refused to be deterred by not being allowed access to the lab. Jane recognized that she needed to figure out how to get the lab manager on her side. She approached one of her students, who knew the lab manager well and whom she knew was Mormon from their conversations. She engaged the student by explaining how she had also been brought up in the Mormon faith and that her family was well known in the Mormon Church because her uncles had joined Joseph Smith, the religion's founder, on a trek. That helped Jane bond with her student. In turn, the student told her that the lab manager was devoutly religious and had daughters who were home schooled. Jane had a theory that "no matter how they acted, guys who had daughters would help you." She brought a Bible into work and asked the lab manager to come to her office.

Upon the lab manager's arrival, Jane asked him to help her with "a great spiritual dilemma." She pointed to a passage in the Bible that discussed "using your gifts from God" and then to another verse that indicated "a woman is supposed to marry and be obedient to her husband." Then she asked the lab manager how she could reconcile those scriptures. She said that she "never met the right guy for me, so I can't marry and do this. Yet, I'm supposed to be serving God by using my gifts." She went on to say that she believed that her engineering skills were a gift that she should be using to serve God. The lab manager immediately recognized her dilemma of not being able to serve God in her role as an obedient wife and asked if there was any way that he could help. Her response was simple. She said, "I need a key to the lab so I can use my academic gifts to serve God until such time as I find the right man and can marry." Not only did the lab manager tell

her that he would have a key cut for her the next day, but he told her that he “wanted her to tell him if any of the students gave me any issues.”

This story demonstrated how Jane used both her identity as a descendant of a pioneer family in the Mormon Church and as a pioneer, of sorts, who headed out west to find a better life. The pioneer image fit well with one of the photographs that Jane shared during her interview. She and two other women colleagues attended a national conference together when, on a whim, Jane suggested that they stop at a photo booth they saw and have their picture taken. The photograph was one of those old time black-and-white portraits of the three women wearing saloon dresses, as if they were bar wenches in the Wild West. The looks on their faces showed that they were not to be trifled with. One woman was standing, holding a rifle over her shoulder, leaning back against the bar rail. Another woman, Jane, was seated next to her staring directly into the camera lens. The third woman, on the far right in the photo, was sitting cross-legged on the bar top. In the years since the photo was taken, Jane and her fellow photo subjects have “analyzed [the photo] to death.” They believed that the photo accurately portrayed how some of their colleagues viewed them in the early years, as something pretty to look at and maybe someone to sleep with, but not equals or true engineers. Coincidentally, one of those women in the photo with Jane was the trusted mentor who suggested that she report her graduate advisor’s sexual advances.

*As a woman who identified as a lesbian.* Jane’s sexual identity and gender wove throughout her discussions of life experiences working in academia. Throughout the years it was never quite clear to Jane whether her co-workers knew her sexual identity, but several times it was either actively ignored by colleagues or used against her. For

example, somewhat early in her career, one of Jane's married colleagues invited her and her girlfriend over to dinner at their house. Shortly thereafter, he confessed that he was madly in love with her and wanted her to bear his child because his wife was infertile. Jane declined his advances, repeatedly, and eventually added a baseball bat to the sparse décor of her office. The baseball bat was intended for physical protection, if necessary, because she and her colleague spent many late nights in their respective laboratories and she worried that his verbal pleading might eventually lead to an attempt at physically overpowering her. Months passed and he continued to pressure her for sex. She warned him that she would call his wife if he did not stop. He persisted for several more months, so Jane finally called his house and told his wife, "I just wanted you to know that for the last six months your husband has made passes at me." His wife's response was, "You're lying," and she hung up. Realizing that she had no other choice, Jane finally reported her colleague to a special assistant to the university president. This was the second time she had to report sexual harassment to a staff member in the respective university president's office in her short career, and both times, it resulted in her leaving her institution. The university president's assistant interviewed both Jane and her colleague and, in the end, stated that her colleague denied making inappropriate sexual advances toward her but "promised to never do it again." Jane pointed out that "again" was the operative word in that statement.

Jane's experiences with sexism and heterosexism have continued throughout her career. At her current institution, some of her colleagues tried to use her sexual identity against her to undermine her professional reputation. Before Jane was vocally open about her sexual identity, she worked closely and productively with a male colleague who



began every lab meeting with a Christian prayer. Based on that, she assumed that he followed most Christian Church's teachings that homosexuality was wrong, and she did not want to jeopardize their relationship by discussing her life outside of work. She successfully maintained that separation until people in their department asked him, "Do you know she's a lesbian?" Then this colleague "came to [her] and said, 'People said horrible things, and they're so horrible that I won't even repeat to you what they said! And I know you don't believe in even having sex before marriage.'" At the time, Jane believed that "this was the most terrible thing anyone could have done to her" professionally and she believed that it was a blatant attempt to undermine her professional credibility with this individual. In that case, she did not come out to the colleague and they continued to work together until he left for another institution.

Years later, after she was more open with most people at work about her sexual identity, she faced a second opportunity to be true to herself or to cover her sexual identity. The second example that she shared was another case where she was working alongside a devoutly religious man, this time with a post-doctoral fellow who was Muslim and who had traveled literally halfway around the world and left his family temporarily to work with her. This man was relaying a story to Jane that his wife was unhappy with him because he had not brought "her and her family" a gift when they started working together, and it was tradition in his culture to thank individuals who provide you with opportunities. He said he "was sure that you are married, and have children, and [my wife is] really mad at me because I have no idea." Once again she "had to decide, 'Am I coming out to him or not? He's the only guy I'm not out to.'" This time, however, the incident coincided with her impending marriage to her partner. She "had not

wanted to bring it up so I wasn't out to him. I was absolutely out to everyone else, but I didn't want the best collaboration where I was respected more than [by] anybody, ever, to be clouded by something stupid." She took a chance and told him that she was "getting married this summer, to a woman." His immediate response was, "This is an abomination to God." Then they went on to have a long discussion, and in the end, this man ended up purchasing personal gifts for both Jane and her soon-to-be wife. She and her post-doc went on to produce more publications in the 9 months that he worked in her lab than in any year prior to or since that time.

*As a mentor.* Jane rarely received mentoring during her career, and believed that "she wasn't doing the things that were really important" for tenure and promotion because no one explained the criteria or checked on her professional progress. Therefore, she recognized the importance of mentoring her own students so that they were aware of their various options in industry and academia. However, Jane did not describe herself as a mentor during our discussion. Rather, she said that she "interferes with where I think they ought to go, and what kind of jobs they ought to get." She shared a touching story about one of her favorite students, Mark, which demonstrated her student-centered approach to mentoring. Mark was an undergraduate student who sought work in Jane's lab as a freshman even though it was not in his declared major. He was a tall, quiet, muscular kid from the rural South with a strong military background who seemed to emanate "difference" somehow, but Jane never could put her finger on the source of that difference. One day, Mark asked Jane for a letter of recommendation so that he could transfer to another university. This puzzled Jane because Mark seemed to be thriving at their current institution, at least in her laboratory. When she inquired why he wanted to

leave, he said that he was not happy at the school because “everyone is anti-military, and now we have this speech policy and so I can’t say things I want to say.” Jane pressed him on these points and stated that several of her faculty colleagues had military connections so maybe he should change majors into her department. Mark then responded that it was actually the school’s new speech policy that bothered him.

In an example of Jane’s self-described “typical oblivious engineer” identity, she responded, “What speech policy?” Mark went on to describe that the school had recently instituted a no-tolerance policy for hate speech and that meant, at times, he could not say things that he wanted to say when describing people. Jane pushed him further, to his obvious discomfort, but Mark finally blurted out that he was no longer supposed to say things like “faggot.” Jane was slightly surprised at this admission, especially since she had invited all of her research students to her “lesbian wedding celebration” the previous semester. However, without skipping a beat, Jane explained that the anti-bullying policies that were being put into place nationwide were intended to improve the academic environment for LGBT students. She also told Mark that he could say “faggot or dyke or whatever he wanted” and if absolutely anybody gave him a problem, he should come back to her and she would deal with the person. She also encouraged Mark to find a wider variety of friends so that he could engage with others who supported his own intersectional identities as a conservative, pro-military, Republican, engineer. She mentioned that the schools where Mark had indicated he wanted to transfer to were significantly more liberal than their current institution. In the end, Jane wrote him a glowing recommendation letter and Mark left.

A few weeks into the next semester, Mark called from his new school and said that he wanted to return and asked her if he could have his job back in her lab. She noted that his last research project had ended but immediately agreed that she would find him a new research topic. When Mark returned, he seemed more open to interacting with diverse individuals. In the midst of an increase in anti-immigrant activities on campus, Mark befriended a hijab-wearing Muslim immigrant student and walked her to the bus stop everyday “so she felt safe.” Jane considered this experience one of her most career- and identity-affirming. Jane suggested to Mark that it was okay to hang out with one group of friends who supported certain aspects of his identity and a separate group of friends to meet his other needs. By being able to discuss her spectrum of identities with Mark, including that she was gay, and helping him recognize his own array of identities, she was able to support his development in a way that she believed would serve him well throughout his life and career.

*Advisor to the Out in Science, Technology, Engineering, and Mathematics chapter.* Jane was also instrumental in bringing oSTEM to her campus and served as the inaugural faculty advisor. She also proudly mentioned that there have been times when she has perceived that queer students have enrolled in her courses even though they were not in her major. She believed that was because they recognized her from the oSTEM student group.

*Office décor.* Over the years, Jane collected many items that symbolized her personal and professional identities. She stated that her office and lab were practically overrun with memorabilia that she called “a horrendous collection of junk,” yet she proudly shared with me explanations and photos of many of the items. One of the photos

that Jane shared during her interview showed a tapestry with an Asian motif, a movie poster for a cult classic film about the social implications of technology, two award plaques, and a large whiteboard filled with formulas, diagrams, and lists of student names and their research assignments.

All of those items were in stark visual contrast to the white painted cinderblock walls that formed her windowless basement office. The tapestry was from a trip that Jane took to Asia shortly after a major natural disaster. She went to study the disaster's impacts on nearby communities in its immediate aftermath. She used the tapestry as a reminder that she was willing to go when her colleagues were "afraid to go there" because they felt the area was not safe. Jane used the wall hanging as a reminder that she was daring and that her role as an engineer was to help people at times when they were most vulnerable, not just when situations were safe. The plaque hanging between the tapestry and the framed movie poster was a national award presented to an outstanding young researcher in her specialty, named after the discipline's founder. Jane was the first woman to win the award, 30 years after its inception. The poster that hung between the two award plaques was a daily reminder to Jane that tied back into the theme that sometimes you need to tackle challenges that make you uncomfortable, even when it would be easier to hide from the proverbial storm happening outside and just wait until things calmed down. The impression that I got from our interaction was that Jane rarely, if ever, hid from a storm. From how she described her career to date, it appeared that she preferred to tackle issues head on whenever possible. The award that hung to the right of the movie poster was a prestigious, lifetime achievement award for women who have worked in Jane's discipline but who might not be eligible or who have been overlooked

for the professional society's other awards. Jane believed that she had been precluded from becoming a Fellow of her national professional society due to her history of whistle blowing when she saw or experienced discrimination or harassment within her disciplinary field.

Switching focus from her unique wall coverings to her standard office furnishings, Jane's whiteboard measured at least 4 feet tall by 6 feet wide. It was filled with information typical of other faculty members. On the left side of the board, there was a long list of undergraduate students who were researching various topics in her lab. Her winter coat hanging on a coat rack directly in front of the board mostly obscured this list, but it appeared that she had at least 12 to 15 names listed. In the center, there were diagrams of experimental setups that demonstrated how students should assemble lab equipment and graphic representations to accompany differential equations. The right portion of the board was outside the frame of the photograph, but it was obvious that there were two sections of information on that side. Collectively, these items represented Jane's various roles within her profession including researcher, advisor and mentor, trailblazer, and risk taker.

**Nick: "You can use my real name. I don't care."** Nick described himself as an outdoorsy, married, middle-class, white gay male who grew up in the Midwest and liked to cook. He was a junior faculty trailblazer, hired to develop a new joint program between engineering and another college on his urban campus that served a high number of low-socioeconomic status (SES) students. Approximately 10% of the students on campus were over 30 years of age, which led to him being misidentified occasionally as a student rather than a faculty member. He worked in an area of the Southwest that

embraced “a cultural value of ‘I have my space and you have yours.’” Unlike some of the other participants, Nick entered his workplace completely open with his departmental colleagues about his sexual identity because it was important that his then-partner (now husband) find a job locally and be eligible for benefits through the university if necessary.

*Nick’s story.* Nick earned his undergraduate degree at a teaching focused institution. Due to a “bad teaming experience in a design class,” he did not particularly enjoy the design aspects of engineering and shied away from further study of, or professional work in, design. Hence, he considered switching out of engineering and into teaching middle school science. After completing a summer internship as a counselor with a science camp for high achieving kids, he recognized that he wanted to be able to teach more advanced topics than what he had learned in his undergraduate engineering curriculum, so he decided to enroll in graduate school. As a prospective graduate student with a passion for teaching, he applied to institutions where he could combine his engineering degree with the potential of earning a teaching credential. His only other major caveat was that the program had to be in a different geographic region than where he earned his Bachelor of Science (BS) degree. He had grown up near where he completed his undergraduate degree and he “wanted out.”

After earning his BS degree in an engineering field that included a high percentage of women compared to other engineering majors, he started a Ph.D. program in the same degree area. It took him several years to recognize that he did not enjoy the highly competitive environment that surrounded the particular program he had entered. At the same time, he was also “struggling” to come to terms with his sexuality. After 3.5

years, he left his initial Ph.D. program with an Master of Science (MS) and switched into a program that better fit his personality and desired level of mentoring. The peers in his new program were supportive of him both personally and professionally, and it was in that new multidisciplinary Ph.D. program that he realized he also loved research. He was one of the first two graduates of the multidisciplinary program.

Upon graduation, he and his then-partner/now husband had to decide between three job offers. During his academic job interviews, Nick asked two separate individuals about job opportunities for his partner, both because his partner would need a job wherever they moved and so that his sexuality would be a known aspect of his identity with his would-be colleagues. Nick received offers for two different types of positions in different locations across the United States and his partner received a job offer in his professional field outside academia that was in a separate location from either of Nick's offers. They jointly decided that Nick's offer for a tenure-track faculty position at a doctoral institution would be the best fit for them as a family unit, even though it potentially meant a career delay for his partner. In the end, his partner found a job in their new location within a week of their moving. Nick was grateful to his partner for his willingness to "put my career before his. Which, I still very much appreciate to this day." Nick mentioned that their relationship was initially long-distance, with his partner completing graduate school in one state and him in another state when they started dating. Nick's partner was judged harshly for moving to be with Nick as he finished his degree rather than seeking a job after completing his own graduate degree. Their subsequent decision to choose Nick's tenure-track engineering position over his partner's job in industry led to much less negative judgment among their social and professional



circles. Nick specifically pointed out the heteronormativity of that reaction because it was usually the man who was taking the engineering faculty position and the woman who was expected to be the trailing spouse willing to further delay her own career. Both Nick and his husband have felt welcome in their new setting.

In addition to teaching engineering design courses, which we both noted seemed ironic given his previously stated dislike of the topic during his own education, Nick taught courses hosted by the other college where he has held a joint appointment. It was outside of engineering that he was most keenly aware of his identity as a young, White male. The contrast was stark between the demographics of his engineering students and colleagues, who were mostly male, and his students and colleagues in the other college who were almost exclusively female and older. He recently realized that, although he had honed his skills when it came to memorizing the names of his male students in engineering, he had yet to master that skill when it came to learning the names of his female students in classes where they were the majority. For some reason, he had yet to translate that skill across genders. He was also keenly aware that all of his classes included a major gender disparity and some of his students may be gender non-conforming. Therefore, he used the phrase “y’all” to be “gender inclusive” in his classroom. Students called him out on the Southern vernacular but he believed that saying “you guys” was not welcoming to his female students or those who may have been transgender or gender non-conforming.

Nick’s colleagues have considered him the “go to guy” for all things related to LGBTQ demographics within the studies of diverse engineering students and for the a specific theoretical perspective in which he earned his Ph.D. He bristled a bit at that

identity, “because I don’t know that I identify myself as the [specific] theory guy, but that’s how others have of expressing me that I have a strong grasp on [one specific] theory.” He noted that he felt isolated when he realized that he was the only gay male working on a large research project; at least the only openly gay male as far as he knew. He was quick to mention that most of the time his colleagues did not ask him to speak for “the whole gay experience,” but they considered him the expert because he had at least considered the experiences of LGBTQ individuals within engineering whereas most of them had not.

One of the photos that Nick shared with me during the interview showed a pile of books that were on a shelf nearest to the door of his office. In his words, he did not have “traditional engineering” books in his office. Instead, that particular stack with its prominent location included books on topics including queer theory, gender theory, grounded theory, and LGBTQ issues in education. The books served double duty as both a way to identify one aspect of Nick’s personal identity and clearly indicated that one focus of his research was on the experiences of LGBTQ students. Nick also carefully incorporated his focus on student development and equity into his classroom.

From a teaching standpoint, Nick worked to ensure that the undergraduate students had a solid understanding of not only technical aspects of what it meant to be an engineer but that they recognized the importance of professionalism in all that they did. Since he taught a class of about 750 first-year students, the format did not lend itself to developing close personal relationships with individual students. He was also intentional about maintaining a professional separation so that the first-year students learned how to “function within the academy.” He explained functioning as training the students to

recognize an appropriate way “to interact with faculty members who care a whole lot more when it comes to, ‘You did not address me as Doctor in the email, so, delete.’” For that large first-year class, he felt that there should be a clear separation between his professional identity and his personal identity. With his graduate students, that separation was practically non-existent. He invited his research students to his home where they worked and celebrated along with his husband. Nick endeavored to not only learn the names of his graduate students’ significant others, but also about their hobbies and their pets’ names. He did that so at times when he felt that they needed mentoring to step away from their school work and take a breath, he could make personal suggestions about them going to do something leisurely that they enjoyed.

*Office décor.* Nick prominently displayed photos of his professional accomplishments alongside photos of his family and hobbies, providing each equal space on the windowsill in his office. The first photograph he shared during our interview was of him at his Ph.D. graduation in his doctoral robes and eight-sided tam standing beside three fellow doctoral students in their own graduation gowns. A wide grin and pride of accomplishment glowed on each face. The photo next to that was of him and his husband at the summit of an 11,000-foot peak, which Nick described as “basically just a hike.” The sky was blue and there were wispy white clouds on the horizon. In the background and well below them was a barren hill above tree line, showing the literal heights these two men have climbed together. Each man was wearing a jacket and sunglasses to protect him from the bright sun and chill common on mountaintops. Nick’s husband had his hand on Nick’s shoulder, and both had tooth-baring smiles on their faces. The final picture in the row was of Nick, his husband, and another person, with their arms around each

other's shoulders, standing in front of tall wooden barrels that towered about the threesome. Once again, each individual wore a smile that clearly demonstrated the camaraderie of the experience. At another point in the interview, Nick mentioned that some of his friends and colleagues shared interests around "good food and good drink" and, from the setting of that last photograph, I inferred that this photograph documented one of those times when the threesome were bonding over "good drink." An interesting perception that I had was that these photographs were ambiguous. Someone who did not realize that the individual in two of the three photographs was Nick's husband would simply see two close friends sharing various adventures. This was another instance where Nick had the privilege of turning his diversity on and off. Depending on the level of separation he wanted to maintain, he could choose whether or not to explain whom he was with. From these pictures, few people would immediately notice or consider the fact that these two men were in a romantic relationship. Yet, if one of the subjects in the photos was female, everyone would assume that it was Nick's significant other. This demonstrated another example of heterosexism in our everyday environment.

*Research producer.* The focus of the next photo that Nick shared was a zoomed out version of that same windowsill. This time, the focus was on the windows themselves, all of which were covered with rows of sticky notes and text drawn directly on the window with markers. Nick explained that this was his "publication pipeline." It was where he posted his "ideas for proposals, papers, [and] that kind of stuff." Of all the photos that Nick shared, this one clearly placed him in the role of tenure-track faculty member. It was a stark visual reminder that he was constantly seeking funding and publications to demonstrate his value to his university before the tenure clock strikes

midnight and he has to defend his body of work to a multidisciplinary group of individuals who he believes do not know exactly what he does.

*Ally.* The final photo that Nick shared was that of his ally sign, a simple pink triangle with the word “Ally” below. The LGBTQ Ally or Safe Zone signage was one of the recurring themes among the participant’s photos. His sign used to hang adjacent to his name on the faculty directory of those who shared the office suite. Nick returned from a conference recently and found that the sign must have fallen off or was taken down and, whoever replaced it, moved it from its initial position to its current position centered above the names of all of the suitemates. When he returned to his office, he considered replacing it in its former location but,

I was kind of like, “Well if you are going to assume that all these people are allies and they are okay with it, then I’m just going to let it run a little bit.” But I’m the only person that I’m aware of in this entire building of [more than] 100 individuals that have an ally sign out where it’s visible, anywhere.

Nick’s placement of the ally sign was somewhat of a bold move because, in his mind, it labeled all of his suitemates as allies even though, to that point, none of those individuals had actively demonstrated allyship by posting their own signs in or near their offices.

**Phyllis: Always inhabiting the spaces in between.** Phyllis identified as a White, female, queer bisexual, progressive who was upper-middle class. She noted that she continually had to deny aspects of her identity in her academic work environment. In her words, “everything except whiteness and upper middle class gets left behind.” Being a woman was “tolerated as long as she does not point out sexist attitudes or behaviors among colleagues or try to change policies or cultures accordingly.” Discussions or displays of sexuality, religion, and politics were all unwelcomed in her place of work. She often made a point of bringing both her bisexual and female identities into the

workplace, and this created discomfort or friction. She often resisted the ways in which she was “allowed” to express her identities. For example, overt identity statements such as “I am bi[sexual]” were not welcome, whereas subtly mentioning a same-sex partner might be acceptable with some colleagues. Discussing queer-themed campus events was not welcomed among her peers. Within Phyllis’ department, the [assumed binary] gender distribution was nearly equal. She described her university community as a diverse and welcoming bubble surrounded by a low socioeconomic status, rural, Republican, “deeply racist” environment where public services were limited and political views were downright “cruel” to those most in need.

*Phyllis’ story.* Phyllis has spent her career as an academic and social boundary spanner. Professionally, she sought out positions where she could push the envelope of what engineering as a discipline should include, how it should be taught, and by corollary, what it meant to be an engineer. Her goal has been to expand the narrow perception that engineers should simply focus on solving technical challenges without recognizing that every “problem” includes a social and political back story and perspective, and every “solution” should explicitly recognize that how an engineer was trained would inevitably shape the solution that the person proposed. An adage that demonstrated this perspective was Maslow’s paraphrased statement that, “If all you have is a hammer, everything looks like a nail.” In other words, in her opinion, engineers who were trained using perspectives that encouraged them to believe that finding and using the right equation would lead to identifying a singular solution that served all clients fairly and appropriately. She believed that those engineers would not have the skills to deal with the messy world where inequitable distribution of wealth and social capital lead

to the most vulnerable members of society being excluded from the benefits of modern technology. Phyllis has received both accolades and scathing public feedback on her opinions, teaching style, and research topics throughout her career, in part, due to the facts that she was always pushing the envelope of what engineers were supposed to be taught and that she was completely open about her identities, including her bisexuality.

Even as an undergraduate student Phyllis recognized that she did not fit within disciplinary or social silos. She selected her undergraduate engineering major because she “wanted to work on [fixing] environmental problems,” not recognizing that there might have been a different major that was more directly related to that professional goal. Like most engineering programs at the time, the institution she attended was “really male dominated . . . and there was all kinds of hostility going on there on the basis of gender. And I rejected that.” Her faculty members were not outright hostile to her, but they did not seem to know “what to do with the women [in engineering] . . . they would mentor the [male students] . . . and open doors for them to go to grad school and all this stuff. And the women were just kind of . . . along for the ride.” Recognizing that she was never going to have a female faculty member within her discipline, she sought out a female research mentor whose research focused directly on what interested Phyllis. To find a mentor, Phyllis had to look not only outside her degree but also outside the field of engineering. That collaboration led her to seek out a graduate program with a combined focus on engineering and social science.

On the personal side, Phyllis has been active in the queer community starting as an undergraduate. Her primary connection at the time was through the initiatives of a campus Christian organization, which seemed counter-intuitive to her. The organization

focused on social justice and was at the forefront of supporting gay and lesbian rights on campus. Yet, even there, she faced experiences of not quite fitting in because she identified as bisexual. Repeatedly, she was identified as a “lesbian activist” in a newspaper, even when she clearly stated, “As a bi[sexual] woman . . . .” When one article was published and her quote was changed to, “As a lesbian . . . .,” she called the newspaper office and asked why they changed how she had described herself. To her, it seemed like “nobody understood” why it mattered that they got it wrong. But to Phyllis, it mattered immensely because, by making what some people considered a small change or mistake, Phyllis’ true identity was being made invisible.

As was the case with other participants, Phyllis purposively selected potential institutions where she wanted to start her faculty career with her identity as a sexual minority and non-traditional engineer in mind. She held “this kind of passion to start something new” and looked for an institution that offered that possibility along with the possibility to work closely with students because that “has always been one of my favorite things.” She started her career in a place where she “went in thinking it was going to be an absolute mecca for me.” She had known others who lived in the area, and the school had a reputation for being more queer-friendly than most, “so I just assumed that it would be a friendly place.” The environment at Small College (a pseudonym) seemed to support innovation in teaching engineering and social justice, both of which were passions for Phyllis. Upon closer inspection, however, the school administration was not quite as progressive or supportive as it seemed. For example, Phyllis became aware of a senior faculty member in the Women’s Studies program on campus who insisted to her students that bisexuality did not exist. As a bisexual person who was



actively working for greater diversity and inclusion at the school, this was appalling to Phyllis. It was as if she had stepped back in time more than a decade to when the reporter quoted her as saying that she was a lesbian, not a bisexual, and then not understanding why Phyllis was angry that the reporter had misstated her self-described identity. The issue was that she felt that others were trying to erase her identity as a bisexual.

When Small College added sexual identity to its non-discrimination clause and initiated domestic partner benefits, it was hailed as a victory for the rights of gay and lesbian faculty and staff. However, the domestic partner benefit was enacted exclusively for same gender domestic partners. At the time, Phyllis had a male partner to whom she was not married and that led to some unexpected challenges. While she could not be fired for acknowledging that she was bisexual, she also could not obtain benefits for her male partner under the domestic partner benefit policy. This became clear to her when Phyllis applied to get her partner a school identification card so that he could use the campus library. On the request form, she indicated that her partner was male. She was stunned when the human resource office called to clarify her partner's gender. When she indicated that, yes, he was indeed male as she had noted on the form, she was told that he was not eligible for partner benefits because he was not of the same gender so the policy did not apply to them. Eventually she protested to the Provost, who allowed an exception to the rule so that her partner could get an identification card and use the library. Nevertheless, Phyllis wondered how it would have turned out if her partner had needed to obtain health insurance or wanted to utilize some other benefit that would have cost the institution money. Phyllis explained that, "As a bi person, it's so arbitrary because to me, my partner's gender is kind of just a random happenstance of life," so it was odd to her

that a university would create a seemingly progressive work-life policy that, in reality, discriminated against unmarried opposite gender partners.

*Interaction with colleagues.* Phyllis was also unpleasantly surprised when her faculty colleagues failed to recognize her relationship with her male partner. Whereas her colleagues “went out of their way to invite” the [new lesbian couple who joined the department] to dinner . . . and support them,” Phyllis felt that her relationship with her male partner was “invisible” because they were not invited to couples’ events hosted by other faculty members in Phyllis’ department. Phyllis shared her two potential hypotheses about this situation with one extreme being that the situation was due to benign neglect or, on the other extreme, that it was intentionally meant as harmful or exclusionary. First, it might have been that her colleagues simply “didn’t like [her]” and, therefore, did not invite her or her partner to social events. She understood that some individuals bonded more closely than others on a personal level and that was just a fact. If that were the case, it would not have bothered her quite as much. The second option, which, at the time she felt was more likely, was that “it had a lot to do with kind of a discomfort with my personal life, right? It’s sort of like, ‘Why aren’t you married?,’ ‘What’s that about?,’ and also, ‘Why aren’t you having kids?’” Phyllis felt that some of her colleagues believed that “being bi[sexual] is an incomplete lesbian, or you’re a kind of a traitor, or you haven’t really sorted it out yet, or there’s something wrong with you.” To her, the situation seemed to be a result of the heteronormative environment of engineering. Whereas colleagues had come to terms with her being queer, which in their minds meant lesbian, when she joined in a relationship with a male partner, yet refused to follow the

typical heteronormative path of getting married and having children, it was threatening and reason for exclusion.

*Engineering climate change.* Luckily, as was the case with David, Phyllis has noted a significant shift in the engineering environment within the past 5 to 7 years. Before that time, it was commonplace to hear homophobic comments or jokes at professional conferences or see exclusionary behaviors toward the few LGBTQ organizations that exhibited alongside other professional engineering organizations. To Phyllis, it seemed like engineering academia was 20 years behind the social trend within the United States of acknowledging and accepting human diversity. When she started in her faculty career in the early 2000s, no one in engineering talked about sexual identity. No one she knew was out, at least not as publically as she was. Yet over the years, she came to know of several other engineering faculty members who were gay or lesbian. For various reasons, those others did not feel the need or desire to “take on one more risk” and share their sexual identities publically. Phyllis’ perspectives of their reasons included their fear of the loss of respect, concern about losing out on academic leadership roles, or their intersectional identities that meant that they were already fighting battles because they did not fit the stereotype of being a White male from a middle-class background. Phyllis noted that they would speak of their same gender partners in private conversations, but would never speak up in a public forum or consider being nominated for a national award recognizing their accomplishments from an LGBTQ organization.

It has only been within the past few years that Phyllis has worked at a doctoral institution. She made the switch so that she could further her research agenda and work with students who wanted to work specifically on her current research focus rather than

the disciplinary, more traditional research focus she had maintained previously. While that required her to move to a more traditionally conservative area of the country, she found that her new colleagues and administrators were “collegial and supportive” in a way that many others had not been at her previously, assumed-to-be queer-friendly institution. Nevertheless, she still found herself having to explain to someone how she could consider herself queer and yet have a male partner. When she started dating her current partner, one of her colleagues asked her, “Explain to me again. You’re still bi[sexual], but you’re dating a man? But you still think of yourself as queer or did you change identity?” The answer to the question of whether she had changed her identity was a definitive no. These interactions made Phyllis recognize that there was still much work to be done within engineering academia to make it a more welcoming space. At her new university, although she was well-versed in discussing gender and sexual equality prior to her arrival, Phyllis went out of her way to complete the campus’ Safe Zone Ally training so that she could earn the placard and sticker to post on her office door. At her university, the poster went so far as listing areas in which subjects within the larger Safe Zone suite of topics in which you have specialized training.

*No office to hold décor.* Phyllis was in the midst of changing offices and institutions at the time she interviewed so she did not submit any photographs to discuss during her interview. However, she shared details of items that had been displayed in her offices throughout her time as an engineering faculty member. For instance, she always had a Safe Zone poster visible. She also had a small rainbow ribbon tacked to her bulletin board behind her desk. She said that she would “pull it out for [National] Coming Out Day and wear it,” but the rest of the time it was just there as a reminder to herself and her

students who visited that she supported LGBTQ rights. When asked if she maintained any sort of religious displays in her office to honor her decades of work with a Christian church, she laughed and stated that, “No! No religious symbols at all. And in fact . . . I’m more able to bring the queer part of myself into engineering than the religious part. . . . I really don’t ever bring that up!” She went on to say that she did not discuss religion because “that’s more about not wanting to offend other people. And feeling like I’d be judged or something.” She was raised by a “traditional set of parents” that trained her that “you don’t [discuss] religion, sex, or politics in [public]. And you know, I pretty much go with that.” However, she made it clear that discussing her sexual identity was not the same as discussing sex or politics, which was why she would discuss her bisexuality. She knew that some people considered that political, but she worked hard to not alienate other people by discussing “electoral politics.” For the most part, she attributed the lack of family photos or other items in her office to simple disorganization. She has moved twice in the past 5 year, and, during that time, decorating her office has never been high on the list of things that she had to do.

### **Notes from My Research Journal**

During my dissertation journey, I maintained a research journal to document my thoughts and reactions to both my participants’ stories and several relevant events that I attended to further immerse myself in the study of self-identity. I found myself comparing my experiences with my faculty participants, who ranged in age from 15 years younger than me to 15 years older. It was clear to me that I shared many, but not all, of the personal and career stresses as those I interviewed, which made sense to me because we were all engineers working in engineering academia.

**Not to be included in publically posted photographs.** One of the most gut wrenching moments for me during this process was the realization that when I attended the oSTEM conference, some of the attendees had colored dots on their nametags. I did not think much of it at first but, during the opening session, the organization's president pointed out that the dots meant that the individual did not want to be included in any publically available photographs. Therefore, he asked the attendees to be cognizant before posting conference photos to social media. The fact that people were uncomfortable being photographed at a professional conference both broke my heart and made me angry. After all, how many other student-centered or professional engineering organizations had to make arrangements so that their participants were not photographed because the result could be the loss of employment, familial support, or lead to harassment? I could not think of any. That announcement led me to think back to when I was the age of many of those undergraduates. I recognized that I would never have had the courage to attend such a conference in the first place. Or, if by some miracle I mustered the courage to attend, I most definitely would have been one of the attendees with the "do not photograph" colored dots on my nametag. Like the times when David was unknowingly photographed and identified by name in campus newspapers, I vividly recalled attending my first on-campus gay rights rally and the next day discovering that the photograph in the paper had been taken from over my shoulder. I looked back and wondered what my life would have been like today if that photographer had captured me in that shot.

**It takes time to heal.** Another instance that left me distraught during the interview process was when Alex choked up at the memory of being called "faggot"

more than a decade ago. I was speaking with an outwardly confident, gregarious, highly intelligent man and in an instant I saw through who he was during our interview to the “nerdy, quiet, faggot that people made fun of” when he was in high school. Like Alex, I was a nerd throughout school and was certainly the butt of jokes and target of bullying during grade school. No one would ever have accused me of being quiet though! Over the decades, the pain has faded and I have become less concerned about what others think of me. I can only hope that, as additional years separate Alex from those painful experiences, he will also allow them to cause him less emotional stress. The fact that Alex would not come out to his parents until he was financially independent was another comment that resonated with me. Although my parents never indicated that they would have disowned me or loved me less if I were gay, it was, nevertheless, one of the hardest things that I have ever done to tell them that I had a girlfriend. The fear of their response was unbearable and, when my mom cried at my admission and told me not to tell my father, it cut me to the quick. She was the one who I expected to take it well, or easy. Instead, it was my father who replied, “I thought that you were trying to tell me that months ago!”

**The double-edged sword of bisexuality.** At a lecture where New York Times columnist Charles Blow discussed his recently released memoir, several of his statements resonated with me. Many of his statements were practically repeated verbatim by Phyllis during her interview. As bisexuals, the gender of our partner was not a primary consideration. It was about falling in love with the person somewhat irrelevant of the physical packaging. In Phyllis’ case, she was shocked to learn that the progressive policies in place at her institution actually discriminated against her when she had a male

partner in ways that they would not have discriminated against her if she had a female partner at the time. As someone who utilized the domestic partner benefits at my institution, I had not considered the inequity of the policy that made domestic partner benefits available only to same gender partners. I was too busy being grateful that my unemployed partner could be added as a dependent on my insurance policy.

**Honoring the participants' comfort level.** During member checking, I found myself getting frustrated when one of the participants wanted me to change individual words "so as to be less identifying." While I greatly appreciated the participant's willingness to provide feedback on multiple drafts of his biography, I found myself wanting him to allow me to keep the galvanizing and gut-wrenching words that I initially wrote but that he requested I temper. Although the participant said that the initial word that I used was accurate, he "wouldn't want to put that in writing." On the other end of the spectrum, two of my participants indicated that they did not care if I used their actual names. They were each at a stage in life that they were perfectly comfortable being disclosed as academics that identified as sexual minorities. Since I had written in my review board application that I would use pseudonyms for all participants, I was unable to honor their requests. These extremes reminded me of the importance of ethical research and the importance of trying to place oneself in the lived experience of others.

### **Shared Themes**

To be eligible for this study, individuals had to identify as sexual minorities and be employed as engineering faculty members. However, the questions that shaped the anonymous survey and interviews were intended to encourage a much broader definition of the participants' self-identities and highlight how varying identities were more or less



salient at times throughout their careers. Many of these identities were initially identified in response to a question on the participants' survey. During data collection, several reoccurring themes appeared.

**Sexism, heterosexism, and hegemonic masculinity.** All participants who interviewed noted prominent experiences with sexism, heterosexism, and/or hegemonic masculinity during their careers. Gender clearly set the initial boundary conditions for interview participants and several of those who completed the anonymous survey. In other words, female-identified engineering faculty members managed their identity threats from a different starting place than male-identified engineering faculty. As Phyllis said, "Femaleness, sexuality, religion, politics are all unwelcome in my place of work. . . . Being a woman is tolerated as long as I don't point out sexist attitudes or behaviors among colleagues, or try to change policies or cultures accordingly." David mentioned his role as an ally for women more than once. Although he felt unable to always vocalize his concerns about the heterosexism he faced, he repeatedly and publicly worked to diffuse sexism in his presence. He explained:

I don't like going to dinners where anyone is drinking, where they are having wine, because a lot of times what I've learned is that people have two glasses of wine and they lose their manners. And so they are having wine, and they start telling jokes. And it wanders into misogynistic jokes and homophobic jokes. And I'm doing what I can, which wasn't very effective at all, just to not . . . to obviously not laugh, but also to try to redirect or something like that. But, um, it still happens. And I'm, I'm just amazed that it still happens, but it does.

At least for a time, David felt empowered enough to try to steer his colleagues away from what he deemed inappropriate conversation during social events. However, he noted that his attempts to redirect the conversation were not particularly effective and so his long-term response has been to avoid social functions affiliated with work. Instead, especially when time conflicts have arisen such as with a recent awards ceremony at the university,

David has actively chosen to attend activities and events with his friends rather than his co-workers.

**Work-life balance.** Another added challenge for engineering faculty members was work-life balance. Several participants noted the difficulty involved in meeting the expectations of their jobs while maintaining a satisfactory life outside the university.

Alex quipped that “work can become your life” and noted the importance of the fact that his partner also worked in the same college so he understood the workload required for faculty there. Alex also recognized that he had significantly more flexibility and financial benefits in his job as a faculty member than did his partner who was administrative staff. The relatively high initial salary he received as a faculty member and perquisites such as housing down payment assistance benefitted them as a couple when it came time to purchase a home in the extremely expensive housing market where their university was located. “Um, but the work-life balance is something that I’ve really had to work on the last two years. I’ve gotten to a good place. It’s better. But I just need to keep learning to say no.” Evelyn’s identity as a wife and mother of a young child led her to re-evaluate her work-life balance. She became more vigilant about ensuring that her job duties did not occupy more than 50 hours per week so that she could spend time with her daughter every morning and evening because she was not available to pick her up from school. Evelyn considered time to be the greatest stressor in her job due to her need to balance mid-level career expectations along with her roles as a mother and wife, plus her chores at home.

The extra burden of housework was a topic of discussion during one session of Jane’s female faculty support group. One day, after gushing for 20 minutes over a new

mother's arrival at the meeting, the group returned their focus to the topic of how to manage chores at home. Colleagues were saying, "Oh, I use this maid service, and that's helpful, blah, blah, blah." When it was Jane's turn to speak, she proudly announced, "My house chores have now been cut, *exactly*, almost to the hour, in half!" Intrigued, her colleagues asked how she managed to do that, and she replied, "I got married to a woman!" At this point of the interview, Jane broke away from the story to set the stage for the importance of her honest and blunt statement. She shared just how important it was for her, in her late 50s to "be married for the first time when [she] *never* thought it would *ever* happen."

Her marriage was the tipping point for her to be completely out to her colleagues, because marriage equality had been a topic of discussion in the group previously and several participants had shared their opposition to marriage equality by noting their support of gay marriage ban legislation in their state. She knew that her statement would make some of her colleagues uncomfortable, but she simply did not care anymore. She "decided [at that moment] that [she] was going to be totally out." Immediately the group fell silent into "a stunned silence. It wasn't, 'Congratulations, 'Oh wow!' or 'This is a major life event!'" as had been the responses moments before when the new mother entered the room. There was simply stunned silence.

Jane used the metaphor of the proverbial "elephant in the room" to describe what happened. She wondered if it was a pink elephant was because her colleagues were uncomfortable with her open statement about her sexuality. She felt that, in turn, could have made them realize that their heteronormative expectations of society were leading to a gendered career impediment for the rest of them. Alternatively, she wondered if the

awkwardness was also about the revelation that the husbands of those faculty members failed to take on an equal share of the housework. A third option, in Jane's mind, was that "it was a 'goddamn lavender elephant' because she was 'flashing back to graffiti in the women's room at [her graduate institution].' In one of the stalls was inscribed, 'The world doesn't need any more femmes. We need more real women!'" She went on to say that other faculty members within her current the college had told her that the women faculty members in her department were "the most femininely dressed in the university." In other words, they were femmes--engineers who dared highlight the fact that they were women.

**The expectation of excellence and its consequences on faculty identity.** One key identity threat, and potentially the one that trumped all others, was the expectation that every tenure-track engineering faculty member would be excellent. In engineering departments at doctoral research institutions, the rating of excellence typically required for tenure and promotion usually hinged on meeting grant funding expectations and quotas for number of publications in highly ranked research journals within one's field. Four of the six interviewed participants touched on the implications of this quest for excellence this during their narratives.

According to Alex, he was "knocking it out of the park" with regards to the amount of grant funding he has attained in his first 3 years. In fact, his sponsored project funding totals have surpassed the stated goals for individuals who were seeking promotion to full professor and he has not even hit his 3-year reappointment milestone yet. Reappointment was the first required step to be evaluated for promotion to associate professor with tenure. But this extramural funding success had come at a price. He

believed that some of his more senior colleagues sought out collaborations in order to take his ideas and develop research agendas without him in order to revitalize their own research performance. Alex described himself as, by nature, collegial. During his 3 years of employment, he has gone out of his way to try to collaborate with his immediate workgroup colleagues, all of whom were already full professors. However, he met with limited success in response to his attempts at research partnership. Of the approximately 45 grants he has submitted in his brief career, only 1 was with a member of his immediate workgroup. And that single collaboration ended in a negative situation with his colleague using their joint work as a jumping off point for new research that did not include Alex. During our interview, Alex indicated that he knew this situation had nothing to do with him personally or his sexual orientation, but he felt that this incident was one of the defining experiences that could eventually lead him to leave his current institution. Subsequently he avoided any collaboration with that member of his small workgroup and retreated back to what he called his island. He noted that he was “trying to . . . have some sort of tie to the mainland there . . . but he [the colleague] forced me to cut that off quickly.” Instead, Alex collaborated with other junior faculty members in the broader department, with faculty outside the college, or worked alone.

David was at the opposite end of the research excellence and tenure spectrum, but faced similar stress and strains related to his research. Although he maintained sufficient performance to rise to the rank of full professor at his institution, he believed that his colleagues and others in his field viewed him as more of a “worker bee. Someone who, you know plods along and gets important things done. You know, very respectable, but . . . by no means a star.” He partially attributed his middle-of-the-road performance to his

lack of self-confidence. Rather than being able to pour his effort into his research, he spent his career “needing to cope in the anti-LGBT environment” where “survival kind of trumped everything else.”

David’s research agenda meandered through the years, as he sought to collaborate with individuals who were not openly hostile. He was not sure if colleagues were hostile to him because they “didn’t like a gay person involved or if it’s just [that] I had the misfortune of being in fields that were just really sharp-elbow, knock-em, block-em kind of fields.” This quote demonstrated one of the most challenging features of maintaining an intersectional identity that includes being a sexual minority. People never knew if a situation was being driven by their sexual minority status, but that concern could lead to that one particular identity becoming all consuming and performance limiting (Steele, 2010). In response to what David considered “really harsh” and “unfair” reviews of his journal articles, he repeatedly sought new areas of research where people were not “so mean.” That repeated led him to engage in research areas where individuals noted a desire to collaborate with him. He described himself as a “pushover” for people who wanted to collaborate. He would think, “Hey, somebody wants to [work with me]. . . . Somebody likes me!” That inevitably led to a change in research direction, at least for a time. Over the years, that meandering research path led David to being a generalist within his interdisciplinary network rather than a superstar who created a field of his own. He felt that it was “presumptuous of him to assume that he could have been excellent” but openly lamented that he wished he could be a better role model for his gay students so that they could realize that it was possible to excel in the field and be gay.

Similar to David, Jane described how she responded in the face of the overarching stress of not meeting expectations for lifetime research performance. Even with 25 years as a full professor, she did not “have a million dollars in grants [like] my colleagues do.” In fact, her college’s administrators recently threatened to take away her lab but support from her department chair has kept that from happening. Jane wondered if, in part, the support from her department chair was in response to her comment that, if she no longer had the capacity to do research because she had no lab space, she might write a tell-all autobiography about her experiences with current and past colleagues and that could be awkward for her university.

Jane carried the load of a small portion of a large research center. Unlike her peers who had the funds to hire one or two graduate students, Jane managed her research portfolio by hiring 12 to 15 undergraduate students who were less expensive but could only complete smaller-scale projects. This increased her student management workload substantially compared to her peers who only had one or two more highly trained individuals to conduct the work. However, it provided Jane with an unintended, but what she considered to be a positive consequence of having the opportunity to mentor younger students who were still seeking their career and life paths. She relished the role of mentoring students since she felt like her career was hindered by a lack of mentoring.

**Value and importance of good mentoring for both faculty and students.** All six interviewees discussed various facets of mentoring--whether that involved being mentored personally as a student or by colleagues, the satisfaction gained from mentoring students who were seeking their paths in life and careers, or the negative effects of lacking personal mentorship throughout their careers. Alex had excellent mentors

throughout his education and early career, and almost all of them were women. He recognized how unique that was because his specialty area did not include many women, yet, both in his professional internship and academic research pursuits, it was women who pushed him to excel and encouraged him to persist through the difficult times he faced. He did not believe that he intentionally sought out women mentors but then stated, “it was just something that [he] naturally gravitated [to].” He credited his Ph.D. advisor with keeping him from dropping out of academia once he earned his degree. As Alex said,

Everybody in their [*sic*] Ph.D. [program] gets a little beaten down a little bit because it’s a lot of work. And you’re kind of done with academia. And I went through a little spell where I didn’t want to be in academia anymore. And my advisor, just one day, she looked at me and she was like, “You’re going to really regret it if you step out. Because you’re going to be great.” So, I thought, “Okay, so I’ll give it a shot!”

Alex’s Ph.D. advisor saw his potential for greatness as a future faculty member and, based on his early professional performance, she was right. Alex has since become acutely aware of the lack of mentoring available to him in his current all-male workgroup. Although one of his colleagues was assigned as his official mentor at the time he was hired, that individual did not provide the same kind of support that previous mentors had. Alex was looking forward to the impending addition of a female junior faculty member within his group and recognized that he was already mentoring her during her interview.

Evelyn worked to provide the same support to her students that Alex experienced as a graduate student. When asked what she enjoyed most about her role as an engineering faculty member, Evelyn noted that her favorite thing to do was to mentor students through the research process. She “found that being a faculty member, is a way,



just by being a woman in an engineering field, [that] I can make a difference! As a role model and a mentor.” She chose to mentor many women who were trying to make their way in STEM fields, whether or not those students were officially in her research group or even within her department. Some students sought her because they wanted a female mentor; others sought her because they wanted a gay mentor and they knew her from her role as the faculty advisor to the oSTEM group on campus. Still others sought her because of her openness to discuss the challenges of having both a family and a career. Evelyn recognized that students of all genders needed support for all aspects of their identity and was willing to do what she could to provide that support.

Jane considered the founder of her disciplinary field as a mentor, even though the two never met. She researched the life history of that woman and discovered many similarities between them that she then used as motivation to continue her work in the way that she felt was most appropriate. For instance, she took on assignments that her colleagues considered potentially hazardous, such as researching in post-disaster zones. She also tried to never let her gender limit what she could accomplish, even when men stood in her way, both literally and figuratively. Jane noted that the lack of ongoing mentoring throughout her career had, at times, led her to focus her efforts in areas that were not highly valued in the tenure and promotion process. As a way to support other women in her field so that they did not make the same missteps as she had, Jane has actively recruited other women into her departments at various institutions. In addition, she has supported their rise into administrative roles possibly to make up for the fact that she, herself, was denied official recognition of her administrative roles on several occasions throughout her career.

When it came to mentoring students, Jane worried that she was too pushy about “interfering with where she thinks they ought to go.” She noted that some of her students did not seem to like her while they were students but, after a few years in industry, they returned to tell her that they finally understood what she had been trying to do, which was prepare them for industry. The story about her student Mark, shared earlier, best demonstrated how far Jane was willing to go to mentor her students. As a reminder, Mark was the student who felt that the school’s speech policy was infringing on his right to use derogatory names for gay individuals. Rather than withdraw from the student because of his stated opinions, Jane explained the anti-bullying goal of the policy but encouraged Mark to feel free to express himself openly around her. By opening a critical discourse with Mark that built upon their existing mentoring relationship, Jane was able to incorporate various aspects of her identity into the discussion in ways that may have positively impacted one of her favorite students. When Mark returned from his brief foray into attending another university, Jane noticed that his demeanor had changed and he was more open to engaging with peers who seemed less like him.

In stark contrast to the positive mentoring experiences detailed above, David’s story demonstrated how so-called mentoring could actually lead to negative outcomes for mentees. His perception of the mentoring advice that he has received over the years was, “You need to cover. You need to make sure that you don’t make anybody else uncomfortable with your being gay. And if they do feel uncomfortable, it’s your fault because you didn’t cover well enough.” David asked others if they believed that he was interpreting the advice as intended and “other people say that is consistent with what they thought these people (his supposed mentors) were saying.” In this manner, individuals

who seemed to be providing David with tips to navigate his career within the academic environment in which he worked were actually undermining his confidence about his ability to succeed and simultaneously be true to himself. In response, David has been hesitant to develop any type of relationships with his students outside the classroom, which, in turn, has limited his capacity to be a mentor in the manner described by the other participants. Instead, he supported students through his advocacy for changes in campus policies and recognition of official LGBT groups like oSTEM.

**Importance of the Out in Science, Technology, Engineering, and Mathematics (oSTEM) student group.** Four of six individuals interviewed were either the initiator or faculty advisor of the oSTEM group at their university. According to the organization's website (Out in Science, Technology, Engineering, and Mathematics, 2017), oSTEM grew out of an IBM-sponsored event at the Human Rights Campaign Headquarters in Washington, DC, where students discussed the needs of LGBTA students at their own institutions and devised how to create a sustainable organization that could support and serve STEM students nationwide. "Started as a single chapter in 2005," oSTEM has become "a national society dedicated to educating and fostering leadership for LGBTQA communities in the STEM fields . . . built by students, for students" (Out in Science, Technology, Engineering, and Mathematics, 2017, para. 1). According to Cortland Russell, the organization's new president as of 2017, there are now more than 60 chapters across the United States (personal communication, May 1, 2017). As a national 501c(3) organization, oSTEM now holds legitimacy alongside other organizations that support diversity in science and mathematics including the Society of Women Engineering (SWE), the Society of Hispanic Professional Engineers (SHPE), the

National Society of Black Engineers (NSBE), and the American Indian Science and Engineering Society (AISES). Each of those organizations was explicitly mentioned as potential collaborators in the ASEE Engineering Dean's Council Diversity Initiative (American Society of Engineering Education Deans Council, 2015). That legitimacy is important for faculty members who wish to include their participation as faculty advisors as part of their professional service.

Organizational legitimacy was important to David. He refused to participate in a precursor organization to oSTEM at his institution because the students did not want to affiliate as an official student group so that they did not have to follow the university's restrictive rules. That made David uncomfortable. His refusal, in turn, led to "chilly treatment, at best, from the few out LGBT younger folks there were [in his department] because they seemed to believe that he was not doing enough to support them." However, in David's words, he was "paranoid about anybody saying that he did anything unprofessional" and he also "thought that it was leading with the chin a little bit [to use queer in the group's name] . . . when we were dealing with an engineering culture that was barely dealing with the word 'gay.'" He used that experience as the push he needed to advocate for oSTEM that, at the time was a new, nationally recognized organization that he believed his college's administration would consider supporting publicly.

Evelyn noted that one of the ways that her faculty position fit with her identities was that she could be a role model and a mentor simply because of her intersecting identities as a lesbian engineering faculty member. Since recently becoming the faculty advisor of her campus oSTEM chapter, she has become an invited speaker at various

diversity conferences and other campus events that, in turn, has provided her with a stronger link between the various aspects of her identity and her role as a faculty member.

At one point in her career, Jane changed the focus of her service efforts from female faculty in general to oSTEM because she felt that she was more likely to be able to make a difference in that area. Jane shared, “I decided that is what I care about and screw all this straight women crap! That [gender discrimination in engineering] is the kind of stuff that I can’t do anything about it.”

Alex only discovered that there were other sexual minority faculty members in his college when he participated as a speaker on an oSTEM panel discussion hosted by the student group that he advised. Before that night, he thought that he was the only gay faculty member in his entire college. His response to learning that there were others was, “Oh my gosh! They’re my people!” This revelation demonstrated how the presence of an oSTEM chapter was not only beneficial to students but could be helpful to faculty too.

**Social and geographic location mattered.** While listening to my participants, it became clear that both the individual’s social capital and geographic locations/settings mattered tremendously to their experiences as individuals who constantly negotiated the perceptions of their myriad of identities. Four of the six interviewees (Alex, David, Evelyn, and Nick) had spent their entire careers at a single institution, over timeframes ranging from 3 to nearly 30 years. Therefore, their coping mechanisms and responses to identity threats and contingencies, situations that a person had to deal with solely because of a particular identity that person held, were different from those of Jane, who has spent her career “running until [she] realized that everything was the same” and Phyllis. Identities that were supposed to be hidden tended to become all encompassing. The

foreground and all-encompassing identity that Alex felt through the years changed as he progressed through his education in different geographic locations within the United States. As an undergraduate at the local university near his home in the southern United States, his sexual minority status trumped the identity threat of being a smart, first-generation, low SES college student. At his undergraduate alma mater, he was surrounded by other White males who came from lower income families so that was not something that he had to expend energy working to conceal. Luckily, Alex connected with a supportive group during his mandatory freshman orientation sessions. Those students indicated that it was okay for him to adopt a different persona than the one he had brought to school with him, which was a quiet, reserved, kid who lacked self-confidence and tried to deny his sexuality. By surrounding himself with supportive fellow students, Alex gained the confidence needed to blossom into a leader who was comfortable with his varied identities. That confidence, combined with his continued academic excellence, led him to the decision to attend graduate school, “because only the cream of the crop from undergraduate gets to go to graduate school!” This statement came from a young man whose parents did not even attend college.

All of a sudden, Alex was able to channel his identity as an excellent student and recognize that he could continue his education and quest to be exceptional within his family. But he was not able to make a clean break from his low-SES identity. After being accepted to every graduate school to which he applied, including his aspirational school, Alex’s lack of funding limited his ability to follow his dream. Instead of expatriating to the West Coast, Alex packed up his bags and enrolled at his “safety school” which allowed him to move further from home to a more cosmopolitan urban area but kept him

limited in the geographic region where sexual identity was a key contingency to be managed. While seeking funding for his graduate work, Alex connected with a female mentor who both funded him and encouraged him to apply for the National Science Foundation's Graduate Research Fellowship. That prestigious and geographically transferrable award funded students to attend graduate school anywhere they had been accepted. Alex tearfully gushed that, "it was a life changing moment when I got that notification that I won that fellowship. And it was my ticket to [my dream school]!" Not only did the fellowship allow him to attend one of the most prestigious engineering schools in the United States but also it opened the opportunity that he could return to either his undergraduate or master's alma mater as a faculty member in the future if he chose to do so. It also provided him the opportunity to openly discuss his sexuality and describe how that made him different from other applicants and how attending Dream University (a pseudonym) would help him to be a role model for others like him.

The geographic move did more than change his socially constructed environment; it allowed him to change the focus of his primary identity contingency. At Dream University, it mattered less that he was gay. He felt that everybody was supportive of LGBT rights and everyone seemed liberal minded. In fact, Alex said that, "It was almost reverse culture shock to me . . . it was almost to the point that I wasn't specially really, because it was like, 'Okay, well that's just another attribute of what makes you, *you*.'" All of a sudden, Alex flashed back to being the low-SES kid from the South who had somehow snuck into a school filled with brilliant people. So now, he needed to "not be the stupid gay one. I need to be, like, the smart gay one!" This was an example of how changing physical geographies changed the primary challenges that he faced both

internally and externally. From this point forward in his life and career, and because the only university that offered him a faculty position also happened to be located in what was considered a bastion of liberalness, Alex was able to focus primarily on meeting the same performance bar of excellence that other faculty members must achieve from the social perch of a privileged, White male.

David, on the other hand, had to deal with the primary identity threat of potential repercussions due to his being gay since before his faculty career began. David was in college in the 1980s, when AIDS was first being diagnosed and spreading rapidly among the gay male population. He felt that the political environment was such that if you were gay but maintained a quiet presence or silence rather than engaging in civil disobedience and public outrage against the lack of a coordinated political and medical effort to find a cure for AIDS, you were considered a threat to the gay community and you should be outed (forced out of the closet involuntarily and publically identified as gay). David had carefully managed his public gay identity until that fateful moment when he was unintentionally photographed at a campus Gay Pride event and that photo was included in the university newspaper. In an instant, David went from being a “somewhat out” supporter of gay-friendly campus initiatives to being the gay engineer on campus. From that “traumatic day” forward, David spent significant daily energy attempting to manage his public image: foregrounding his identity as a faculty member and back grounding what he considered to be an ever-present, but rarely spoken, specter that he was a “weirdo” or “abnormal” because he was gay.

Part of the reason for the hypersensitivity to his image management was that his mentors repeatedly told him that he needed to cover the fact that he was gay because it



made people uncomfortable and, if people were uncomfortable around him, it was clearly his fault for not covering well enough. That advice has limited David in his interactions with students and constantly worries that anything he did might be construed as inappropriate. He felt intentionally excluded from maintaining a social relationship with his peers because they did not invite him when they socialized together. His fellow faculty was also careful never to ask him personal questions. Again, since his sexuality seemed to be the elephant in the room, it remained at the top of David's list of concerns. Since he has remained at the same institution, David has not been able to escape his long-term identity contingencies. He has neither physically relocated (expatriated) from his midwestern locale nor has he been able to significantly alter his network of collaborators to the degree necessary to pass as heterosexual because of two high profile incidents of being outed in local newspapers both before arriving on his current campus and once while employed there.

Jane's sexuality has almost always held a secondary role to her gender. As an individual who has faced several significant instances of sexual harassment throughout her career, it has seemed almost irrelevant that she identified as a lesbian. Her harassers were fully aware of her sexuality and yet they persisted, in some cases for years. At various times throughout her career, she believed that she was fully in the closet, or fully out of the closet, or somewhere in between. She has moved around the country trying to escape "negative situations" but, because the negativity she faced was directly tied to her gender, she has not been able to escape. Throughout her career she downplayed her gender by wearing masculine-looking attire but then faced the double bind that all

women in masculine disciplines face--being judged on her physical appearance more than her academic substance.

### **Answering the Qualitative Research Questions**

#### **Research Question 1c**

Q1c How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities perceive that their identities influence their relationships with their professional colleagues?

The majority of participants maintained a collegial, yet primarily professional, relationship with their colleagues and personal interactions with those colleagues occasionally led to awkward moments. During our discussions, both Phyllis and Nick noted that they explicitly mentioned their partners when they discussed their activities outside of work. One of Phyllis' colleagues recently asked her to explain if she still considered herself bisexual and queer now that she had a male partner. The colleague, who identified as lesbian, was genuinely confused about whether Phyllis had changed her identity now that she was romantically involved with a man. To her colleague, it did not make sense that a woman could consider herself queer yet be engaged to be married to a man. However, that was not the only thing that seemed to confuse Phyllis' colleagues. Phyllis also described a time when she took her partner to a social event with academic colleagues outside of engineering, and those individuals could not "fathom" that her partner was not an academic and did not have a bachelor's degree. The assumption seemed to be that an academic, such as Phyllis, would only date another academic. Phyllis' point was that people hold assumptions about more than just a person's sexual identity.

Nick also described somewhat awkward interactions with his colleagues regarding his husband's presence or absence at events. Nick was upfront about his relationship status while interviewing for his current position and frequently brought his husband to departmental events. On one occasion when his husband could not attend an event due to conflicting a work schedule, Nick was repeatedly questioned if something was wrong or if he felt uncomfortable bringing his husband to the event. Rather than accept the simple explanation of a time conflict, his colleague asked, "Did you not feel comfortable bringing your husband? Why isn't he here? Are you uncomfortable?" Another time, Nick explicitly requested that his husband attend a board meeting where he was scheduled to give a presentation "because there will be at least one person that I can start to shake their brain a little bit [and make them realize that] there are individuals within colleges of engineering who are gay!" At that meeting, one of his colleagues turned to him and said, "Oh, you brought your student!" Nick's response was, "No, I brought my husband."

For the other participants, colleagues rarely, if ever, asked the status of the participants' spouses or partners. Jane's colleagues have gone silent and then quickly changed the conversation immediately after the few times that she has mentioned her wife. David was clear that his colleagues never asked and he never voluntarily mentioned his spouse to his colleagues. This was a clear side effect of decades of his being advised to cover the fact that he is gay. Alex said that his senior colleagues in his immediate workgroup "don't ask a lot of questions" so they know little about his personal life. On the other hand, the other junior faculty members in the department "know way more [about my life] and we hang out. We're friends. But my immediate workgroup, it's

purely professional.” Three of the six participants acknowledged that it was not always clear why they did not have closer relationships with some of their colleagues, acknowledging that it could be simply that people with certain personalities get along better than others. However, those same participants felt that it was at least a reasonable assumption that their sexual identity had something to do with the awkward relationships with some colleagues.

Overall, most participants indicated that their relationships with their colleagues varied based on a variety of factors. None mentioned that they had particularly close relationships with any of their workgroup colleagues, but with the exception of David, none felt that their colleagues harbored personal negativity towards them based on their sexual minority identity. As summarized in the literature review sections that described the continuing lack of diversity in engineering, engineers who identify as women have always had to deal with extra challenges regarding managing their relationships with colleagues. These participants were no different in that regard, it was just that with certain colleagues, they also had to expend energy to manage their social identities as sexual minorities. The participants who were men, on the other hand, recognized that they held unearned privilege of identifying with the normative gender, within their profession and demonstrated a willingness to expend energy and social capital by engaging their colleagues in discussions regarding the importance of making the engineering culture more welcoming to diverse individuals.

### **Research Question 1d**

- Q1d How do full-time, tenure-track engineering faculty members who self-identify as sexual minorities perceive that their identities influence their relationships with their students?

**Inside the classroom.** None of the study participants stated that they explicitly incorporated their sexual minority status into discussions within their classes. However, in his opinion, Alex offered hints to his status. He did that by incorporating discussions of pop culture, which he called his attempt to be “a little hip” while making it clear that he was an expert on the topic he was presenting. In his mind, he felt that most engineering faculty, especially those who identified as heterosexual men, were unlikely to show an interest in the specific cultural topics that he discussed. Those topics included the debate regarding the dress shown on the internet being blue and black or white and gold and the activities of Khloë and Kim Kardashian. He also occasionally incorporated random photos of a drag queen or other pop icon making a silly face to accompany a question in this middle of his PowerPoint presentations.

Phyllis noted that “working with students has always been one of her favorite things” about her job. Early in her career, she came out publically in an article and her students responded by telling her that they already knew that she was queer “based on her pronoun usage” in class. She had always worked to use inclusive language, calling people “they” and using the word “partner” irrelevant of the gender mix of the couple. That was apparently enough for some students to recognize her as a sexual minority, or at least make that assumption. Phyllis went on to say that, “At some point . . . I came to see pretty quickly that it mattered that I was out. You know? And it might not have mattered before that, but it definitely mattered once I was in the classroom getting up in front of them.” Phyllis did not explicitly discuss her sexual identity in the classroom but it was known, nonetheless, and several students told her how appreciative they were that she was out.

Participants did explicitly incorporate aspects of their other identities within the classroom. Evelyn explained that she intentionally incorporated her identities as a mentor and advocate for diversity within her field. She worked tirelessly to add diverse voices into her students' reading assignments, although during a discussion with a colleague about her efforts she realized that if she did not actively mention the diverse scientists and engineers who conducted the research that her students were unlikely to figure that out on their own. That was because undergraduates did not typically research the authors listed on their reading assignments.

**Outside the classroom.** Some, but not all of the participants tried to incorporate their identities, including their sexual minority identity, into their interactions with students outside of the classroom when appropriate. For example, Evelyn invited her wife and daughter to attend occasional social events with her research group. In addition, Evelyn referred to her experiences as a wife and as someone who desperately wanted to have a child but who could not get pregnant as talking points with her students, men and women, when she described how she personally managed her work-life balance. Nick frequently invited his research group students to his house where they would interact with his husband and learn more about what he liked to do when he was not at work. Jane, who had spent most of her career hiding her sexual identity, invited everyone who worked in her lab to attend her "lesbian wedding." As mentioned in his narrative, David attempted to maintain a purely professional relationship with his students at all times. However, outside the classroom, he did try to demonstrate that he was a caring individual who was willing to mentor students and was an LGBTQ ally. He felt that since there were no LGBTQ ally stickers or other gay affirming symbols in the entire building where

he worked, that he would post them in his office. The main activity where the participants shared their minority status with students was by advising the campus oSTEM groups. Although none of the participants provided much detail regarding oSTEM activities, it was clear that the venue allowed both the faculty and the students to share their sexual minority status as an understood baseline, relieving the stress surrounding whether or not to disclose that aspect of their identities.

Overall, the study participants indicated that they maintained positive relationships with most students, and felt strongly about the importance of mentoring those students. They believed that they had insights that could help their students in both their future careers and personal lives, and were willing to share those insights on a proactive basis--whether or not the students were seeking the advice at the time.

### **Conclusions**

Participants in this study worked as engineering faculty in public doctoral institutions across the mainland United States and ranged in age from their early 30s to their early 60s. Two of the participants had been faculty for 3 years or less while another two had been faculty for more than 30 years. The age and experience range was sometimes evident and sometimes transparent in their survey responses and in the life stories for those who interviewed. In response to the overall research question that asked how these participants experienced working in Doctoral Universities, they described many similar experiences surrounding their work as engineering faculty members, some of which seemed driven by their identities as sexual minorities, and others irrelevant of that particular identity. Both self-identified men and women participants noted the sexism and hegemonic masculinity of the engineering environment. In other words, gender was

the primary identity that appeared to mold these faculty members' experiences on a day-to-day-basis. Beyond gender, the professional pressures surrounding performance expectations of tenure-track faculty, the value of good mentoring, and the differences that institutional location and personal social capital made were primary concerns.

Participants also discussed the perceived value of being involved with a student group explicitly focused on supporting sexual minorities and the challenges and benefits of incorporating their personal lives into their work.

Indicative of today's academic environment, these engineering faculty have faced high expectations and meeting those expectations has required each individual to expend significant time as well as emotional and intellectual effort. Wondering if colleagues or students were treating them or rating their work differently because of their sexual identity added an additional layer of stress onto this group of individuals. Responses to that underlying concern differed based on the individual's own life experiences and level of outness with colleagues and students. On one end of the spectrum, some respondents maintained fluid boundaries between their personal and their professional lives, when appropriate, to create an environment of mutual respect and expectation between them, their colleagues, and students. At the other extreme, faculty members completely compartmentalized their personal and professional lives to ensure that they would not be accused of being unprofessional or making others uncomfortable.

The presence or absence of having strong, positive mentoring throughout their education and career seemed to shape the faculty members' level of self-esteem and confidence regarding their ability to succeed and to share the breadth of their identities with others. All interviewees recognized the importance of supporting their students, both



for the benefit of the engineering discipline and the personal growth of each student. One vehicle which allowed some of the participants to explicitly support their sexual minority students was through the oSTEM group.

In general, the findings of this study supported previous literature regarding a technical/social dualism within engineering and the prevalence of continued stigma for individuals with sexual minority identities. Faculty participants generally noted a greater acceptance of differences by their students than by their professional colleagues but, specifically, noted that it was their department staff that provided the most encouragement for them to be honest about their full range of identities. Faculty surrounded themselves with reminders of their identities by decorating their offices, sometimes including explicit items explicitly linked to their sexual minority status and other times in more subtle ways that either intentionally or unintentionally maintained the compartmentalization between their personal and professional identities.

## **CHAPTER V**

### **DISCUSSION, IMPLICATIONS, AND CONCLUSIONS**

In the previous chapter, I highlighted personal stories of the participants that led to themes related to my research questions and used those identified themes to answer my research questions. In this chapter, I discuss those findings as they link to the theoretical frameworks use, present implications of my findings, and identify potential future research opportunities that would extend the work presented here. During the development and completion of this study, I engaged in conversations with many engineering faculty members, beyond my participant pool and inclusion criteria, to consult with them regarding their experiences with engineering culture throughout their careers. Two separate non-participants indicated that people have been “trained to strip away their humanity” when entering engineering (A. Bielefeldt, personal communication, January 15, 2017). This appeared to be the case for some, but not all, of the participants and tied to the theoretical lenses of stigma theory (Goffman, 1963) and social identity theory (Tajfel & Turner, 1979).

#### **Links to Theoretical Frameworks**

The aim of this study was to learn more about the experiences of individuals who were employed as tenure-track faculty members in engineering and who considered themselves to be sexual minorities. By using key concepts from stigma theory (Goffman, 1963) and social identity theory (Tajfel & Turner, 1979), I inquired about how these faculty

members interacted with colleagues and students and how the participants felt that their various social identities, including their sexual minority status, did or did not affect their relationships. By bringing this topic to the forefront in an environment where it would not usually be discussed, my intention was to identify strategies that individuals have used to successfully navigate the current engineering environment and to open a discursive environment where students, faculty, and administrators could work to lessen the emotional burden of managing perceptions surrounding this particular identity.

### **Stigma Theory**

Generally, this study found that stigma theory was still applicable for tenure-track engineering faculty members who identified as sexual minorities. Within engineering, a sexual minority identity could still lead to being socially ostracized or discredited. In response, some individuals demonstrated a tendency to compartmentalize their personal and professional lives, cover their sexual identity, and/or pass as a member of a non-stigmatized group. Fifty years after Goffman (1963) authored his theory, the culture of engineering academia is still one in which individuals are socialized into a heteronormative, masculine environment that discourages discussions of any topic outside what is considered technical.

As a reminder, Goffman's (1963) theory noted that the stigmas related to social relationships rather than personal traits and could be known (discrediting) or unknown (discreditable). Individuals with identities potentially leading to social stigma tended to manage public perceptions in one of three ways: by passing, covering, or compartmentalizing aspects of one's life.

**Passing.** Passing is when a person actively engages in deception to appear to be a member of a non-stigmatized group, or in Goffman's (1963) terminology, a "normal" (p. 5). In this case, individuals with a heterosexual identity would be considered normal, and those with a sexual minority identity would be the outsiders. Passing involves "managing the tension" within a social interaction when a person with a discrediting identity worked to ensure that the stigma was not revealed during an interaction (Goffman, 1963, p. 42). However, not knowing how much people know about your identity could lead to a never-ending disequilibrium that could leave a person constantly on guard and, hence, preoccupied with some subset or particular aspect of their full identity. This tension was apparent at times for Alex, David, and Jane, whereas Evelyn, Nick, and Phyllis assumed the perspective that everyone already knew about their sexual identity so they did not feel the need to manage individual interactions with that at the forefront of their thoughts. As someone who identified as bisexual, Phyllis actually went out of her way to ensure that she did not pass and that her sexual identity was correctly identified. Throughout her career, on more than one occasion, she had contacted reporters who had described her as a lesbian even after she explicitly identified herself as a bisexual woman. Phyllis actively refused to pass, even when it was possible because her current partner was male, because she recognized that passing made her, and others with a bisexual identity, invisible in both the straight and the gay and lesbian communities.

In years past, some individuals went so far as to create personas of imaginary spouses or partners of the "correct" gender or would intentionally and regularly socialize with someone who was willing to cover for them (known as a "beard") in order to divert suspicion that they were gay or lesbian. None of the participants in this study engaged in

such levels of active deception, although at times, Jane intentionally chose not to mention her partner or marital status when encountering a person whom she feared would react negatively. In one case, Jane explained her decision to pass by saying that she “did not want the best collaboration of her career to be ruined by something so stupid.” Passing only would work for individuals with stigmatized identities that could be hidden. For some, but not all, people who identify as sexual minorities it would be possible to pass as heterosexual because the culture within much of the United States, and especially within engineering, has been heteronormative--meaning that the default assumption was that everyone was heterosexual (Cech and Waidzunus, 2011).

**Covering.** Covering is when a person works to be unobtrusive about their known stigmatized identity, which Goffman (1963) described as a matter of “managing information” rather than managing the tension of the unknown (p. 42). For example, choosing not to bring one’s partner or spouse to work events in order to maintain a “don’t ask, don’t tell” environment for others or intentionally excluding office décor that includes family photos are examples of covering. Those whose identity would be known or difficult to hide due to their mannerisms, but who wished to keep that identity from playing a central role in interactions with others, would expend emotional energy downplaying or covering that identity. This typically would occur when someone was interacting with others who did not maintain that same identity and who had not demonstrated the willingness to be supportive allies for the person with the discredited identity.

David spent decades covering his identity, primarily because his mentors enforced that expectation throughout his career. Alex made it clear during our interview that he

never intentionally shared the fact that he was gay during class but that some students might have been able to guess his sexuality based on his mannerisms and habits of discussing pop culture issues during his lectures. Evelyn, Jane, and Nick simply lived their lives and rarely expended energy to explicitly cover or disclose their relationships. Even so, they occasionally experienced interactions where the person they were conversing with was unaware of their sexual identity and assumed that they were heterosexual. In stark contrast, as previously mentioned, Phyllis expended significant energy at times insuring that individuals who may have assumed that she was straight or lesbian were informed otherwise. In addition to her concern about being rendered invisible, Phyllis also wanted to ensure that she was not mistaken as an ally who was overstepping her boundaries when advocating for or against specific actions related to the LGBTQ+ community.

**Compartmentalizing.** Separating aspects of one's life to limit social interactions between technical (engineering) and social (anything other than engineering) is called compartmentalizing (Cech & Waidzunus, 2011). As literature has shown (Bilimoria & Stewart, 2009; Cech & Waidzunus, 2009, 2011; Faulkner, 2000a), engineering culture has been rife with the expectation that individuals separate topics considered technical and social and focus solely on technical issues, especially when the social topics included identities that did not match the masculine, heteronormative expectation. Compartmentalization may be intentional or subconscious. For example, my participants gave different reasons for including or not including aspects of their social identities within their workspace décor.

Jane's lab was filled with artifacts that highlighted both her professional successes and her hobbies. Nick displayed photographs of his favorite social activities such as climbing and dining out with his husband alongside his photograph of his doctoral cohort attending graduation. Similarly, Evelyn posted photographs of her wife and daughter alongside photos of her research student team. At the other extreme, Alex noted an *intention* to print out and post photos of his family and friends in his office, "at some point," but after 3 years on the job, his office space included only a handful of beautiful, but technically oriented, photographs of built structures. There was not a single photo of a person or him engaging in social activities of any kind in his entire office. From my perspective as a researcher, it appeared that Alex was trying to maintain the aura of professional excellence by excluding items that could indicate that he focused any part of his life on something other than engineering.

**Other types of coping methods used by participants.** In addition to the three coping mechanisms mentioned by Goffman (1963), the participants demonstrated additional positive or negative coping mechanisms. For example, Evelyn actively worked to create an environment of acceptance within her laboratory and classroom. As previously mentioned, her theory was that she expected individuals to accept and respect her as she was, and in return she promised to accept and respect others as they were. In other words, she worked proactively to decrease the possibility of negative reactions to her sexual minority identity by creating an open and accepting relationship with her colleagues and students. She did this by openly challenging people who displayed bigotry towards any identities, whether or not she shared that identity. For instance, she did not consider herself particularly religious, but she respected that others had strong religious

beliefs. She was especially frustrated that, “Kids are being made fun of for being Christian, and it’s not right! And it certainly doesn’t belong in a class setting. And I’ve had to shut that down.” She also actively called out members of her family for “ridiculing somebody for their political beliefs without knowing why they have those beliefs.”

On the other hand, both David and Alex demonstrated instances of withdrawing from colleagues to avoid awkward situations. As mentioned in his story, after a particularly uncomfortable experience at an awards banquet several years ago, David refused to attend those types of social events since that time. This response left him further disengaged from students. For the first year or two that Alex worked at his current institution, he tried to engage several of his colleagues in discussions about his “partner” or “significant other.” However, after feeling rebuffed by a lack of response, he decided to stop reaching out. He felt that he was saying, “Here it is, here is my story.” In response to silence from his colleagues, he responded, “Oh, you want to turn away? That’s fine. Please [do]. Those that want to stick around and listen to my story” would have the opportunity to learn more about him. He would happily engage with them. But he stopped trying to connect with the colleagues who seemed emotionally distant.

**Playing the role of an engineering faculty member.** To varying degrees, the participants mentioned that they felt the expectation that they should do what was necessary to fit into the standard perception of what it meant to be an engineering faculty member by covering or muting much of their individuality. As described in Chapter IV, some of my participants acquiesced to this expectation whereas others resisted. For example, in the 1980s, Jane responded to a sexist mandate by her dean that all engineering faculty members should wear dress shirts and ties by donning a tie alongside



her male colleagues. Thirty years later, she has a collection of nearly 700 ties and wears one every day because she has incorporated it into her identity. Alex always wore clothing with a hint of color or pattern and short sleeves rather than the long-sleeved, dark shirts uniformly worn by most of his colleagues in both academia and industry. But expending energy to deny aspects of one's identity leads to varying degrees of disintegration in the individual's personal and professional lives. It was clear that more than 50 years later, Goffman's (1963) stigma theory was still relevant for engineering faculty members who hold other non-dominant identities, including identifying as sexual minorities.

For some, but not all, the professional environment has still encouraged passing as heterosexual and covering their personal lives. All of the interviewed participants and several of the anonymous survey participants felt that they must compartmentalize their identities rather than being able to integrate the varied aspects of who they were as humans into their identities as engineering faculty. The dis-integration of identities has by no means been limited to their sexuality. In accordance with Goffman's (1963) stigma theory, participants developed coping mechanisms and relationship management techniques including passing, covering, and compartmentalizing personal and professional aspects of their lives and doing what they could to avoid working with individuals who were unsupportive or openly biased against them. These mechanisms and techniques differed based on each person's local geographic and disciplinary environments and length of career--or, in the words of Claude Steele (2010), responses were molded by each individual's particular "identity contingencies" (p. 3). For example, the younger faculty members and the faculty member whose university was led by strong

and vocal allies of the LGBTQ+ and other minority populations felt less pressure to hide their sexuality and so, for the most part, it faded somewhat into the background of their daily concerns. On the other hand, the more mature faculty members who were employed in geographic locations where people were less supportive, as a whole, faced an added level of stress regarding relationship and perception maintenance and, therefore, expended more energy dealing with what had involuntarily become an all encompassing identity trait. For both David and Jane, the constant threat of what someone might say or do, or that a collaborator might discover their open secret regarding their sexuality, molded some or all of their interactions. As stated before, David stifled his level of engagement with his students to the point that he did not allow his spontaneity to shine through. In his words, he has “donned the mask of a boring engineer” and enveloped himself in an emotional overcoat that separated him from having any kind of personal relationships with either his colleagues or students. This, in turn, has led some of his students to label him as a “weirdo” because he always seemed so focused on his technical field. Jane, on the other hand, maintained close mentoring relationships with many of her students and openness with most of her colleagues but then has been surprised when she encountered individuals who still appeared unaware of her sexuality based on comments that they made. A recurring thread throughout her narrative was that she was never aware who knew about her sexual identity or not. For instance, she thought that she was completely closeted at Wild West University more than two decades ago, but then one day about five years ago, a gay faculty member called her for advice because “she was the only person that could be identified who was gay faculty in engineering in the history

of the college!” At other times, when she mentioned her recent marriage, long-time colleagues would ask things like, “Who’s the lucky guy?”

### **Social Identity Theory**

As a reminder, a social identity “describes those aspects of a person’s self-concept based upon their group memberships” (Turner & Oakes, 1986, p. 240). According to social identity theory, people’s self-concepts have been constructed based on interactions with the world surrounding them including group memberships (Brown, 1999; Tajfel & Turner, 1979). Individuals tend to affiliate with smaller groups so that they can feel similar to others and yet simultaneously individual, a concept described by Brewer (1991) as “optimal distinctiveness.” That individuality could be described colloquially as being the big fish in a little pond. Brewer (1991) went on to state, “Being highly individuated leaves one vulnerable to isolation and stigmatization . . . however, total deindividuation provides no basis for comparative appraisal or self-definition” (p. 478). In other words, people are uncomfortable being the only one in a group who identifies in a certain way, but they also do not want to be just like everyone else.

When initially selecting this theory as a partial theoretical basis for this study, I expected that the participants would hold stronger ties to their identities as engineers in their particular discipline than either engineers, as a general category, or other social categories not related to their profession. I realized that I held this assumption because I had also ingrained the technical/social dualism as reported by Cech & Waidzunus (2011), Faulkner (2000a), and Hacker (1981) where engineers are socialized to focus solely on the technical side of the identity equation. Yet, by crafting my interview questions from an intersectional perspective and encouraging participants to share a breadth of identities,

as repeatedly prompted using the Jones and McEwen (2000) figure titled Model of Multiple Dimensions of Identity (presented as Figure 4 in Chapter III of this document and also included in the instructions to the participant survey), participants shared and detailed their wide ranging identities.

For example, 7 of the 11 initial participants mentioned their religious identification/affiliation or the fact that they considered themselves “spiritual but not necessarily religious.” The most profound example of this was when Phyllis said, “I’m more able to bring the queer part of myself into engineering than the religious part.” I found this statement to be profound because throughout the study it was clear that “bring[ing] the queer part” into engineering was clearly not socially acceptable for most of the participants, with the exception of Evelyn and Nick who chose to publically integrate their lesbian and gay identities, respectively, from the beginning of their professional careers as engineering faculty. David also provided a profound example where one of his straight, white, senior colleagues openly shared an invitation to a religiously-based student organization in a general email to students. David, on the other hand, was always careful to separate his religious affiliation and his affiliation with an LGBT supportive student group from any general discussions with students. According to David, he felt that his colleagues would believe that it was not appropriate for him to share those non-technical identities in such a public fashion, yet his colleague obviously did not feel the pressure to hide his affiliation with the religiously-based student organization he advised. Here again was a dichotomy of privilege--individuals who held primary social identities that were not stigmatized felt more free to share non-technical identities and affiliations than those who were busy managing identities that were “socially devalued

and negatively stereotyped” (Quinn & Earnshaw, 2013, p. 40). It is important to note that all participants worked at public institutions, so this finding of the perceived need to hide one’s religious or spiritual affiliation could differ from others who work at religiously-affiliated institutions where religion was expected to be integrally incorporated into a faculty member’s everyday life.

The participants constantly negotiated their roles as members of faculty groups of varying sizes, and they thoughtfully responded to my interview questions regarding in what ways they were similar or different than their peers. For the most part, the participants stated that they fit well in their roles of researchers, teachers, and colleagues. They also stated that they felt that it was important for them to demonstrate what it meant to be an engineer and a caring faculty member. On the other hand, several of the interview participants have chosen positions where they spanned disciplinary boundaries rather than where they were situated within existing silos. This may have been a conscious or unconscious coping mechanism that led them to a space that was not quite as rigidly defined as a disciplinary engineering specialty area might have been. For example, Nick held a position that was split between two colleges. David had followed a trail of friendly research colleagues for so long that he found himself as a topical generalist within his field rather than a specialist as was the case for most senior faculty in his department. Alex described himself as working on an island while bridging technical topics between several disciplinary groups within his department. These placements allowed each of these individuals to be affiliated, simultaneously, with others similar to themselves and with individuals different from themselves in some important social identity. In other words, the fact that participants sought a space in between could have

been a conscious or subconscious attempt to optimally differentiate (Brewer, 1991) themselves within their professional spheres.

The question of how the participants differed from their colleagues actually brought out some of the most amusing responses during my study. Although they were quick to note that they were joking, when asked how they differed from their peers, participants quipped that they were “not assholes” or that they were “more interesting.” Both comments were followed by laughter from the participants; possibly in an attempt to make a joke of what they felt was an accurate portrayal of some of their peers. These remarks demonstrated examples of what McLeod (2008) called social categorization, or individuals improving their own self-image by comparing themselves to others and categorizing others in ways that made them feel better about themselves.

### **Implications for Research**

Along with other recent studies by Cech and Waidzunas (2009, 2011), Farrell et al. (2016), Patridge et al. (2014), and J. B. Yoder and Mattheis (2016), through this study I demonstrated that it is possible to engage a hard-to-reach population by ensuring participant confidentiality and transparency of research intent. If future research funding for diversity-related topics continues to hinge on the existence of baseline data within national databases, it will be imperative for future researchers to continue to engage sexual minorities so that they are no longer invisible within the data pool. Also, given the vastly different culture in which those with stigmatized and privileged identities find ourselves living today as compared to the environments in which Goffman (1963) and Tajfel & Turner (1979) developed their theories, it will be important for researchers to

review both the underlying assumptions and the application of each of those theories and continue to document advances.

This work of updating these theories has already started with respect to stigma theory. On the 50<sup>th</sup> anniversary of Goffman's (1963) work, Bos et al. (2013) summarized the current status of research in stigma theory. In particular, Bos et al. (2013) noted that issues including "structural factors that promote and maintain stigma, the social neuroscience of stigma, how social interactions between perceivers and stigmatized individuals impact stigma, the interrelatedness of different forms of stigma, the measurement of stigma, and stigma reduction inventions" (p. 5) are areas ripe for further research. These topics, along with investigations into how those with stigmatized identities interact with those who Goffman called 'normals' would provide updated validation for the classic theory.

The upcoming 40th anniversary of the work by Tajfel and Turner (1979) would provide a fitting opportunity to reinvestigate the tenets and assumptions of their work, especially given the vast expansion of people's opportunities to compare themselves to others due to social media platforms such as Facebook, Instagram, LinkedIn, and others. Individuals are no longer limited by pressures to conform or differentiate themselves solely amongst individuals within their geographic vicinity; now people have the opportunity to compare themselves to literally millions or billions of others worldwide. That pressure is beginning to be documented with regards to increasing levels of anxiety among adults (Vannucci, Flannery, & Ohannessian, 2017) that could potentially lead to depression and suicide, especially among individuals who identify as sexual minorities. In-group and out-group categorization and discrimination remains strong within society

in the United States and elsewhere, although the categorization of groups as “in” or “out” changes with time. This provides researchers many opportunities to continue to investigate identity formation.

### **Future Directions for Research**

To ensure that this study could be completed successfully within my timeframe and resource limitations, I limited the scope to tenure-track faculty at doctoral research institutions. Therefore, admittedly, this study barely scratched the surface of information that could be gleaned by engaging diverse faculty in discussions regarding improving the culture and climate of engineering academia. In the future, I hope to continue this line of inquiry to gather the stories of individuals who work in both tenure-track and non-tenure-track roles at in a wider range of academic environments. Since women and minorities have been over-represented in non-tenure track and adjunct roles (Kezar & Sam, 2010; National Education Association, 1996), a future study that would include non-tenure-track faculty might make it more likely to engage non-White individuals. That study might incorporate more perspectives of those whose identities intersect between racial minority contingencies and sexual minority contingencies within engineering could be added to the limited, existing literature. I also hope to engage faculty who work at private institutions to see if their stories mirror those of faculty at public institutions or if there might be inherent differences in academic environments between public and private institutions.

Another potential line of inquiry would be to interview engineering faculty about all of their social identities and then compare responses between those who identify as sexual minorities and those who do not. As Phyllis said, she felt compelled to hide or



downplay many of her identities--including her femininity, her spirituality, and her socio-economic status. For her, she was simply unwilling to hide her sexual identity. In other words, it would be enlightening to investigate the experiences of heterosexual engineering faculty at similar institutions as included in this study to determine which identity aspects and threats would come to the foreground for them.

### **Implications for Practice**

The findings from this study lead to several implications for practice:

1. Deans who have signed the ASEE diversity initiative letter should be vocal regarding their support for the elimination of discrimination based on sexual identity.
2. Faculty members who are comfortable doing so should be encouraged to decorate their offices with personal items that recognize their full range of identities, and not feel limited to simply work-related, technical items.
3. At institutions with established oSTEM chapters, those chapters should receive the same benefits and visibility as any of the college's other diversity-focused societies and faculty members who are comfortable doing so should be encouraged to hold roles as advisors for the oSTEM chapters.

### **Deans Should Provide Vocal Support**

Deans have always been the figureheads responsible for sharing the visions of their colleges, schools, and departments of engineering. They help set the priorities and strategies that lead to expectations of appropriate behavior. In that role, they may have the greatest potential to start a sea change that could help to reduce the marginalization and invisibility of engineering faculty members who identify as sexual minorities that has

remained nearly a decade after Riley (2008) noted that situation. The large number of deans who have signed the ASEE letter pledging tangible actions indicates willingness to further improve and expand efforts to foster truly inclusive and diverse environments within engineering academia. This is important because the concepts of intersectionality and interdependence of discrimination (Hackman, 2012) have shown that the environment for underrepresented minorities has impacted the success of everyone within that environment. Negative social and environmental conditions within academic environments have limited the potential of both faculty and students, whether or not they shared specific identity traits. Ethereal identity threats have been proven to significantly decrease performance in fields that have been subject to stereotype threat (Steele, 2010).

At the same time, empirical research in student affairs over the past several decades has shown that student-faculty interactions both inside and outside the classroom have led to both higher retention rates (Barefoot, 2004; Blickenstaff, 2006) and other beneficial outcomes for students (Astin, 1993; Chickering & Gamson, 1987; Kuh, 2008a). In other words, students have missed the full range of educational and mentoring skills that individuals could be sharing when they were instead, spending significant effort to make their identities invisible on a daily basis. Colleagues have missed out on the full potential of research collaborations and development of a collegial environment, both of which could lead to career dissatisfaction (Campbell & O'Meara, 2014) or stalling of the promotion and tenure process. Both of these situations limit faculty members' opportunities to be fully productive and successful.

Tenure-track faculty members at doctoral universities have represented an important resource for both the institutions of higher education where they work and for

students who enroll at those institutions (Astin, 1993; Benjamin, 2002; Duderstadt, 2012; Geiger, 2011; Kuh, 2008a; Umbach & Wawrzynski, 2005). When those resources have become constrained because of unnecessary forces, both the institutions and their students have suffered from the loss of potential. Deans who were unaware of the added social pressures placed on faculty members who identify as sexual minorities may not realize how significantly limiting those pressures could be and how much they could affect people's ability to perform at their full potential. This study has provided a glimpse into the experiences of some of those individuals and could be used to enlighten deans who were previously unaware. Since excellence has been an expectation of tenure-track faculty, it should behoove deans and other administrators to remove as many limiting contingencies as possible within the academic environment. The first step towards making these improvements would be to vocalize their importance in strategic plans, college-wide faculty and staff meetings, and meetings with outside constituents and advisory boards.

### **Encourage Integration of All Identities**

Throughout the literature review and data collection for this study, it was obvious that compartmentalization--or an enforced technical/social dualism that separated what was considered appropriate in an engineering environment--was the standard. Although the phenomena were not limited to those who identified as sexual minorities, it appeared to be doubly enforced on them. In other words, examples described by some of the participants demonstrated the added layer of expectation laid on them to manage their image. Breaking the enforced silence regarding who engineering faculty were as human beings and, instead, acknowledging and celebrating how those identities could bring

diverse perspectives to bear on the teaching and learning of engineering concepts should be a goal of every engineering dean and department chair. It takes a lot of energy to successfully hide part of oneself and part of one's life; in addition, it makes it harder to have truly honest and open relationships with anyone who you work with or mentor. In my opinion, people who cannot openly share their varied identities cannot be excellent role models because, as Steele (2010) discussed, hiding aspects of one's identity can eventually lead to a lack of trust and a pre-occupation with those aspects of identity. When faculty members were not forced to expend energy on hiding aspects of their identities, it released that energy so that they could live up to their full potential. Welcoming all faculty to personalize their offices to the extent they felt comfortable and engaging students in critical discussions of how their intersectional identities affected their motivations to engineer/design innovative solutions to the world's most pressing problems could go a long way to dissolve the technical/social dualism that has long been the culture within engineering. Obviously there are limitations to what should information be shared in a work environment. However, I would propose that the limits enforced in the current engineering culture go beyond what would be healthy/necessary for a discipline that aspired to expand its ranks to include a broader range of individuals than were currently engaged in the profession.

Research findings based on diversity of gender (Dezsö & Ross, 2011), ethnicity (Richard, McMillan, Chadwick, & Dwyer, 2003), and political affiliation (Loyd, Wang, Phillips, & Lount, 2013) demonstrate that "socially diverse groups (that is, those with a diversity of race, ethnicity, gender and sexual orientation) are more innovative than homogeneous groups" (Phillips, 2014, p .43). In addition, "Simply interacting with

individuals who are different forces group members to prepare better, to anticipate alternative viewpoints and to expect that reaching consensus will take effort” (Phillips, 2014, p .43). Based on these findings, it is reasonable to extrapolate that diversity of sexual orientation could provide positive benefits to an innovative industry such as engineering; although to date I could not find any published studies on that topic. Hence, in contrast to the prevalent belief that social identities are irrelevant to so-called “real” engineering (Cech, 2014, p. 45), social identity diversity has been proven to increase innovation through creative tension (Phillips, 2014) and therefore should be of vital concern to engineering deans and industry leaders.

Diversity and inclusion should be about more than simply allowing in those with visible, assumed identities and counting checkboxes. True inclusion would require an environment where all people who chose to embark on a journey be allowed to follow that path to the best of their ability. Not everyone who wanted to be an engineer or an engineering faculty member at a doctoral institution would succeed. However, it would behoove those who have the power to level the so called playing field to do so to the best of their ability so that a diverse range of individuals could remain among the ranks that shape generations to come and, quite literally, the built environment in which we all live.

### **Tangible Actions to Extend Diversity Efforts to Include Sexual Minorities**

Examples of how deans could support both their faculty and students who identify as sexual minorities include encouraging, or at least not blocking, their school or college’s efforts to initiate an Out in Science, Technology, Engineering, and Mathematics (oSTEM) chapter. This would include providing the oSTEM group the same publicity and financial or programmatic support as any other affiliated student group within the

college such as placement on the college's diversity or student group websites and permission to include the college's logo on chapter events if that was standard practice for any other engineering student group. Chapter representatives from oSTEM should sit alongside representatives from other diversity groups at orientations and college recruiting events. Colleges or universities should sponsor tables at the national oSTEM conference in a manner similar to what they typically would do at other engineering society conferences such as the Society of Women Engineering, National Society of Black Engineers, and the Society of Hispanic Professional Engineers. Finally, faculty members who are comfortable doing so should be encouraged to hold roles as advisors for the oSTEM chapters and know that those roles will be considered equivalent to other service roles.

### **Conclusions**

As shown in this study, engineering faculty members who identify as sexual minorities face additional stresses regarding managing their full range of social identities while maintaining their images as competent professionals. However, those forces have not worked in isolation from the identity threats posed by other, more visible aspects of identity. For instance, female engineering faculty still appeared to face different challenges and identity threats than their male counterparts, even before their sexual identities were discussed or known. Without significant changes in the culture of engineering as a profession, faculty who hold identities as sexual minorities will likely continue to wonder if their racial/ethnic appearance will forever taint how colleagues and students rate their competence, whether or not they welcome others in to learn about their sexual identity. It is my hope that if some of the suggestions for practice can be

implemented, future engineering faculty can feel more confident in incorporating their full ranges of identities into their efforts of molding future engineers. Until engineers are allowed to present themselves as fully human, with a broad spectrum of integrated social identities, humanity will fail to gain the full benefits that could be generated by these creative individuals.

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**APPENDIX A**


**STUDY INFORMATION CARD TO BE DISTRIBUTED  
AT VARIOUS CONFERENCES AND  
AFFILIATED LANDING PAGE**

STUDY INFORMATION CARD TO BE DISTRIBUTED  
AT VARIOUS CONFERENCES

Front of Card

Seeking Research Participants for a Study on  
Lived Experiences of Engineering Faculty Who Identify  
as Sexual Minorities

For more information, scan this QR code



Back of Card

Robyn Sandekian, PhD Candidate  
University of Northern Colorado  
sand9372@bears.unco.edu

For more information, email Robyn or check out this  
website < <https://goo.gl/SYh55w> >  
Data collection is expected to begin in January 2017  
and last through April 2017

## TEXT OF LANDING PAGE FOR INFORMATION CARD



Do you or someone you know meet the following criteria?

1. Employed as a tenure-track engineering faculty member at a public or private, non-religiously-affiliated doctoral-granting institution of higher education within the United States?

2. Someone who self-identifies as having a non-heterosexual identity (e.g. lesbian, gay, bisexual, asexual, demisexual, pansexual, or other)

If so, please submit an email where you can be contacted with more information once research approval has been obtained from the IRB at the University of Northern Colorado. Submitting your contact information in no way obligates you to participate in the study. Please submit your email only, not the email of any other potential respondent.

---

Please enter your valid email address to receive additional information about the study once it has been approved.



**APPENDIX B**  
**INSTITUTIONAL REVIEW BOARD APPROVAL**



*Institutional Review Board*

DATE: December 9, 2016

TO: Robyn Sandekian, EdS  
FROM: University of Northern Colorado (UNCO) IRB

PROJECT TITLE: [967150-3] EXPERIENCES OF ENGINEERING FACULTY WHO IDENTIFY AS SEXUAL MINORITIES  
SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED  
APPROVAL DATE: December 8, 2016  
EXPIRATION DATE: December 8, 2017  
REVIEW TYPE: Expedited Review

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB has APPROVED your submission. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on applicable federal regulations.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of December 8, 2017.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Sherry May at 970-351-1910 or [Sherry.May@unco.edu](mailto:Sherry.May@unco.edu). Please include your project title and reference number in all correspondence with this committee.

**APPENDIX C**  
**EMAIL CORRESPONDENCE**

## Email to Participants Personally Known by Researcher

Dear Name,

As you may know, I work in the College of Engineering and Applied Science at the University of Colorado Boulder and am a doctoral student in Higher Education and Student Affairs Leadership at the University of Northern Colorado (UNC). I am preparing to conduct my doctoral research and I am writing to you today as someone whom I believe might personally meet the criteria for my study and as someone who might have personal contacts who could be tapped as additional participants. I am seeking the narratives of full-time, tenure-track engineering faculty who identify as sexual minorities: lesbians, gays, bisexuals, asexuals, pansexuals, and others who work at public or private (non-religiously affiliated) doctoral universities within the United States.

If you are interested to learn more about my research, please visit this website <[goo.gl/kfPNZ6](http://goo.gl/kfPNZ6)>. This site includes basic details about the study and an introduction to the informed consent documents that you will need to sign before engaging in the study. It should take you less than five minutes to read these document and afterwards, you can decide whether to participate. No information will be tracked or data collected until the point of submission of an email address for follow-up contact. If you wish to personally participate, please use the website to submit your email for further contact. You may use a generic email address without your university affiliation if you so choose.

Second, if you know individuals who might also qualify for this study, and are willing to provide them with a brief introduction, please cut and paste the following text into a personal email and send it to your colleagues *individually* <*text to cut and paste is shown in next section as "Email from first wave participant to second and subsequent wave participants (known by first/subsequent wave participant but not by researcher)"*>. For confidentiality, do not include multiple email addresses in any email request to potential participants. Note that I am not asking you to share the names of other potential participants with me or anyone else. I am simply asking you to share the information and the informational website link so that others may participate if they so choose.

Participation in this study is voluntary and if you choose to not participate, or should you choose to participate and then want to leave the study, there will not be any repercussions. I believe you have valuable perspectives regarding your experiences of living as an engineering faculty member who identifies as a sexual minority and hope you will be willing to share them. Participation will include the following activities:

- one 60- to 90-minute, recorded, semi-structured interview conducted either face-to-face or via video conferencing software, and
- submission of three to five photographs of artifacts from your personal workspace or lab that represent your identity. Artifacts might include, for example, family or vacation photos, awards from academic or social organizations, professional

engineering licensure certificates, diplomas, or symbols of your religious affiliation. If you do not display any personal or professional artifacts in any of your workspaces, or you do not wish to share photographs of your personal workspace, I will ask you to consider why that is the case and share your reasoning with me during the interview. Additional details about this activity will be included in an email sent to you with the verification of date and time of your interview.

Thank you for considering being a vital resource for my doctoral dissertation. As someone who has been immersed in engineering academia for more than two decades as a student and staff member, I look forward to being able to add your story to the academic discussion about the experiences of engineering faculty members and ways that engineering diversity efforts can be improved. If you wish to chat with me by phone to learn more details, call me at xxx-xxx-xxxx or you can email me at Sand9372@bears.unco.edu. I look forward to hearing from you via the informational website submission form at <[https:// goo.gl/kfPNZ6](https://goo.gl/kfPNZ6)>.

Respectfully,  
Robyn Sandekian, MS (Aero Engr), EIT, Ed.S., Ph.D. candidate

**Email from first wave participant to second and subsequent wave participants (known by first/subsequent wave participant but not by researcher)**

The prior wave individuals are encouraged to add a personal greeting and introduction, and then use the following copied and pasted text for the remainder of their e-mail to members of their network who might be interested in participating. They are encouraged to include the fact that they did not share any contact information with me (the researcher) and are simply forwarding a request for consideration from someone else whom they personally know.

<First wave participant, please cut and paste starting below the line>

---

Hello,

This email is an invitation to participate in a research study for completion of a doctoral dissertation that seeks to explore the lived experiences of full-time, tenure-track engineering faculty who identify as sexual minorities. Criteria for participation include:

- Personal identification as an individual with a minority sexual identity including but not limited to lesbian, gay, bisexual, pansexual, asexual, or other self-designation;
- Currently employed as a full-time faculty member in a designated field of engineering (e.g. Aerospace, Biomedical, Chemical, Civil, Electrical, etc.) at a public or private non-religiously-affiliated doctoral university as shown in the latest Carnegie Classification (<http://carnegieclassifications.iu.edu/lookup/lookup.php>).

I recognize that sexual identities can be fluid and that the terms lesbian, gay, bisexual, pansexual, and asexual are not wholly inclusive. I also recognize that by using sexual identity as a criterion for this study I may be excluding heterosexual individuals with diverse gender identities including trans\*, gender-queer, two gender, and others. I believe that the experiences of all of these individuals have great value but this study is a first step in my research agenda and therefore required specific bounding. In addition, confidentiality of participants is of utmost importance to me so I needed to select criteria that would not limit my results to such a small population that individuals might be personally identifiable regardless of my attempts to maintain each participant's privacy. That is also my reasoning for excluding faculty who work at religiously affiliated institutions.

Participation in this study is voluntary and if you choose to not participate, or should you choose to participate and then want to leave the study, there will not be any repercussions. I believe you have valuable perspectives regarding your experiences of living as an engineering faculty member who identifies as a sexual minority and hope you will be willing to share them. Participation will include the following activities:

- One 60- to 90-minute, recorded, semi-structured interviews conducted either face-to-face or via video conferencing software, and
- Submission of three to five photographs of artifacts from your personal workspace or lab that represent your identity. Artifacts might include, for example, family or vacation photos, awards from academic or social organizations, professional engineering licensure certificates, diplomas, or symbols of your religious affiliation. If you do not display any personal or professional artifacts in any of your workspaces, or you do not wish to share photographs of your personal workspace, I will ask you to consider why that is the case and share your reasoning with me during the interview. Additional details about this activity will be included in an email sent to you with the verification of date and time of your interview.

Thank you for considering being a vital resource for my doctoral dissertation. As someone who has been immersed in engineering academia for more than two decades as a student and staff member, I look forward to being able to add your experience to the academic discussion about the experiences of engineering faculty members and ways that engineering diversity efforts can be improved. To learn more about the study without having to input any information, please visit the informational website at <<https://goo.gl/kfPNZ6>>. Or, if you wish to chat with me to learn more details, call me at xxx-xxx-xxxx or you can email me at Sand9372@bears.unco.edu. I look forward to seeing your email address submission at <<https://goo.gl/kfPNZ6>>.

Respectfully,

Robyn Sandekian, MS (Aero Engr), EIT, Ed.S., Ph.D. candidate

**Email to Participants who Complete the Participant Demographic Survey and  
Submit an Email Address for Further Contact**

Dear Name,

I want to express my sincere gratitude for your consideration of participating in my doctoral research on the experiences of engineering faculty members who identify as sexual minorities. It is important to me to hear and share the stories of members of this group so that we can work together as a discipline to expand the definition of diversity to improve the experiences within engineering academia and industry for those who identify as sexual minorities.

I have attached the informed consent document that you will need to sign prior to continuing with the interview phase of the study. We will discuss that document at the beginning of the interview before you are asked any study questions. To get started, I would like to schedule a date and time for the semi-structured interview. The interview is expected to take approximately 60- to 90-minutes minutes and may be conducted on any day and time convenient for you, including nights or weekends as desired. My goal is to make this process as easy as possible to fit into your busy schedule. Please provide three dates and times that you are available to participate in an interview either in person, if you prefer and you live in the Denver/Boulder/Colorado Front Range area, or via videoconferencing software called ZOOM. Once I receive details of your availability, I will send you an email confirming the day and time, as well as directions regarding how to connect to the videoconferencing software that we will use, if applicable.

Thank you,

Robyn Sandekian, MS (Aero Engr), EIT, Ed.S., Ph.D. candidate



## Consent Form Email

Dear <Pseudonym>,

Thank you again for being willing to share your experiences as part of my doctoral research. As someone who works closely with engineering faculty members, I am cognizant of your busy schedules and have tried to make the process of participation relatively simple. Your willingness to assist me in this research means a great deal and I appreciate your time and your perspective.

My purpose for this research is to increase the awareness of the existence of an underrepresented group of faculty who typically are not mentioned when it comes to improving the inclusive environment within engineering. While there have been a growing number of empirical studies of lesbian, gay, and bisexual (LGB) students, and a few studies of LGB professionals in STEM, I believe that it is important to tell the stories of engineers who identify anywhere on the sexual minority spectrum so that we are explicitly included in future diversity efforts. I recognize that individuals have multidimensional identities, and that your sexual minority status may play a minor role, a major role, or somewhere in between when it comes to the breadth of your daily experiences. These are the details that I am seeking to share.

The first step in the research process will be for you to complete the participant consent form attached to this email. It requires a signature from you and it must be returned to me in order to continue this study. If you thoroughly read the consent form, electronically or physically sign the form, and send it back to me, I will respond with the next steps of the study. If you have any questions, you are welcome to contact me via email or telephone prior to signing the consent.

As a reminder, the next phase of data collection will involve the following timeline and data collection methods.

Timeline:

January 1 to April 30, 2017:

Interviews including discussion of photographs taken in workspace  
Transcripts will be available for participant review within 15 days of  
interview

May 1 to June 15, 2017:

Narratives will be sent to participants for review by June 15, 2017

Photographs of Participant On-Campus Workspaces--After you submit your signed consent form and prior to our interview, I will ask that you take three to five photographs of your on-campus workspace showing examples of items that honor or highlight any of your multiple dimensions of identity such as family or vacation photos,

awards from academic or social organizations, professional engineering licensure certificates, diplomas, or symbols of religious affiliation. Additionally, if there are any particular items that make you participant feel unwelcome in your work environment based on your identity, I would like you to photograph those too in addition to the three to five previously mentioned photographs. Alternatively, if you don't display any personal or professional artifacts in any workspace, or you do not wish to submit photographs of your workspace, I ask you to consider why that is the case and share the reasoning with me during our interview. I ask that you submit the photographs to my email at sand9372@bears.unco.edu prior to the time of our interview. These photographs will be one of two main topics of discussion. To the extent possible, please take photographs of objects only, not people, and be prepared to describe those photographs and their meaning when we meet. Photos of people (such as family photos) should have the faces blurred or blacked out for confidentiality purposes. If I receive photographs with visible faces, I will modify them as described (blurred/blacked out faces) upon receipt.

Interview--One interview of approximately 60-90 minutes will be scheduled at your convenience and will occur via videoconferencing software called ZOOM. The interview will begin with questions about your relationships with colleagues and students and will then move into the description of the photographs that you have shared.

Transcript Evaluation--You will be offered the opportunity to review the transcript of your interview to ensure that what was said matches the meaning that you intended. This will also be a time when you can add additional information you feel is important but may not have been discussed in the interview. I will ask that you read through the transcript and provide feedback within two weeks of receipt so that I may begin my data analysis.

Narrative Evaluation--You will be offered the opportunity to review the narrative that I write based on your transcript to ensure that you feel that it authentically describes your experiences. I will ask that you read the narrative and provide feedback within two weeks of receipt so that I may finalize my data analysis and study discussion and implications.

I look forward to hearing from you and receiving your signed consent form. Please remember that if you have any questions, you can contact me at the email that I used to send this message, sand9372@bears.unco.edu, or you can call me at xxx-xxx-xxxx.

Thank you,

Robyn Sandekian

### **Email Reminder to Participants Who Provided Interview Time Availability**

Dear Name,

Thank you for your willingness to participate in my study. Based on the days and times you said that you were available, I would like to schedule our interview on DAY at TIME. Here is the information you will need to connect to the ZOOM online videoconferencing software. <insert directions here – participant will click on URL for my personal ZOOM>

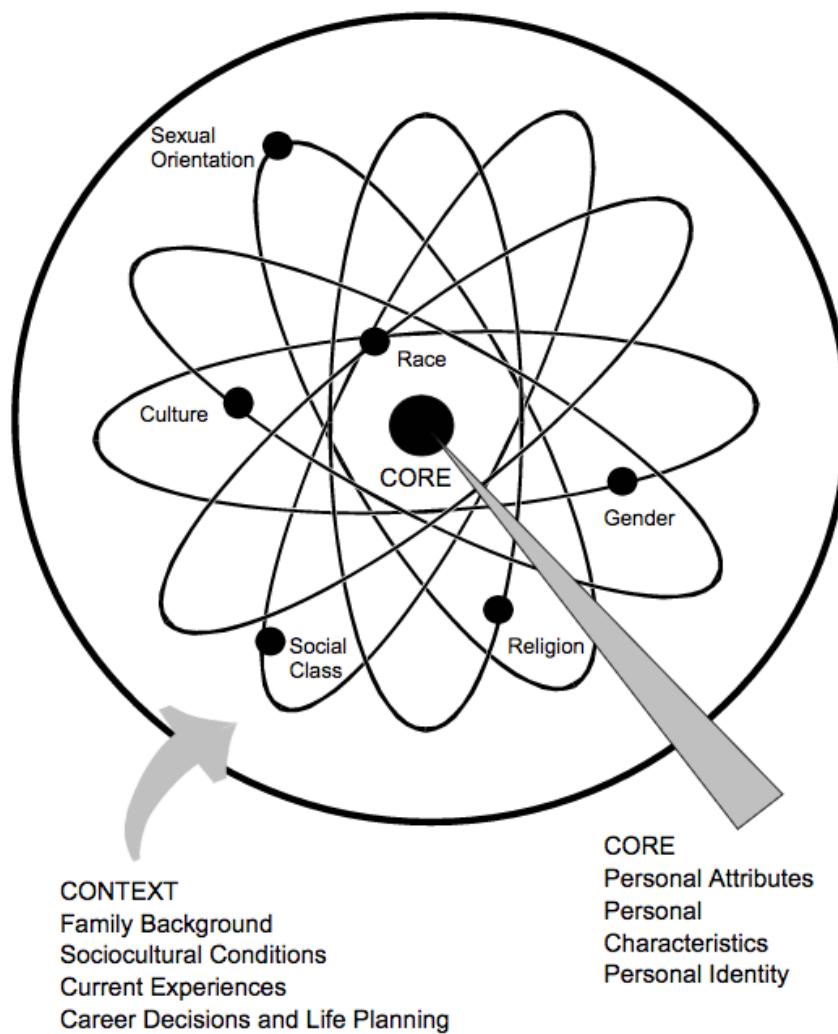
Prior to our interview, I am requesting that you take three to five photographs of personal items that you deem relevant to your multidimensional identity such as family or vacation photos, awards from academic or social organizations, professional engineering licensure certificates, diplomas, or symbols of religious affiliation. Additionally, if there are any particular items that make you feel unwelcome in your work environment based on your identity, I would like you to photograph those too in addition to the three to five previously mentioned photographs. Alternatively, if you don't display any personal or professional artifacts in any workspace, or you do not wish to submit photographs of your workspace, I ask you to consider why that is the case and share the reasoning with me during our interview. I ask that you submit the photographs to my email at sand9372@bears.unco.edu prior to the time of our interview. These photographs will be one of two main topics of discussion. To the extent possible, please take photographs of objects only, not people, and be prepared to describe those photographs and their meaning when we meet. Photos of people (such as family photos) should have the faces blurred or blacked out for confidentiality purposes. If I receive photographs with visible faces, I will modify them as described (blurred/blacked out faces) upon receipt.

I have included a copy of a graphic that might help you to consider some of the many aspects included in your identity. I look forward to speaking with you on DAY at TIME. If you need to contact me for any reason, please call me at xxx-xxx-xxxx.

Sincerely,  
Robyn Sandekian

Attachments that will be sent to participant along with previous email.

1. Informed consent document
2. Graphic highlighting some components of a person's identity



Jones, S. R., & McEwen, M. K. (2000). A conceptual model of multiple dimensions of identity. *Journal of College Student Development, 41*(4), 405.

**APPENDIX D**

**EMAIL TO DEANS OF COLLEGES AND SCHOOLS OF  
ENGINEERING**

**Email to Deans Who Signed American Society of Engineering Education  
(ASEE) Engineering Deans Council Diversity Initiative Letter**

Dear <mail merge dean's name & title>,

I would like to introduce myself and make a request. My name is Robyn Sandekian and I am a doctoral candidate in Higher Education and Student Affairs Leadership at the University of Northern Colorado. I am also someone who earned B.S. and M.S. degrees in Aerospace Engineering Sciences and who has worked as a staff member in a College of Engineering and Applied Science for most of my 25-year professional career. During that time, I have constantly advocated for greater diversity and inclusion among the student body and faculty within engineering. I am now preparing to conduct the research for my doctoral dissertation on the experiences of diverse engineering faculty members, specifically, those who identify as having a minority sexual orientation (such as lesbian, gay, bisexual, questioning, or other).

As someone who signed the ASEE Engineering Deans Council Diversity Initiative Letter pledging to “promote the pursuit of engineering education to all those who have been historically underrepresented within our discipline . . . and prevent marginalization of any groups of people because of visible or invisible differences” (ASEE Diversity Initiative, 2016), I am requesting your assistance in sharing a participant recruitment email for my exploratory study. Faculty with minority sexual orientations hold vital roles in expanding the diversity and inclusiveness discussions within engineering academia, yet are frequently omitted. My study is intended to provide members of the ASEE Engineering Deans Council and others with real-life samples of experiences from one of the underrepresented groups that should be consulted while crafting future diversity and inclusiveness initiatives to better serve today’s student and faculty population and to ensure a more welcoming environment in engineering academia for decades to come. .

Below is the email I would like for you to send to all tenure-track faculty rostered within your engineering departments/school/college. Sending this email to all faculty will allow those who may not be visible or known to you personally the opportunity to participate, and will provide an opportunity for those who are not eligible to participate the chance to share this information with their colleagues whom they know may be eligible. I have received IRB approval through the University of Northern Colorado and hope to collect data for this study between January and April 2017. Below is the email that I would like you to forward to all tenure-track faculty in engineering.

Hello,

My name is Robyn Sandekian, and I am a Ph.D. candidate in Higher Education and Student Affairs Leadership who also holds a B.S. and M.S. in Aerospace Engineering Sciences. This email is being distributed to all tenure-track faculty in your school/college. It includes an invitation to participate in a research study for completion of a doctoral dissertation that seeks to explore the

lived experiences of full-time, tenure-track engineering faculty who identify as sexual minorities. I am seeking participants who meet the following criteria:

- Personal identification as an individual with a minority sexual identity including but not limited to lesbian, gay, bisexual, pansexual, asexual, or other self-designation;
- Currently employed as a full-time tenure-track faculty member in a designated field of engineering (e.g. Aerospace, Biomedical, Chemical, Civil, Electrical, etc.) at a public or private non-religiously-affiliated doctoral university as shown in the latest Carnegie Classification (<http://carnegieclassifications.iu.edu/lookup/lookup.php>).
- Willingness to complete a participant identification survey, one interview via a web-based medium, and provide three to five photographs that identify or honor aspects of your multiple dimensions identity including, for example, family or vacation photos, awards from academic or social organizations, professional engineering licensure certificates, diplomas, or symbols of your religious affiliation. Alternatively, if you don't display any personal or professional artifacts in any workspace, or you do not wish to submit photographs of your workspace, I ask you to consider why that is the case and share the reasoning with me during our interview.

Participation in this study is voluntary and if you choose to not participate, or should you choose to participate and then want to leave the study, there will not be any repercussions. Your interest or participation in this study will not be tracked or known by anyone in your institution, and your participation will be confidential. As a signatory to the American Society of Engineering Education Engineering Dean Council Diversity Initiative Letter of 2015/2016, your dean has simply agreed to forward this request to all engineering faculty so that I can notify a broad pool of potential participants.

As a member of an often-overlooked population within engineering academia, I believe you have valuable perspectives regarding your experiences of living as an engineering faculty member who identifies as a sexual minority and hope you will be willing to share them.

Potential participants will be asked to complete a participant demographic survey to identify personal and basic institutional demographics to aid in data collection and participant selection processes. You can preview and complete this survey without inputting any personally identifiable information. This Qualtrics-based survey is available via this anonymous web link: < [https:// goo.gl/kfPNZ6](https://goo.gl/kfPNZ6)>. Should you choose to participate, you will be asked to answer the survey questions and provide a contact email. That email can be from your institution or you can use a generic email such as [tell-me-more@yahoo.com](mailto:tell-me-more@yahoo.com). Additional details will be shared with potential participants who submit a valid email.

Thank you for considering being a vital resource for my doctoral dissertation. As someone who has been immersed in engineering academia for more than two decades as a student and staff member, I look forward to being able to add your story to the academic discussion about the experiences of underrepresented engineering faculty members and ways that engineering diversity efforts can be improved.

To learn more about the study without having to input any identifiable information, please visit the survey website at <[https:// goo.gl/kfPNZ6](https://goo.gl/kfPNZ6)>. Or, if you wish to chat with me to learn more details, call me at xxx-xxx-xxxx or you can email me at Sand9372@bears.unco.edu. I look forward to seeing your email address submission at <[https:// goo.gl/kfPNZ6](https://goo.gl/kfPNZ6)>.

Respectfully,  
Robyn Sandekian, MS (Aero Engr), EIT, Ed.S., Ph.D. candidate

I hope that you will consider sharing this request and encouraging your faculty members to participate in this study. Doing so will represent one more tangible action towards meeting your commitment stated in the ASEE Engineering Deans Council letter. Thank you, in advance, for your assistance.

Respectfully,  
Robyn Sandekian, MS (Aero Engineering), EIT, EdS, PhD Candidate  
sand9372@unco.edu



**APPENDIX E**  
**PARTICIPANT SELECTION SURVEY--INCLUDING**  
**CONSENT FORM**

## PARTICIPANT SELECTION SURVEY

Q1.1 Do you agree and consent to the following?

Q1.2 CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH  
UNIVERSITY OF NORTHERN COLORADO  
(Consent for participation in anonymous online demographic survey only)

**Purpose and Description:** The purpose of this study is to explore and analyze the experiences of tenure-track engineering faculty members who identify as sexual minorities. As a participant in this study, you agree to complete this survey by providing information that will be used to describe the lived experiences of tenure-track engineering faculty who identify as sexual minorities (lesbian, gay, queer, bisexual, other; LGBTQ+). This survey is anonymous and should take no more than 10 to 15 minutes to complete. Should you choose to continue as a participant in the follow-up interview portion of this study, you will be asked to sign a separate consent form and therefore you will no longer be anonymous. However, with continued participation your identity will only be shared with the researcher and her doctoral committee chair on a password protected system.

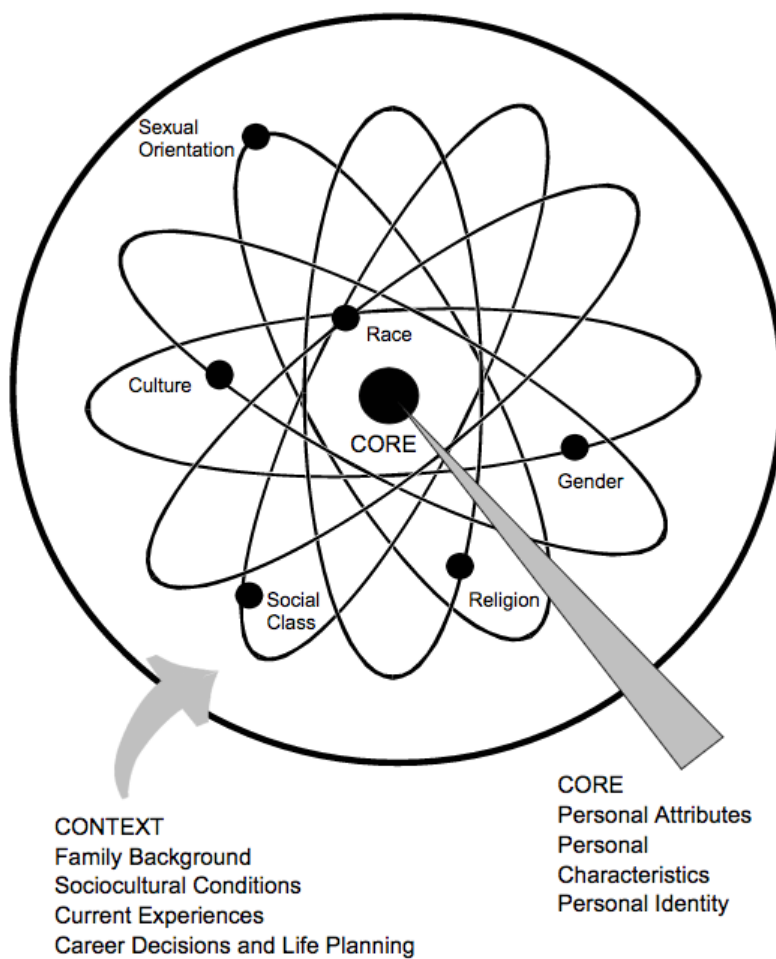
Although you will receive no direct benefit or compensation from participating, an indirect benefit may include satisfaction in your role of providing empirical knowledge on the experiences of a sexual minority tenure-track faculty member in engineering. Potential risks in this project are minimal. However, there is the chance that you will experience discomfort or anxiety while answering questions. These emotions should not be outside what you have experienced in your day-to-day life as an engineering faculty member who is also a member of the LGBTQ+ community. However, you may choose not to answer any question posed except for the inclusion criteria questions. Should you experience unexpected emotions, reactions, or feel unsettled or uncomfortable, you will also have the option to discontinue your participation in this study.

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions (by contacting the researcher at the phone or email listed above), please indicate below if you would like to participate in this anonymous survey portion of the research. A copy of this form can be printed directly from this website so that you can retain it for future reference.

If you have any concerns about your selection or treatment as a research participant, please contact Sherry May, IRB Administrator, Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

- Q1.3 Do you agree to the consent and wish to participate in this online, anonymous survey?
- Yes, I consent to participation and would like to complete the survey. (1)
  - No, I do not consent to participation. I wish to exit the survey now. (2)
- Q2.1 For the purposes of this study, engineering faculty are individuals who have earned a graduate degree in a designated engineering field that leads to the professional practice of engineering and who work in a program that awards degrees in designated engineering fields. Field of degree and field of employment need not be the same.
- Q2.2 Are you currently employed in a full-time tenure-track position within an engineering college, school, program, or department within the United States?
- Yes
  - No
- Q2.3 Is the institution where you work defined as a Doctoral University according to the 2015 Carnegie Classification? If you are unsure you can check on this website < <http://carnegieclassifications.iu.edu/lookup/lookup.php>>.
- Yes (1)
  - No (2)
- Q2.4 Do you identify as heterosexual?
- Yes
  - No
- Q3.1 The following graphic is intended to help you consider the multiple dimensions of your identity.

Q3.2



Model of Multiple Dimensions of Identity (Jones & McEwen, 2000)

- Q3.3 Using the above graphic as a guideline, how would you describe your identity? Feel free to include aspects of context and core as shown above or any others you consider important. (Any length of answer will be recorded in this window. There is no word limit.)
- Q3.4 Do you feel that you have to deny dimensions of your identity in the workplace? If so, when? Why? (Any length of answer will be recorded in this window. There is no word limit.)

Q3.5 What is your highest earned academic degree?

- PhD / DEng
- MS / MSc / SM / ScM
- MA
- Other, please specify: \_\_\_\_\_
- I do not wish to specify

Q3.6 In which engineering discipline did you earn your highest degree? Please check all that apply.

- Engineering, general
- Aerospace, Aeronautical, or Astronautical
- Agricultural
- Architectural
- Bioengineering/Biomedical
- Biological
- Ceramic
- Chemical/Chem-Bio
- Civil
- Computer Engineering (not Computer Science)
- Electrical/Electronics
- Engineering Education
- Environmental/Environmental Health
- Industrial
- Materials
- Mechanical
- Metallurgical
- Mining
- Nuclear
- Petroleum
- Systems
- Other, please specify: \_\_\_\_\_

Q3.7 What is your age range?

- 20 to 29 years old
- 30 to 39 years old
- 40 to 49 years old
- 50 to 59 years old
- 60 to 69 years old
- 30 to 79 years old
- 80+ years old
- I do not wish to specify

Q3.8 What is your ethnicity?

- Hispanic or Latino
- Not Hispanic or Latino
- I do not wish to specify

Q3.9 What is your race? Please check all that apply.

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White
- I do not wish to specify

Q3.10 What is your gender identity? Please check all that apply.

- Female
- Male
- Agender
- Demigender
- Genderqueer
- Intersex
- Transgender
- Other, please specify: \_\_\_\_\_
- I do not wish to specify

Q3.11 What is your sexual identity? Please check all that apply.

- Lesbian
- Gay
- Bisexual
- Asexual
- Demisexual
- Pansexual
- Queer
- Other, please specify: \_\_\_\_\_
- I do not wish to specify

Q3.12 What is your faculty rank?

- Instructor
- Senior Instructor
- Assistant Professor
- Associate Professor
- Professor
- Other, please specify: \_\_\_\_\_

Q3.13 Are you tenured?

- Yes
- No

Q3.14 In which engineering department are you rostered for tenure purposes? Please check all that apply.

- Engineering, general
- Aerospace, Aeronautical, or Astronautical
- Agricultural
- Architectural
- Bioengineering/Biomedical
- Biological
- Ceramic
- Chemical/Chem-Bio
- Civil
- Computer Engineering (not Computer Science)
- Electrical/Electronics
- Engineering Education
- Environmental/Environmental Health
- Industrial
- Materials
- Mechanical
- Metallurgical
- Mining
- Nuclear
- Petroleum
- Systems
- Other, please specify: \_\_\_\_\_

Q3.15 What is the approximate gender distribution, in percentage, among faculty within the department in which you are rostered? (Total must sum to 100%.)

\_\_\_\_\_ % Female

\_\_\_\_\_ % Male

\_\_\_\_\_ Other (as self identified by your colleagues)

\_\_\_\_\_ I don't know

Q3.16 In what geographic location/state is the institution where you work located?

Northwest (AK, WA, OR, ID, MT, WY)

Southwest (HI, CA, AZ, NV, UT, NM)

Midwest (CO, KS, NE, SD, ND, MN, IA, MO)

South (TX, OK, LA)

Southeast (AR, MS, AL, TN, NC, SC, GA, FL)

Great Lakes (MI, WI, IL, IN, OH, KY, WV, VA, MD, DE)

New England (PA, NY, NJ, CT, RI, NH, VT, MA, ME)

U.S. Territories (Puerto Rico, Guam, Northern Mariana Islands, U.S. Virgin Islands, American Samoa)

Q3.17 Is the institution where you work ...?

Public

Private

Q3.18 Approximately how many undergraduate students are enrolled in your university? (If your university maintains multiple campuses, please answer based on your specific campus. There is an answer option for "I don't know.")

Please select a range

0-4,999

5,000-9,999

10,000-14,999

15,000-19,999

20,000-24,999

25,000+

I don't know



- Q3.19 Approximately how many graduate students are enrolled in your university? (If your university maintains multiple campuses, please answer based on your specific campus. There is an answer option for “I don't know.”)
- Please select a range
  - 0-4,999
  - 5,000-9,999
  - 10,000-14,999
  - 15,000-19,999
  - 20,000-24,999
  - 25,000+
  - I don't know
- Q3.20 Approximately how many undergraduate students are enrolled in your college/school of engineering? (There are answer options for “I don't know” and “not applicable.”)
- Please select a range
  - 0-499
  - 500-999
  - 1,000-1,499
  - 1,500-1,999
  - 2,000-2,499
  - 2,500-2,999
  - 3,000-3,999
  - 4,000-4,999
  - 5,000+
  - I don't know
  - Not applicable
- Q3.21 Approximately how many graduate students are enrolled in your college/school of engineering? (There are answer options for “I don't know” and “not applicable.”)
- Please select a range
  - 0-499
  - 500-999
  - 1,000-1,499
  - 1,500-1,999
  - 2,000-2,499
  - 2,500-2,999
  - 3,000-3,999
  - 4,000-4,999
  - 5,000+
  - I don't know
  - Not applicable

- Q3.22 Approximately how many undergraduate students are enrolled in your department or program? (There are answer options for “I don’t know” and “not applicable.”)
- 0-249 (1)
  - 250-499 (2)
  - 500-749 (3)
  - 750-999 (4)
  - 1,000-1,249 (5)
  - 1,250-1,499 (6)
  - 1,500-1,749 (7)
  - 1,750-1,999 (8)
  - 2,000+ (9)
  - I don't know (10)
  - Not applicable (11)
- Q3.23 Approximately how many graduate students are enrolled in your department or program? (There are answer options for “I don’t know” and “not applicable.”)
- 0-249
  - 250-499
  - 500-749
  - 750-999
  - 1,000-1,249
  - 1,250-1,499
  - 1,500-1,749
  - 1,750-1,999
  - 2,000+
  - I don't know
  - Not applicable
- Q3.24 How would you describe the community surrounding your university? Include your opinions of the social and economic status, attitudes and values, demographics, and any other factors you feel might impact discourse with your colleagues and students. (Any length of answer will be recorded in this window. There is no word limit.)
- Q3.25 Is there anything else that you'd like to mention? (Any length of answer will be recorded in this window. There is no word limit.)
- Q3.26 Thank you for your input to this point! Would you be interested in furthering your participation in this study by volunteering for a personal interview?
- Yes - tell me more
  - Maybe - tell me more
  - No

If No Is Selected, Then Skip To End of Survey

- Q4.1 Thank you for considering continued participation in this research study. The next steps will include: (a) review and submission of a signed informed consent form by email; (b) one interview via a web-based medium, expected to last between 60 and 90 minutes; (c) submission of three to five photographs of items in your work space that identify and/or honor aspects of the multiple dimensions of you identity. For example, these items might include family or vacation photos, awards from academic or social organizations, professional engineering licensure certificates, diplomas, or symbols of your religious affiliation; and (d) willingness to review the transcript of your interview and the narrative created by the researcher based on your survey and interview responses to ensure authenticity and accurate representation. The interviews can be scheduled at your earliest convenience after the signed consent form has been returned to the researcher. Transcripts will be ready for review within two weeks of the interview and you will be asked to review and return changes to the transcript within two weeks. Narratives are expected to be ready for review by approximately June 15, 2017.
- Q4.2 Based on these expectations, are you still interested in continuing your participation?
- Yes, I am still interested. What's next?
  - I am no longer interested in continued participation. Please record my responses anonymously.

If "I am no longer interested..." Is Selected, Then Skip To End of Survey

- Q4.3 Thank you for your interest in continuing on to the next phase of this research! Please provide your email address and expect to receive an email response from me with more details and the consent form that needs to be signed to participate in the remainder of the study. The email address that you enter can be your work or personal email, or a generic email that you set up just for use in this study such as SM-engineer@yahoo.com.
- Q4.4 Please provide your preferred pseudonym for use throughout the remainder of this study

**APPENDIX F**

**CONSENT FORM FOR SEMI-STRUCTURED INTERVIEW**



CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH  
UNIVERSITY OF NORTHERN COLORADO

(Consent for participation in confidential interview portion of study; signature required)

Project Title: Experiences of Engineering Faculty Members Who Identify as Sexual Minorities

Researcher: Robyn E. Sandekian, Ed.S.--College of Education and Behavioral Sciences: Higher Education Student Affairs Leadership  
Phone: xxx-xxx-xxxx  
E-mail: sand9372@bears.unco.edu

Research Advisor: Tamara Yakaboski, Ph.D.--Associate Professor, College of Education and Behavioral Sciences: Higher Education Student Affairs Leadership  
Phone: 970-351-1156  
E-mail: tamara.yakaboski@unco.edu

**Purpose and Description:** The purpose of this study is to explore and analyze the experiences of tenure-track engineering faculty members who identify as sexual minorities. As a participant in this study, you will participate in a one-on-one interview via computer-mediated communication (ZOOM videoconferencing software) lasting approximately 60- to 90-minutes and will be asked to provide approximately three to five photographs to the researcher via email. The interview may be held at a location of your choosing--if you are in close proximity to the Denver Front Range area I can physically travel to a destination of your choosing, or you can choose to participate in the web-based interview from your office, home, or other location where you feel comfortable.

The web-based interview will be guided by approximately 20 questions seeking to better understand your experiences as a faculty member with multiple dimensions of identity. Prior to the interview, I ask that you photograph some aspects of your personal workspaces, whether that be your on-campus office, laboratory, or any other place where you spend significant time on campus. You will be asked to take and submit approximately three to five photographs of personal items that identify and/or honor

aspects of the multiple dimensions of you identity. For example, these items might include family or vacation photos, awards from academic or social organizations, professional engineering licensure certificates, diplomas, or symbols of your religious affiliation. You will be also encouraged to identify items that negatively influence your comfort within your larger work environment, and will be asked to share those in addition to the three to five photos of your personal workspace. These photographs will be a main topic of discussion during our interview. Please do not take photographs of colleagues or students. If you include family photographs among those you send, and you have the ability to do so, please obscure individuals' faces. If you do not have the ability to do that, please send the photos and I will do that after receipt. I will not publish any photograph--they are solely for use during our discussion and during my data analysis process. You will be asked to email these photographs to me after you have submitted your signed consent form and before we meet for our interview. Alternatively, if you don't personalize your workspace, you'll be asked to discuss your reasons for that during our interview.

Your interview will be audio recorded and transcribed by the Researcher, Robyn Sandekian or by a transcriptionist personally known to the researcher. I will take every precaution in order to protect your confidentiality. I will ask that you use a pseudonym (pretend name) for reporting purposes including during the recorded interview. The transcriptionist, should one be used, will not know your real name, nor will s/he keep copies of either the audio file or the written transcript after completing the initial transcription. Only my research advisor and I will know your real name because it will be included on this consent form. All data collected and analyzed for this study will be kept in a locked cabinet in the Researcher's home office, which is only accessible by the Researcher. All electronic data (consent forms, recordings, transcript files) will be kept on a secure cloud-based data service (Dropbox.com or Google drive) that is password and firewall protected. Only the researcher will have access to this online information with the exception of the consent forms that must be shared with and maintained by my research advisor. Any back ups of this information will be kept on the researcher's secure (password/firewall protected) laptop. Throughout the interview, I will use the pseudonym that you selected during the online demographic survey. As the researcher, I will be the only person who will know which name is associated with which pseudonym. The information collected will be stored in a password-protected computer and I will be the only individual with access to this password. I will destroy any identifying information three years from completion of my study

Although you will receive no direct benefit from participating, an indirect benefit may include satisfaction of sharing your stories about your lived experiences as an engineering faculty member with multiple dimensions of identity, including at least one underrepresented identity that is often overlooked in diversity discussions and satisfaction in your role of providing empirical knowledge on the experiences of a sexual minority tenure-track faculty member in engineering. Potential risks in this project are minimal. However, there is the chance that you will experience discomfort or anxiety while answering questions. These emotions should not be outside what you will have experienced in your day-to-day life as an engineering faculty member and member of the

LGBQ+ community. However, you may choose not to answer any question posed and skip the photo submission portion of the study if you so choose. Sample questions include, “What are some of the things that you enjoy about your current professional position? What are some of the stresses you face in your current professional position? In what ways, positive or negative, if any, does your identity affect your *professional/personal* relationships with your peers? How would you describe your relationship with your students *in the classroom*? How about *outside the classroom*?”

Should you experience unexpected emotions, reactions, or feel unsettled or uncomfortable, you will also have the option to discontinue your participation in this study.

There is no compensation for participation in this study.

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference.

If you have any concerns about your selection or treatment as a research participant, please contact Sherry May, IRB Administrator, Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

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Subject’s Signature

---

Date

---

Researcher’s Signature

---

Date

**APPENDIX G**

**GUIDELINE OF TOPICS FOR SEMI-STRUCTURED INTERVIEW**



## GUIDELINE OF TOPCS FOR SEMI-STRUCTURED INTERVIEW

On your demographic survey you selected the pseudonym \_\_\_\_\_. Is that still the name that you would like to use throughout this study? The pseudonym is intended to maintain your confidentiality. That name will be used throughout my dissertation and any journal articles that I publish using my data. As is described in the informed consent document, only my research advisor and I will be able to connect your pseudonym to your actual name because we have to maintain the informed consent forms for a period of three years per University of Northern Colorado IRB policy.

I'd like to start this interview with some big picture questions regarding your decision to become an engineering faculty member at a doctoral institution, then we'll discuss a bit about your relationships with colleagues and students. Afterwards, I'd like to ask you to discuss your identity and share the meaning behind the photographs that you took.

- 1) Tell me a little bit about what led you to your current faculty job at your specific institution.
- 2) What are some of the things that you enjoy about your current faculty position?
  - a) How does your current faculty position fit with your personal identities?
- 3) What are some of the stresses you face in your current faculty position?
  - a) In what ways, if any, do the stresses you face in your current faculty position relate to your identities?
- 4) What makes your workgroup unique?
- 5) What makes you unique?
- 6) How would you describe your relationships with people in your immediate workgroup?
- 7) How much do you know about your workgroup peers' lives outside of work?
  - a) Why do you think that is the case?
- 8) How much do you share with your workgroup peers regarding your life outside of work?
  - a) Why do you think that is the case?

- 9) In what ways, positive or negative, if any, does your identity affect your professional relationships with your peers?
- 10) In what ways, positive or negative, if any, does your identity affect your personal relationships with your peers?
- 11) Do you feel that you can be open and honest with members of your workgroup regarding all aspects of your identity? Why do you say that?
- 12) What makes you feel similar to your workgroup peers?
- 13) What makes you feel *different* from your workgroup peers?

Moving on to the topic of students,

- 14) What aspects of your identity do you feel that you intentionally incorporate into your classroom?
  - a) What aspects of your identity do you intentionally *exclude* from the classroom?
- 15) How would you describe your relationship with your students *in the classroom*? [Prompt if necessary: For example, are you formal in class or do you joke around with students?]
- 16) How would you describe your relationships with your students *outside the classroom*?
- 17) How much do you discuss about your life and identities with your students?
- 18) In what ways, positive or negative, if any, does your identity affect your *professional* relationships with your students?
- 19) In what ways, positive or negative, if any, does your identity affect your *personal* relationships with your students?

Alternative questions to consider:

- 20) In what situations would you/do you tell your coworkers about aspects of identity? (from Swan, 2016)
- 21) In what situations would you/do you tell your students about aspects of you identity? (from Swan, 2016)
- 22) What do you think people's attitudes are/would be toward you if they knew?

- 23) Do you think that telling someone about your sexual identity would affect how they treated you? In what ways?
- 24) Tell me some of the challenges you face as an A B C (ex. gay white male) working in engineering--based the A, B, C on information from the participant's demographic survey. (from Bowleg, 2008)

Now it's time for you to describe the photographs that you took and explain their meanings. I am specifically interested in how those items relate to your multidimensional identity.

**Photo elicitation questions**

- 1) Why did you choose this photo/item?
- 2) What is its significance?
- 3) How does it demonstrate your identity?
- 4) Where do you keep it in your office space? Why do you keep it in your office space?
- 5) What do you say about this photo when asked? Does it matter who is asking?

After all photographs are discussed, finish the session with the following:

Thank you for participating. I will be following up with you by email within 15 days to ask if you want to review the interview transcript and to see if you came up with any additional topics relevant to the study that you might like to discuss.