

AC 2009-1862: “ENGINEERS WHO HAPPEN TO BE GAY”: LESBIAN, GAY, AND BISEXUAL STUDENTS’ EXPERIENCES IN ENGINEERING

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“Engineers Who Happen to be Gay:” Lesbian, Gay, and Bisexual Students’ Experiences in Engineering

Abstract

While much is known about the experiences of women and racial/ethnic minority students in engineering education, the experiences of lesbian, gay, and bisexual (LGB) identifying students remain unstudied. This paper breaks this silence with a study of the ways LGB students at a major research university in the Western US both experience and navigate the climate of their engineering college. We find that, because of pervasive anti-gay sentiments and dualistic thinking that often conflates homosexuality with technical incompetence, these students do not have access to the same opportunities of success as their heterosexual peers. Nevertheless, through coping strategies which require immense amounts of additional effort, LGB students bravely navigate this climate with tactics that include “passing” as heterosexual, “covering” or downplaying cultural characteristics associated with LGB identities, and garnering expertise that makes themselves indispensable to others. These additional work burdens are accompanied by academic and social isolation, often making engineering school a hostile place for LGB identifying students. Beyond breaking ground on an unstudied population, this research theorizes categories of inequality within engineering education, such as sexual identity, which often do not have visible markers and often require disclosure.

Introduction

The American Society of Engineering Education “Statement on Diversity” reads, “ASEE believes that regardless of gender, age, race, ethnic background, disability, or national origin all individuals must be provided with equality of opportunity to pursue and advance in engineering careers”.^{1, i} While this is an important position statement, it is notably missing the human diversity dimension of “sexual orientation,”ⁱⁱ among other possibilities. Students who identify as lesbian, gay, or bisexual (LGB) are enrolled in our engineering colleges, but what are the experiences of these students? *Do they have equality of opportunity within American engineering schools?*

Researchers have made impressive strides in understanding the experiences of women and racial/ethnic minority (REM) engineering students, exposing how cultural biases foster chilly climates which hinder the success of these students. But the issue of sexual orientation in engineering has yet to be even mentioned in social science literature. Indeed, the only publications the authors could locate related to this topic are two visionary articles on LGBT people in professional engineering, but neither are systematic studies. In the February 2005 issue of *IEEE Spectrum*, journalist Prachi Patel Predd interviewed a lesbian and a gay engineer and notes that the situation for LGB professional engineers may be improving in high tech companies. However, the engineers she interviews still face considerable anti-gay bias in the workplace and legally may be fired for being gay in many states within the US.² More recently, Donna Riley’s 2008 article in *Leadership and Management in Engineering*, provides a primer on definitions of LGBT categories and issues facing LGBT persons in engineering workplaces, and

makes recommendations for creating LGBT-friendly workplace cultures.^{3,4} Nevertheless, this topic has yet to be systematically examined in either professional engineering settings or engineering education. We break new ground with a study of LGB students enrolled in a major US engineering college we call “Gold University.”

This project draws on intensive interviews and focus group meetings with seventeen engineering students from a variety of engineering sub-disciplines and educational levels. Our research questions investigate (1) the climate these students experience, (2) the effects of this climate on their lives, and (3) the coping techniques they utilize to navigate engineering school. While these students have a range of experiences, some recurring themes emerge in our data. We find that LGB engineering students face a considerably strong heteronormative (pro-heterosexual) climate within the Gold University engineering school, widely understood to be an “apolitical” and “meritocratic” space. This climate is fraught with dualistic thinking about sexual orientation and engineering work, leading LGB engineering students into both academic and social isolation. In order to succeed in the field, these students must compartmentalize their lives--a requirement which burdens them with additional academic and emotional work. They work extremely hard to maintain their credibility as competent students as they face the potential of being discredited because of their sexual identity. These students must daily negotiate public knowledge of their personal lives in a climate which reinforces heterosexual norms. LGB engineering students must actively downplay any cultural characteristics associated with LGB identities, pressured to be “engineers who happen to be gay” rather than “gay engineers.”

“Covering” within a Professional Culture of Dualisms

The process of becoming a professional involves more than the mastery of technical competence or expert knowledge, but involves learning a culture and obtaining a professional identity.^{5,6,7} Professionalization is the process by which students learn and adapt to this culture, contend with uncertainty, and begin to understanding the ethical responsibilities of a professional.^{7,8,9} Professional cultures inculcate numerous norms and assumptions, producing mental habits in professionals that become taken for granted.¹⁰ Through the rituals of coursework, internships, and informal interactions, students become professionals as they adapt to this professional culture and learn what it means to be a capable engineer.^{5,7,8,11,12} The longer they spend in the initiation process, the more firmly impressed upon the students are the values of the profession.^{13,14} If the socialization process fosters a culture in which certain groups of people are favored over others, this can create a “chilly climate” for disadvantaged groups, deterring members of these disadvantaged groups from persisting in engineering education and beyond.

Research on “chilly climates” within engineering education largely focuses on the experiences of women and racial minorities. In the former, researchers have found “chilly climates” which are unwelcoming to women and can have negative impacts on women’s sense of self-efficacy within engineering school.^{15,16,17,18} Researchers investigating the experiences of racial and ethnic minority (REM) students have also found chilly climates which are biased against minority students, particularly African-Americans, Latinos and Native-Americans.^{15,19}

A key mechanism for the facilitation of chilly climates for women (particularly within professional engineering) is the pervasiveness of dualistic thinking.²⁰⁻²² At the heart of

engineering culture is a strong propensity for dualistic styles of thought.^{20, 23, 24} Starting in undergraduate training, engineers learn to differentiate between people-focused/technological-focused, detached objectivity/emotional connectedness, hard/soft technologies, etc.²⁰ Of course, such dualisms do not exist in engineering practice, as engineers' work is necessarily heterogeneous,²⁵ but engineering scholars have noted the surprising extent to which engineers are able to maintain these dualistic ideologies in spite of their heterogeneous lived experiences.^{22, 23, 24, 26}

One particularly relevant dualism for gender inequality in engineering is the technical/social distinction—the ideological separation between technically-focused activities (such as design, science, and math-related activities) and socially-focused activities (such as management, communication with other employees and clients, etc). Educational training is overwhelmingly focused on technical aspects of engineering, and teach students very little management or communication-related skills.^{27, 28, 29} “Core technical” work, then, is work which is most closely-aligned with this training. The technical and social realms, furthermore, are seen as mutually exclusive: “To be ‘technical’ is to be ‘non-social’”.²² This is in part an exercise in boundary work, where engineers emphasize their technical expertise to uphold status within their profession.³⁰ But, more than that, the technical/social dualism is a central part of the engineering identity: to be considered a competent engineer requires “throwing oneself” into technical activities.³¹

Unsurprisingly, the “technical” is more highly valued in all realms of the profession (training, education, work) than the social. And a technical/social dualism is often mapped directly onto a corresponding masculinity/femininity binary, having consequences for women within the profession. Faulkner claims, “The distinction between being technology-focused, on the one hand, and people-focused, on the other...maps very readily onto the sociological distinction between masculine instrumentalism and feminine expressiveness”.²⁰ Women face a cultural non-congruence between their gender and their engineering identity, threatening their stance as “real” engineers and their reception as competent, skilled, and valuable technical workers.^{iii; 20, 31, 32}

Our investigation requires the exploration of another consequential dualism: the heterosexual/homosexual binary. As Sedgwick emphatically claims, “a critical analysis of modern homo/heterosexual definition” is central to the understanding of virtually any aspect of modern Western culture.³³ It remains an empirical matter for our investigation, thus, to show how a heterosexual/homosexual binary becomes culturally mapped onto a technical/social dualism, with homosexuality relegated to the devalued sphere of sociality and politics—outside of engineering. Table 1 below shows the mapping and differential valuation of various cultural binaries found within engineering work which we explore in this study.

Table 1: Differentially Valued Binaries within Engineering Work

Dualism	More Highly-Valued	Less Highly-Valued
Work	Technical	Social
Gender	Masculinity	Femininity
Sexual Orientation	Heterosexuality	Homosexuality

At the interactional level, LGB identifying individuals must navigate a heterosexist culture which stigmatizes gay identities. According to Goffman,³⁴ for a person who possesses a stigmatized identity, navigating a social world dominated by “normals” depends crucially upon whether signs of the person’s stigma are visible or not. If signs are not visible, then a person who possesses a potential stigma is “discreditable” rather than immediately “discredited.”³⁴ In these situations, a discreditable person may be required to adopt the strategy of “passing,” being careful not to reveal his or her stigmatized status to individuals who would apply stigma, while simultaneously revealing this status to a group of confidantes.³⁴ Institutions and cultures may create “passing demands” which require LGB persons to remain closeted. For example, the 1993 “Don’t Ask Don’t Tell” policy of the US Military requires that LGB persons pass in order to keep their jobs. Yoshino states, “Under ‘Don’t Ask Don’t Tell,’ gays can no longer be excluded just for being gay, but can be excluded for coming out.”³⁵

However, according to Yoshino, passing demands for LGB persons have been giving way to less stringent rules in many US sectors. Individuals “can be gay” as long as they “don’t ‘flaunt’”.³⁵ These are demands for lesbian, gay, and bisexual people to participate in what Goffman calls “covering,” attempts to minimize the obtrusiveness of traits associated with a known stigmatized identity. He states, “[P]ersons who are ready to admit possession of a stigma (in many cases because it is known about or immediately apparent) may nonetheless make a great effort to keep the stigma from looming large. The individual’s object is to reduce tension, that is to make it easier for himself [sic] and the others to withdraw covert attention from the stigma...”³⁴ In the case of LGB persons, engaging in covering behaviors involves concealing and downplaying cultural markers typically associated with an LGB identity, including discussions of same-sex relationships, demonstrations of gay culture, or displays of same-sex affection.³⁵ Such covering demands permit people to be gay, lesbian, or bisexual, so long as cultural attributes associated with their stigmatized identities are concealed such that the dominant heterosexual culture is not disrupted; consequently, covering demands still relegate LGB people to a status of second-class citizenship.^{iv} In one example of a gay covering demand, a flight attendant asked a man who had fallen asleep resting his head on his male partner’s shoulder to “stop that” because it was disturbing other passengers.³⁶

As an alternative to “covering” and “passing,” Yoshino identifies the strategy of being “authentic,” in which people have the opportunity to express their true sense of self. This strategy gives people a feeling of being “real” and an ability to relate to the world as oneself.³⁵ While people permitted to live a life of authenticity still have the opportunity to maintain healthy boundaries, a climate which supports this approach allows individuals the option to express themselves and to engage with others on more equal footing.

In summary, we use these theoretical tools to investigate the experiences and strategies of LGB engineering students at Gold University. To understand the climate these engineering students face, we explore ways that a dualistic culture creates deterrents by associating heterosexuality with technological competence while relegating homosexuality to the devalued sphere of sociality and politics. We also investigate ways that engineering school culture does or does not include passing and covering demands directed at LGB students. To understand the coping mechanisms these students employ, we investigate ways that students deploy passing, covering, or authenticity strategies, and to what effect. By studying the climate for LGB students at Gold

University, and looking at the effects of this climate, we begin to uncover whether LGB engineering students are provided equality of opportunity within the context of engineering education.

Methods

We conducted formal in-depth semi-structured interviews and focus groups with seventeen engineering students (11 identifying as gay, 4 as bisexual, and 2 as lesbian), both undergraduates and graduates (see Appendix Table 1). Six of our respondents identified as Hispanic, two as Asian, and the rest as white. Respondents were all students at “Gold University,” a large, research-oriented, and competitive public university in the western US. Respondents frequently describe the climate of Gold University as “typical” or “unexceptional” in comparison to other universities. The study was conducted between January and December of 2008.

We conducted our study with full and enthusiastic support of Gold University administrative staff, including the Dean of the engineering college. Nevertheless, many factors made our data collection quite challenging. First, unlike other minority groups in engineering, there are no student organizations or central social centers that cater to LGB engineering students.^v Additionally, most students desire to remain at least partially closeted to other engineering students and the topic of the interview itself may also be uncomfortable for some students to discuss with a stranger. We advertised our study by hanging fliers around campus for 10 weeks^{vi}, wrote announcements on lecture-hall chalkboards, included advertisements in five of the weekly e-newsletters that go out to every engineering student, and sent a message to every person in the Gold University “network” on a popular social networking website who indicated that they were engineering students and were interested in same-gender relationships.^{vii}

We conducted formal semi-structured interviews with each of our respondents (see Appendix Table 2 for interview schedule), lasting between 45-90 minutes each, at the on-campus location of the respondent’s choosing. In our interviews, we asked students about their identities, their interactions with faculty, interactions with other students, their views on the climate in the engineering program of Gold University, and their coping strategies. Due to the sensitive nature of the topic, we offered respondents the option of conducting the interview in our offices or anonymously over online instant-messaging programs. All respondents elected to have face-to-face interviews, in one of our offices or at various public locations on campus.

Nine of the seventeen interviewees participated in focus groups (see Appendix Table 3 for focus group questions) which lasted 90-150 minutes.^{viii} In this focus group setting, we observed informal interactions, the first time that all respondents were in a room with more than one other LGB engineering student, and for a few of the respondents it was the first time they had ever *met* another LGB engineering student. The purpose of the focus groups was to facilitate discussion of the climate with multiple respondents at once, uncovering points of consensus and disagreement.^{ix} Prefacing that students need not agree with one another or with us, we asked questions about climate in engineering school, the effects of climate, and their coping strategies. We also showed websites of various organizations designed for support of LGBT people in science and engineering, including Out in Science, Technology, Engineering, and Mathematics (oSTEM) (<http://www.ostem.org>), Stanford Queer Engineers and Scientists (SQUEAS)

(<http://www.stanford.edu/group/squeas>), and National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP) (<http://www.noglstp.org>).

To analyze the data, we employed a dual-pass coding strategy. In the first pass, interview and focus group transcripts were coded under three themes derived from our research questions: “climate,” “effects of climate,” and “coping strategies.” Once the data were coded for these three basic elements, we analyzed the data within each code to extract themes that emerged as patterns across respondents. For “climate,” we extracted themes including “hostility,” “don’t ask/don’t tell,” “hegemonic masculinity,” “engineering skills questioned due to sexual identity,” and “socially conservative.” For “effects,” we extracted themes such as “social isolation,” “academic isolation,” “job security fear,” and “emotional energy burden.” Finally, for “coping strategies,” we extracted themes such as “living compartmentalized lives,” “participating in pro-LGB organizations,” “joking,” and “emphasizing technical expertise and indispensability.” The theoretical apparatus of “covering” within a dualistic culture, building on Yoshino, Goffman, and Faulkner, helped us to organize these coded data and to present it with more compelling explanatory force. For this paper, we selected quotations that were exemplars of the various themes in our coded data, rather than extreme cases. If a theme is rare in the data, we note it as such in the results section of this paper.

An unusual challenge in our study was that this was the first time many respondents had ever discussed their experiences as being both LGB and engineers. This meant that they had no standardized interaction scripts, pre-fabricated “definitions of the situation,”³⁷ at the ready about “LGB engineers” on which they could rely in moments of uncertainty or awkwardness. It also meant that we had to be extremely careful not to impose researcher-generated scripts onto our respondents. To the extent possible, we utilized respondents’ own language when asking clarification questions.

The final challenge we faced was that many respondents identified with multiple identities in addition to lesbian, gay, or bisexual—a reality that has been theorized as “intersectionality.”^{38, 39} Students’ experiences are shaped by their locations in hierarchies of gender, race/ethnicity, etc. in addition to their sexual identities. We made every attempt in our interviews to encourage discussion about gender or race, without reverting to discussions of “only” sexual identity. However, in our analysis, our limited sample size and the magnitude of the task of describing LGB identities for the first time prevent us from making generalizations about the experiences at specific intersections. While we are sensitive to these issues, we leave it to future researchers to describe these intersections more fully.

There are several limitations on the generalizations we can make with our data. Our sample is relatively small with many variations in degree level and sub-discipline, so we are extraordinarily cautious in generalizing to all LGB students in engineering, and especially to the specific experiences of these sub-populations. Instead, we attempt to tie our findings to broader *cultural issues* identified in engineering by other scholars in order to identify mechanisms by which these cultural elements become part of the climate students experience. Additionally, we received descriptions of the climate second-hand; we did not observe the day-to-day interactions that create this climate. Despite these limitations, we believe that this study is a useful first step in understanding the experiences of LGB students in engineering.

Results

Engineers Experience an Oppressive Climate Fraught With Dualistic Thinking

We find evidence for the operation of three dualisms in the climate experienced by LGB students: the previously discussed technical/social dualism, a masculine/feminine dualism, and a heterosexual/homosexual dualism with differential valuation (See Table 1). Similar to the oppressive effects of these dualisms for women in the workplace, they have consequences for how LGB engineering students feel they are perceived by other engineers. In other words, the dualisms within the climate foster hostility, heteronormativity, and passing and covering demands. We describe each of these in turn.

Heterosexual/Homosexual Dualism

The climate respondents experience includes a clear distinction between heterosexual and homosexual individuals: heterosexual students belong in engineering, LGB students do not:

[I expect to hear] “what are you doing in engineering? You’re gay!” (Isaiah, male gay undergrad)

From my experiences in engineering, it is the stereotypical straight white male. To not fit these criteria, to be somewhat abnormal, somewhat strange, is a problem. If you can’t take their sexuality seriously, then you can’t take the person who is identifying as it seriously. Therefore, if you don’t take someone seriously, why would you take their work seriously? (Lisa, female bisexual undergrad)

The climate Isaiah and Lisa experience makes an explicit distinction between gay and straight students, and an implicit statement that straight students hold a privileged place in engineering.

Like other dualistic ideologies in engineering, there is little tolerance for ambiguity (at least ideologically speaking) within the heterosexual/homosexual binary. Bisexual students note that there is likewise little tolerance for students who do not fit into either the “gay” or “straight” category:

A lot of people don’t understand, I think a lot of them are confused by bisexuality....thinking that bisexual people are really slutty. I am weirded out by the fact that my colleagues would speculate about that, which I know has happened. In some ways, I’m more comfortable with them thinking that I’m a lesbian... (Sara, female bisexual grad)

Sara found that classmates did not deal well with her ambiguous position in the heterosexual/homosexual dichotomy, and Sara is even willing to tell others she is lesbian instead of bisexual to avoid reactions to that ambiguity.

Heteronormative Hostility

While expressions of the heterosexual/homosexual binary are usually subtle, at times they can be overt and downright hostile. All but two respondents offered at least one instance of explicit anti-gay epithets. Eric recounts his interaction with students in his freshman residence hall:

Four other guys and I were playing some sort of computer game, where you have these like macho fighting people with people without their shirts on or something. One was like, “oh, what turns you on? naked men fighting?” The other remark, the word “faggot” was said, not pertaining to any particular person in the room, but just kind of an epithet thrown in to punctuate the sentence somehow. ...I think just to prove their masculinity, they made a comment about how “faggots do that” or something. It was very negative, hostile...not just an empty, vacuous implication of the word.

Though words like “faggot” are not often heard in respondents’ environment, all respondents noted that the less offensive (but no less heteronormative) “that’s so gay” remark is used extensively by their classmates.

Additionally, gay male respondents reported experiencing pressures to conform to a straight male breadwinner model: “a girlfriend, a wife, a family with kids and be ordinary like everyone else.” This pressure is exemplified in a story Juan tells about the boss at his internship:

I’m 28 now, and everyone’s expecting a wife, or a girlfriend, or something like that. I show up at the Christmas party with this lady professor—a very good friend of mine—and my boss got a little drunk at the party. He gave a toast in front of everyone, congratulating me for “boning my professor.” I was like, whoa, where did you get that idea? But I couldn’t say no, because he’s my boss. There were a few in the crowd who knew the truth, but no one said anything because he’s the boss, and you don’t contradict the boss.

Juan was considering coming out to his office just before this event, but with such strong a statement of heteronormativity, he did not get up the courage to come out to his co-workers for several more months.

Sometimes, heteronormative statements are couched in *technical* language, marking heterosexuality as the only legitimate category:

One of my friends who is a mechanical engineer was describing the body as a mechanical engine that only functions under various strains and stresses and relationships. And he didn’t think that gayness was one of those relationships...basically, “the man is the plug and the woman is the outlet and if there are two plugs, how is going to charge?” (Lisa)

This invocation of a technical or mechanical rationale for heterosexuality hints at the interconnections between sexual identity and the technical/social dualism.

Alignment of Heterosexual/Homosexual, Masculine/Feminine, and Technical/Social Dualisms

In addition to the heterosexual/homosexual dualism, we found evidence of the operation of both the masculine/feminine and technical/social dualisms in the climate experienced by respondents. For example,

I think that the hegemon is that a man uses his hands, and his tools, to build something, and something *mechanical* is more of a hands-on kind of field, where you have to test everything out. You can't take anything at face value, you have to design it yourself... You have to get hands-on and figure out what's wrong. I think men are raised to be the ones that fix things, that create things that work. Therefore, they are more accepted to work in the field because they have developed the field as their own. (Lisa)

This “hegemon” that Lisa describes invokes technical prowess as a trait of masculine fields and implies that women-dominated fields lack such identification with technical skills. We find an additional layer to this intersection of the technical/social and masculine/feminine binaries. Students’ responses indicate that heterosexual/homosexual is often mapped onto the technical/social dualism by first being conflated with gender (see Table 1). Through the stereotypes of gay men as feminine and lesbian women as masculine, gay men are associated with the “feminine” and thus the “social,” while lesbian women are associated with the “masculine” and thus the “technical.” This mapping has serious consequences for how others’ perceive LGB students’ competence:

I mean, stereotypically, gay men are hairstylists and fashion designers...like, the people who act in the most stereotypically gay fashion have more non-technical jobs. Or maybe it's the other way around, and people are expecting gay men, like, there's no way you could be acting like that in a technical position... (Brian)

I guess there's this assumption that, “oh, you're a lesbian, you're kind of butch, you are definitely kind of more guy-ish, so it would make sense that you are an engineer, because guys are engineers”...I think, for straight women, it's like, “oh, you're pretty, you would want a social type of major.”

Researcher (Q)uestion: Do you think the way that other students see competence in engineering aligns with that?

Um, yeah. I actually think so. Because I'm, I guess, not a stereotypical female, or what is socially constructed as a stereotypical female, it's ok for me to be an engineer. I'm smart enough, I'm able enough. I do think people see lesbians in engineering as more capable than straight women.

Q: What about gay men?

Gay men, I think it's the opposite. They're seen as more incapable than straight men. That gay men are stereotypically feminine. But it's interesting, because it has nothing to do with [being a good engineer] at all. (Becky, lesbian woman undergrad)

I mean, queer women are already seen as being more masculine than straight women, in some sense they are seen as more manly, and so that squares more with the “manly” field they're working in. (Eric)

Becky, Eric, and Brian explain that a complex interplay of dualisms exist in the climate they experience. The heterosexual/homosexual dualism is conflated with the masculine/feminine dualism by referring to the stereotyped representation of gay men as more feminine than straight men and lesbian women as more masculine than straight women (see Kimmel⁴⁰). As devalued halves of pervasive binaries, femininity, homosexuality, and sociality are simultaneously devalued in the climate LGB students experience (see Table 1).

This mapping process may be a key reason why some engineering departments foster more hostile climates than others. When asked to rank engineering degree programs from most to least tolerant of LGB individuals, respondents consistently ranked biological and chemical engineering departments as the most tolerant and electrical and computer engineering and computer science with average tolerance. Mechanical, aerospace, civil and structural departments were considered to be the least tolerant fields. These rankings are based on respondents' perceptions that the more "masculine," "technical", or "hard" a subfield is stereotyped, the less tolerant it is:

In all these different facets of engineering, mechanical is held up as THE engineering field, because it's practical, hands-on, it's where it all kind of stems from. It seems like, the more hands-on you get, the more practical it seems, the more it seems like there is less women, and that there's less openness to having deviations from the standard, normal male-dominated field. (Lisa)

There is reason to believe that this tolerance ranking is quite accurate: respondents in bioengineering and chemical engineering reported qualitatively different experiences, both in specific examples they offered and the overall assessment of the climate they face, than the students in aerospace, mechanical, and structural engineering.^x

The "Irrelevance" of the Topic of Sexual Orientation within Engineering

The technical/social dualism largely relegates issues of communication, justice, politics, social consciousness, and identity to the "social" realm, deeming them "irrelevant" to core "technical" engineering work. As a result, many issues which our respondents privately find important are deemed inappropriate issues for consideration within engineering circles, reinforcing a silence on many topics:

It's just a different way of communicating with engineers than with all the people I tend to hang out with; just a different type of language. Very work-oriented. You don't talk about your feelings, you don't talk about the work and what's happening in it, you don't talk about Prop[osition] 8 or the election... I wish there was more of that in school, more about the consequences of technology, the history, the background. Make sure we don't repeat our mistakes. Really, we're just doing the technical stuff. Constantly technical stuff. I wish there was more of that other stuff. (Becky)

It's all very cut-and-dry computer science. There's no cultural exchange. If you're looking to combine your personal values with engineering, you're out of luck. (Eric)

There are things that people don't talk about in engineering, like being strong, or being open, things like that. Anything out of the ordinary, people just don't talk about. It's like this *cloud*...if it's not engineering-related, it's pushed to the side and not talked about. (Dale, gay male undergrad)

This is problematic for some, like Wendy (bisexual woman undergrad) and Guy (gay male grad), who show deep interests in social justice issues as a result of their experiences as an LGB engineering student, but feel that their interests are ignored at best and criticized at worst. Others, like Steven (gay male undergrad) and Dale, are considering leaving engineering because of this "cloud" which casts a shadow on their interests in socially relevant issues.

Issues of sexual orientation in particular are relegated to the "social" and considered "irrelevant" or "inappropriate" topic of conversation in the engineering climate:

They don't say anything toward sexuality, especially in engineering; it's not a humanities course where you discuss what Plato would have thought of it. It's like, you're there to study math and science...It just doesn't seem relevant (Wendy)

There is this big elephant in the room that they won't talk about. I think that they feel like they have to act cool about it, act like it's normal, but they still have those questions that I wish they could just ask and get it over with, so we could continue to do our homework or whatever it is we're doing. (Juan, gay male undergrad)

Though many respondents stated similarly that issues of sexual identity are considered "irrelevant" to engineering, there is a clear sense that taking sexual identity issues out of the realm of discussion does not create a safe, welcoming environment. Instead, silence on these issues allows heterosexual bias to rein free and without challenge. By making sexual equality an irrelevant topic of conversation, discussions of power, discrimination, and hostility are also considered irrelevant. In essence, by relegating issues of sexuality to the realm of the "social," "technical" aspects are upheld as objective and neutral (though they are in fact no less prone to bias, no less steeped in culture and politics than the social aspects). In this way, the technical/social dualism becomes a mechanism by which the "unmarked category" of heterosexuality becomes legitimated. Several respondents speak to the marginalization that occurs as a result of this subtle process of legitimation:

Engineering is strict and it's harder for people to come out...there's only one right answer. You do a problem, there's only one right answer at the back of the book. If you're writing an essay, you can express your view...and it's still right.

Q: So, does the metaphor extend to sexuality, then? That there's one right answer in engineering to the question of sexuality, and that answer is straight?

Yes. I believe so. It's unbending. (David, gay male undergrad)

In my department, it's sort of invisible. It doesn't occur to people that other people might not be straight. I think most of them are straight dudes who don't really think about the existence of people who are not like them. I think they have so much privilege that they

can't understand what it's like for people who don't have that privilege and they think like other people getting privilege is taking it away from them. (Sara)

Everyone in this field is presumably straight...if you're one of the "good old boys," you're among your own. You don't have to worry about having your rights taken away. You have the power. *You dictate what rights other people have.* And no one's opposing you... Like, "I'm straight and I'm white and I'm male and that's the way we all are and there's no danger that anyone else might not be that way." (Eric)

David, Sara and Eric show a keen awareness of the power dynamics of not being part of the unmarked category of heterosexuality. There is *power* in the presumption of straightness: power of having the "right" sexual orientation, power to make others "invisible" and power to "dictate what rights other people have."

Passing and Covering Demands

As described by Yoshino, lesbian, gay, and bisexual individuals often feel pressures to "pass" as heterosexual or to "cover" cultural markers of their sexual identity in certain social settings. We see that many respondents experience a climate that demands both passing and covering.

For example, many respondents—including an ex-marine who took an honorable discharge when he came out as gay—made a direct parallel between the climate for LGB identifying people in engineering and the U.S. Armed Forces policy of "don't ask, don't tell"^{xi} which requires LGB people to "pass" as heterosexual. Wendy expresses this sentiment:

In engineering, it feels a lot like "don't ask, don't tell." A lot of people are just going to keep it to themselves. It's not a very open field of study. (Wendy)

Consistent with a "don't ask, don't tell" climate, respondents are pressured to take very seriously the decision about whether or not to reveal their sexual identity to their engineering peers, faculty members, or co-workers. Most are worried about their reputations and the liability of their future interactions with others in a climate with a "stigma and aura around sexuality". Jonathan presents a particularly vivid metaphor of the passing demands he experiences:

Gay people have to play their cards closer to their chest because, for gay people, the potential ramifications of things being out are, like, being a Jew in Nazi Germany. You use the same discretion but have to decide whether the reaction is going to be worth explaining.... It's definitely a bit of a stretch, [but] you don't want to be ostracized or be judged so you have to decide whether they are going to be the kind of people that will turn it in or if they'll hide you...you have to decide how close they are to you, who they will be chatting with, how much discretion they have.

While Jonathan's metaphor is admittedly hyperbolic, the statements of other respondents corroborate its basic message: not "passing" comes with serious consequences.

Before I was out...I happened to laugh in a very gay way and [another student] mocked my laugh in the same kind of gay way that I laughed and then asked me, with obvious hostility, "are you gay?" Other people were around him at the same time. And I said, "no," I was not gay. (*respondent looks visibly uncomfortable at this point; he grimaced as he said this line, tugged at his shirt, shifted in his seat between "no" and "I was not gay."*) Fortunately, the conversation ended there, but he really hurt me by that. He made me feel unsafe, and denigrated based on my sexuality. I never forgave him for that. (Eric)

Eric confided that he was just coming out to himself at this stage in his life, and fear of this type of interaction pressured him into passing for another year and a half.

While only two students described themselves as "completely out," all but David and Pete were out to at least a handful of their engineering classmates. Though they did not feel demands to pass with these individuals, they often experienced distinct demands to "cover" their sexuality. Once Eric did come out to a few of his classmates, he noticed a double standard in regards to sharing details about dating life:

People are accepting [of me as a gay man] up to a point. They don't necessarily want to talk about the nitty-gritty stuff. They're fine with you being gay, but they don't want you to talk about having a boyfriend. They're fine in the abstract, but let's just not go there. And the fact that they talk about their girlfriends in the lab I find kind of hypocritical.

Lisa, after coming out to the principal members of her chapter of the Society of Women Engineers (SWE), was dealt more explicit covering demands:

If it comes up, it comes up. In SWE, I tried not to make it come up, because many women were uncomfortable with it. Like, we never discussed whether someone in the group is gay because everyone is assumed not to be. I did come out to the president and the vice president, and they're like, "that's cool...just keep it to yourself." There's this stereotypical view that oh, she's a lesbian, so she'll try to hook up with everyone else, especially in a group like SWE that is all women.

Overall, respondents felt that heteronormative pressures hovered just below the surface of a culture of political correctness; such blatant statements of heteronormativity occurred only occasionally. However, just because other students, faculty members and co-workers "behaved themselves" most of the time does not mean that respondents did not find the climate to be marginalizing. This was particularly well expressed in a conversation during the first focus group:

Q: So, is engineering "tolerant," then?

ERIC: To me, it seems that you are *tolerated*, but you are not fully embraced....

DAVID: Yeah, if we use the word "tolerant" then people might think it's all OK.

ERIC: Yeah, gays are tolerated. As opposed to an environment that is *tolerant*, gays are *tolerated*.

JUAN: Yeah, “toleration” is definitely not *acceptance*. You can tolerate someone working with you, but you are not accepting.

This group made a distinction between “tolerance” and “toleration.” The difference is subtle but important: they rarely run into blatant hostility toward their sexuality, but heteronormativity embedded in the culture makes them feel like outsiders, and presents passing and covering demands. To the extent that others undermine their engineering credibility by equating homosexual with “non-technical,” lesbian, gay, and bisexual students do not have equal opportunity to succeed and thrive in engineering. We next describe the tactics that respondents use to navigate this climate and then discuss the impacts these circumstances have on the LGB engineering students.

Tactics LGB Engineering Students Use to Navigate the Climate They Experience

Our respondents are skilled social actors at navigating this climate fraught with oppressive dualistic thinking, relying on several creative tactics that include passing, covering, and the achievement of expertise. We describe each in turn.

Passing and Covering Tactics

Creative “passing” tactics that respondents use include discussing their relationships without using gendered pronouns or simply lying about their sexuality to their classmates. Instead of being labeled as “that gay engineer,” some respondents prefer to hide their gay identities, referring to themselves only as “engineers” instead. As David, Pete and Juan recount, the pressures of passing are often preferable to the pressures of dealing with the negative reactions of colleagues:

If I tell them something they are uncomfortable with, it might throw off the whole team thing. Like, if we’re in a lab group and we have to collaborate together, I feel like maybe they won’t take my ideas seriously, or maybe they’ll collaborate without telling me about key details or something like that, or maybe I’ll be assigned to the menial tasks while they’ll do the design part...(David)

Like David, Pete’s decision to pass among the engineering students is based on his fear that coming out would harm his ability to be taken seriously in engineering, now and in the future:

If you’re in Aerospace [engineering], you don’t get to know at all. If you know anyone who is in aerospace engineering, you don’t get to know. I don’t want it ever to affect me, and I do feel it will. (Pete)

Juan describes a passing tactic he implements in social situations, like departmental functions, where heteronormativity is particularly salient:

I make a disclaimer. If I bring [my boyfriend] along, I will say “by the way, this is important,” and then he knows that we are to be just friends. “This is work and this is

important, and I don't want anyone to get any ideas," I'll say. Unless he gets the OK from me. [This happens for] anything professional, or anything engineering-related.

Not only does Juan have to skillfully enact his passing tactics in engineering social events, but he must get his partner to fully enroll in the passing tactics as well.

Among covering tactics, the most popular is the use of humor. By joining in with or initiating (often self-deprecating) banter about gays and lesbians, students are able to foster a certain interpretation of themselves or their situations which mitigates tensions and eases social interaction. Though it forefronts issues of sexual difference, humor codes sexuality as explicitly part of the "social" and thus not threatening to the "technical" routine of engineering. It is, essentially, a signal to respondents' colleagues that they are complying with the relegation of sexuality to the "illegitimate."

Sometimes I'll crack a joke, just to get it over with, so if they had any doubt they can just stop thinking about it. I'll make fun of gays myself, just to get it over with. Or, I'll act gay myself, I'll say "oh, you look cute today," or something, so they'll think I'm joking. And they laugh at it. And that way, if I ever do actually say something like that they'll think I'm still joking. (Juan)

Juan's use of humor seems to break the tension within his study group and allows the social interaction to proceed. Though outside the scope of this study, such self- or group-deprecating humor likely comes with its own psychological effects on students.

Living Compartmentalized Lives

As an adjunct to covering and passing, another tactic students use to navigate their climate is to live "compartmentalized lives," the maintenance of strict boundaries between their engineering work and their social lives.

I like to distinguish between my business life and pleasure. Simply because I don't think they should mingle; it just creates chaos. (Steven)

Maintaining this strict separation is a difficult process for Steven; "the agony, the stress of constantly trying to portray a certain image of myself and hiding who I really am, rather than just being me and being happy." This sort of strict separation is not necessarily required of straight engineering students, whose classmates often form the core of their friend groups and who are able to pass seamlessly between their personal lives and professional lives while on campus. Many, like Steven, see this as a sacrifice (Steven said "I can't live like this forever!") and others see it as desirable (Ryan advised others at the focus group: "they are separate, the private and personal life; within your workgroup, you don't talk about your personal life...keep it professional") but all saw this burden of additional work as necessary for success in engineering.

This compartmentalization impacts more than just what topics of conversation are appropriate in engineering contexts; students feel that whole parts of their identity have to be "checked at the door" of their engineering lives:

I think of myself as an engineer and I think of myself as gay, but I never think of myself as a gay engineer. I never mix the two together. (David)

LGB people in engineering live two parallel lives. They are the same person, but they don't mix the different environments. (Lisa)

Achieving Expertise

Finally, respondents navigate the climate they encounter by garnering *expertise* and *indispensability* by working extremely hard. This is a form of covering because by achieving an expert status, one's sexual identity can more likely be overlooked. Once achieved, respondents utilize expertise and indispensability to subvert negative aspects of their climate. Specifically, when they are in a position of expertise, they have more control of the environment, more freedom to be "authentic" (although credibility must be continually established).

The graduate students are more comfortable revealing their sexual identity to the undergraduates they teach rather than their graduate student peers because they occupy a formalized "expert" role in relation to the former:

BRIAN: ...when I'm TAing, I feel compelled as a TA to make it clear that I'm gay...I'll sort of give hidden clues that I'm gay and I know the material and I'm teaching you guys this, and you'll have to deal with this.

JUAN: Like what signs?

BRIAN: Like, I'll wear a t-shirt, I'll be more swishy than normal. I feel pressure to show there is a gay presence here and you can be gay and a graduate student.

ERIC: Ya, I feel more comfortable outing myself if I have the upper hand. And an authoritative role. If I can leverage something and impress someone, then I feel like I have the capital saved up and then I can spend it by outing myself.

Because Brian and Eric "know the material" and are in an "authoritative role," they are more comfortable disclosing their sexual identity. They also feel compelled to do so as a representation of *competent* engineering graduate students who "just happen to be gay."

Though they do not yet occupy formal positions of authority, the undergraduate LGB students achieve indispensability by honing their engineering expertise. Juan does "everything possible" for his fellow engineering students to recognize his engineering expertise before they find out he is gay. That way, "they will have already gotten to know me as an engineer, and that kind of helps." Isaiah's statements illustrate similar uses of expertise as a way to subvert hostility:

[My classmates] see me as a good resource. And I think, for me, that outweighs the fact that I'm gay...They don't care, they got a good grade with my help.

Q: If you weren't as strong of a student, do you think the climate would be more of a challenge for you?

Yes. Yes. Definitely. It's within yourself to move on and keep going, because you know that there are these students that won't accept you...If you're not strong enough, that's when you don't make it through engineering, and you switch into English or something.

Though students utilize their expertise to help them navigate the climate, we show below how this academic expertise is hard won. Heterosexual students are not similarly burdened by the need to achieve indispensability and expertise in order to be accepted by their peers.

Impacts of the Climate on LGB Students

The climate just described, and the effort required to navigate this climate, both have significant impacts on the students we interviewed. Passing, covering, living compartmentalized lives, and achieving indispensability requires tremendous amounts of emotional work, including hiding, lying, and isolating oneself from engineering peers, and academic work beyond that which is required of heterosexual students to succeed. Sara speaks to this emotional work:

There is tension in keeping them apart. If you come out to someone, if they don't like it, then *they* have to deal with it. But if everyone just assumes your straight, then it becomes *your* problem. You have to worry about how other people will react if you come out to them. Definitely there are times when I just don't want to deal with...ug. Even if the other person isn't going to be hostile, I don't know if I want to deal with people's changing perceptions of me, or what they are going to ask. Even if they are cool with it, their idea of you changes... (Sara)

In addition to this emotional labor required of LGB students, they often face extensive identity work and social and academic isolation.

Identity Work

As they progress through the professional socialization process in engineering education, students are faced with the challenge of reconciling their new professional identities with their sense of self. This is particularly challenging for LGB individuals, who must reconcile conflicting expectations of their sexual, professional, and gender identities. For example, the social location of gay male engineering students sits between two conflicting, "mutually exclusive" stereotypes of gay men and engineers. Gay males must negotiate others' perceptions of them based upon these stereotypes and the negotiation of their own senses of self.

I guess it just has to do with the stereotypes, I'm more of a stereotypical engineer than I am a stereotypical gay person. I'm not good with people, I'm not effeminate. The only thing I have in common with that stereotype is that I like someone of the same gender.

Q: So you think that the stereotypes of the engineer and of a gay man conflict?

Absolutely. I probably have the hardest of two worlds. Basically, there's the side of you that is socially inept...so that is the engineering stereotype, versus the homosexual stereotype, being extremely open, extremely flamboyant, extremely good with people. I

feel them pulling on me from here, from there. Yes, I would feel they are very conflicting. That's why it's so complicated. (Jonathan)

What is threatening as an engineer and being gay is that it's so contrary to the typical gay stereotype. The assumption that gay guys are art majors or music majors, fashion designers, or what not. Just really effeminate all around, which I never thought was me...But, I don't think I am a stereotypical engineer, either. The stereotypical engineer is good at math, not that emotional, really logical, they're just personally inept at times. I'm breaking the stereotypes. (Mark)

Both Jonathan and Mark express frustration at the seeming mutual exclusivity of the engineering and gay male stereotypes, and they struggle to find their own identity among those stereotypes. Though we have limited data on this for lesbian and bisexual women, we expect contending with stereotypes of their gender, sexual, and professional identities would create similar reconciliatory challenges.

Social and Academic Isolation

The climate LGB students in engineering face is also socially and academically isolating. Brian feels he is "different than everyone else" he sees around him, and Jonathan fights to avoid being labeled as "that gay engineer" by his peers. David provided a poignant example of this social isolation:

There's this division between most of my engineering friends and myself...some people who were my friends from first year in engineering, they all live together. I would love to be a part of both worlds. Well, I *am* a part of both, but I would love to be their friends as well...

Because David is passing as straight in all engineering contexts, he does not participate in many of the social activities with his engineering classmates. As a result, his friendships have suffered and he feels increasingly socially isolated from his engineering peers. He makes a contrast between this and the other engineering students in his class who spend "24/7 together in the library" studying.

As David's experiences hint, the climate of engineering and the subsequent tactics LGB engineering students utilize to navigate that climate can make them academically isolated as well. Both Steven and Lisa have left student organizations as a result of the hostility they felt within them:

When I left SHPE [Society of Hispanic Professional Engineers], I was part of the board. We were helping to put on a safety conference and we were asked to put on a workshop for the centers on campus. There's the multicultural center, the LGBT resource center, and the Women's center. Some of them made remarks like, well then, maybe we shouldn't ask for money [to put on the conference], then. They were really against it, making jokes and laughing. It made me be like, "Ok, then, why am I here?" They were making me really uncomfortable...so I just left. (Steven)

With SWE, I used to go there a lot, but now the people I told [I am bisexual] have graduated, so I kind of get an awkward feeling. I feel somewhat slighted, because there was an election, and I had been part of the group for like two years, and I was the principle member for one of those years, so I was kind of offended that I kept going up for all these positions and I kept being voted down for all of them. I stopped showing up after awhile. I thought, well, you don't need me, so... (Lisa)

Student organizations are vital to the success and inclusion of ethnic minorities and women.⁴¹ However, both Steven and Lisa feel isolated from these professional organizations that are supposed to help marginalized groups because of their sexuality, making them doubly marginalized.

Lisa explains that a gay male friend of hers faces rather extreme academic isolation because of his need to pass as straight among his engineering peers:

With some engineers who are not straight, it seems that, if they are trying to keep it behind closed doors, they're trying to do the work all by themselves and they're missing out on opportunities to learn from others. They isolate themselves from other engineering students because they're trying not to draw attention to their sexuality. One of my friends is in engineering; he doesn't do group study, he likes to hold himself up in the library and keep to himself. He worries that if he interacts with these people, they might find out he's gay, and they will not want to hang out with him or talk to him. (Lisa)

Because of this academic isolation, and the vital importance of group work for success in engineering, students like the one Lisa describes have to work much harder to succeed in school than their classmates who are well-integrated academically.

Juan also speaks to the need to work harder academically than his straight peers, and to both the social and academic isolation that can arise in the engineering climate:

It's like the military, like I have to give 110%. Last quarter, I had this study group, and I think two of the guys feel very threatened that I'm gay...every time we go into a study room or something like that, they'll try and find a seat the farthest away from where I'm at. And, they'll talk to me about nothing by structural engineering. They'll still meet with me, but they wouldn't want anything to do with me outside of work. ...And, even though I have tough questions, I feel like I can't ask *my* questions because of those two students...I really don't want them to see me as gay *and* stupid. So I'll refrain from asking questions in my study group, and it's usually them asking questions and it's more of me helping them instead of them helping me...I feel sort of invisible.

Juan is affected in several ways by the climate in his study group: he feels invisible and isolated, he is socially rejected by the two students (who sit as far away from him as possible!), and he is burdened with the additional work of solving his own questions independently. These experiences are not Juan's alone. This culture burdens LGB students with substantial social

negotiation work such as living compartmentalized lives and identity management. Students are isolated both socially and academically as a result of this climate, and the navigation described above requires a tremendous amount of both emotional and academic labor.

Anxiety over Future Job Security

As a final effect of this climate on LGB students in engineering, we find that students are deeply anxious about their future careers once they leave the “liberal world” of academia. All respondents said that their sexuality might have a negative impact on their job security in the future under the right circumstances.

I could see it when there's going to be management people or upper people who are going to look at me and see me as just a gay guy, and they might judge me because of that. And, I might have to work against that; it would be an uphill battle (Kevin).

Sara imagines similar possibilities when looking for jobs in academia:

I don't even know what I'm going to do if I'm dating a woman when I'm looking for jobs. In terms of what I would do with being out while I was looking for a position. Applying for a faculty position while I was out would be incredibly difficult...I think it would definitely have an impact on whether or not I got hired.

Lisa suggests other mechanisms by which her job security might be threatened, ways that are less easily refuted through discrimination legislation:

With most job applications, they have this whole thing that you won't be discriminated against. If I got fired, it wouldn't be under the pretense that I'm gay; I would most likely be fired because I screwed up *because* I'm gay. Like, if I was sent to another country where they weren't accepting of homosexuality, and I started to be free to act as I choose, then they would be like, you screwed up the sale and our relationship with the customer by exposing yourself as gay, and the customer didn't like that. I'm sure that it would come around to me in a way that I could not take legal action against the company.

It is tempting to brush these speculations off as the naive fears of students nervous about securing a job in a tight economic market, but there is reason to suspect that their perceptions of the labor market might be quite accurate. For one, part of their education process is their professional socialization into the engineering profession, complete with expectations about what the engineering profession is like outside of school. Juan's experiences in his internship also give us pause:

I came out to my office little by little...*and then my internship came to an end.* They didn't “fire” me, but they said, “sorry, we're out of work.” I was like, wow, after a year and eight months, you suddenly run out of work? Maybe it was because I came out that I got fired, maybe it wasn't, but....

If our respondents experience potentially discriminatory treatment as interns, it is likely that the climate issues described here extend far beyond the reaches of academia and are found at least to some extent in the engineering labor force.

Conclusion

This study examined the experiences of seventeen engineering students who identify as gay, lesbian, or bisexual at a large, competitive, public university in the western US.^{xiii} To our knowledge, this is the first systematic examination of its kind. We find that engineering students in our study who identify as lesbian, gay, or bisexual experience an oppressive climate fraught with dualistic thinking. Homosexuality is overtly devalued and stereotyped as incongruent with technical competence. As a result, LGB students' very credibility as engineers is often undermined. Issues of sexual identity (including sexual equality) are considered "social" and thus "irrelevant" to the practice of engineering. As a result, the unmarked category of heterosexuality is legitimated and imbued with power, and LGB engineering students' concerns are bracketed and silenced. Furthermore, respondents describe a heteronormative climate with both passing and covering demands. They often are not afforded the opportunity to be authentic in ways that their heterosexual peers can. *In short, we find that due to this hostile climate, LGB students do not have access to equality of opportunity within this engineering school.*

LGB students rely on tactics of passing and covering, compartmentalization, and achievement of expertise and indispensability to navigate the climate they experience. As a covering tactic, they identify not as "gay engineers," but rather "engineers who happen to be gay." Both the climate and its navigation requirements have a significant impact on these students: they must expend tremendous amounts of emotional and academic labor and these circumstances isolate them from their peers both socially and academically.

What can be done to improve the experiences of these students? Respondents suggest that having visible and out gay faculty members and industry role models would give them mentors to look up to.^{xiii} Also, increased visibility of sexual identity issues in general would help raise awareness. They urge that formal policies against sexuality-based harassment be firmly in place in the university and that faculty and students are educated about these policies.

Several respondents applauded the establishment of a local chapter of oSTEM, an organization for LGBT students in science, technology, engineering and math.^{xiv} Here, they felt that students who were questioning their sexuality could gather in a space where neither engineering stereotypes nor gay stereotypes were dominant, where they could discuss issues pertaining to the climate just described, and where there might be opportunities to invite LGB engineers in the workforce as guest speakers. However, LGB students were adamant that participation in oSTEM would require that it not be a gay activist organization, but rather, only a "background resource." It remains to be seen whether the establishment of oSTEM, and the engineering administration's support of this organization, will help to ameliorate the sources of this heteronormative climate, or even its effects.

It is difficult to generalize from our relatively small and geographically-specific sample to other U.S. engineering schools or into the engineering workforce. Ours is an admittedly imperfect

attempt to draw the contours of the experiences of LGB students in engineering; there is undoubtedly much we have missed and more work to be done.

Yet, we have attempted to identify the *mechanisms* by which this climate leads to LGB students' personal experiences of marginalization and isolation. To the extent that the culture we document exists in other settings within the engineering profession, some of the mechanisms we identify may accompany that culture. For instance, in settings where technical/social and heterosexual/homosexual dualisms are salient, it is likely that the former will be mapped onto the latter with similar consequences for LGB engineers' credibility. Our future research will explore LGB engineering professionals' experiences in industry and academia, allowing for a comparison between the climates in engineering school and engineering work. Further research is needed on the nuanced differences between the experiences within engineering sub-disciplines and on how the LGB issues documented here intersect with other dimensions of marginality such as gender and race/ethnicity.

This research makes important contributions beyond the scope of lesbian, gay, and bisexual students, as it examines a *different kind of difference* in relation to previous work on inequalities in engineering. This research, with its theoretical basis of "covering" and "passing," investigates a situation in which people are marginalized on the basis of an identity category with markers that are frequently invisible. Other forms of difference which may be investigated with these tools include religion, some forms of disability, and citizenship. Looking at these additional experiences of marginalization will help enrich the literature on inequalities in engineering by showing a broader spectrum of mechanisms by which inequalities are reproduced.

While this project opens up more questions than it answers, it is a first step toward understanding the experiences of a virtually unstudied demographic group of engineers. We hope that this project will encourage sensitivity to the issues faced by these students, and that it will contribute to ongoing efforts to make the engineering profession a welcoming place for *all* qualified individuals.

Appendix Table 1: Pseudonyms and Demographic Information of Study Participant

Pseudonym	Gender Identity	Sexual Identity	Undergrad or Graduate Student	Ethnicity
Brian	M	Gay	Graduate	White
David	M	Gay	Undergraduate	White
Eric	M	Gay	Graduate	White
Juan	M	Gay	Undergraduate	Hispanic
Pete	M	Bisexual	Undergraduate	White
Ryan	M	Gay	Undergraduate	White
Sara	W	Bisexual	Graduate	White
Steven	M	Gay	Undergraduate	Hispanic
Wendy	W	Lesbian	Undergraduate	White-Hisp
Dale	M	Gay	Undergraduate	Asian
Isaiah	M	Gay	Undergraduate	Hispanic
Jonathan	M	Bisexual	Undergraduate	White
Guy	M	Gay	Graduate	White
Becky	W	Lesbian	Undergraduate	Hispanic
Mark	M	Gay	Undergraduate	White
Lisa	W	Bisexual	Undergraduate	Hispanic
Kevin	M	Gay	Undergraduate	Asian

Appendix Table 2: Interview Schedule

Introduction and Consent
Verbal consent for interview
Verbal consent for voice recording
Introductory Questions
How is the engineering program at UCSD? Year in school and major?
What do you like about being an engineering student? What do you like the least?
Has your engineering major turned out to be the type of program you thought it would have been?
This study was advertised for gay, lesbian, and bisexual engineering students. Do you identify with any of those categories?
Experiences with Faculty
To what extent are you “out” to the engineering faculty or TAs?
How would you describe your interactions with engineering faculty or TAs? Anything to improve this relationship?
Are there faculty/TAs who are especially helpful to you? Cause problems for you? How do you typically deal with this?
What consequences would you expect if you had your sexual identity suddenly revealed to the engineering faculty/TAs?
Do engineering faculty or TAs ever talk or joke about sex or sexuality? How do you react?
Experiences with other Engineering Students
To what extent are you “out” to your engineering classmates?
How would you describe your interactions with other engineering students? (in labs, study groups, group projects, etc)
Are there students who are especially helpful or friendly? Students who cause problems for you?
What consequences would you expect if you had your sexual identity suddenly revealed to your engineering classmates?
Do engineering students ever talk or joke about sex or sexuality?
With whom do you socialize on and off of campus?
Environment and Expectations
Do you ever feel socially isolated at school?
Are there other LGB students in engineering school that you know of? Do you ever talk to them about your experiences?
What do you think are the most tolerant majors in engineering for LGB-identifying people?
How does the climate in engineering compare to the climate in classes you have taken outside of your major?
Once you decided to choose engineering as a major, have you ever had any doubts? What keeps you in engineering?
Sexual harassment has received a lot of attention over the past few years. Do you think that’s a problem for LGB students in engineering? Have you ever personally experienced sexual harassment?
Do you think being L/G/B will affect your job security in the future, either positively or negatively?
Does your career affect your decision about entering a serious relationship?
Has being L/G/B ever impacted your schoolwork?
We believe that LGB-identifying students make up a very small minority of engineering students. Why might this be so?
Do you think it is harder for gay/bisexual men or lesbian/bisexual women in engineering school? Why?
What would you change about the environment to make it more welcoming of LGB individuals?
Anything about the climate for LGB people in engineering school you think is important that we haven’t talked about?
Broader Contexts
To what extent are you “out” to your friends and family outside of UCSD?
We’ve talked about several sources of support—do you have other important sources of support not already mentioned?
Do you face other sources of hostility we have not yet mentioned?
Do you participate in any LGB activism on or off campus?
Demographic information (age, gender, race/ethnicity, relationship status)

Appendix Table 3: Focus Group Questions

Why did you decide to participate in this focus group today? What did you think of the flyers advertising this study?
In the interviews, you all expressed many different portrayals of the climate in engineering for LGB students. Now we would like to ask this question of the group. What is this climate like? Do you all agree or disagree?
How, if at all, did this climate impact you? How, if at all, did it impact your schoolwork?
We have talked about a lot of situations that are difficult for LGB engineering students. What are some of the ways you choose to handle these situations?
(Show several professional support groups for LGB engineers such as SQUEAS and NOGLSTP) Do you think that forming a group for sexual minority engineering or science students at UCSD is a good idea? What would be the goals of this group? Would you take advantage of these groups in the workplace?
Some people believe that their minority status gives them a unique and fresh perspective on things. Are there any benefits to being LGB in engineering?
Some people might, for example, identify as “gay” and as an “engineer,” as a “gay engineer,” as an “engineer who happens to be gay,” or as just one of these. Are the identities “LGB” and “engineer” separate for you, combined, or intertwined?
Would you say, overall, that engineering is a tolerant place for LGB-identifying people?

ⁱ We thank Christena Turner and Heidi Sherick for their invaluable guidance on this project.

ⁱⁱ While this paper investigates the experiences of engineering students who identify as lesbian, gay, or bisexual (LGB), we might also have included other sexual minority groups such as transgender or queer. We decided to begin this investigation with LGB identifying individuals in order to isolate sexual orientation as a variable.

ⁱⁱⁱ Because engineering identities appear “gender inauthentic” for women, women craft new gender identities as “women engineers”—gender work not required of their male peers.^{22, 42} This has clear implications for the retention of women in this field.

^{iv} Legally, the denial of gay marriage is also a covering demand: it is fine to be gay as long as it is culturally subordinated to the dominant rituals supporting heterosexual privilege.

^v By the end of our analysis, Gold’s college of engineering had initiated a local chapter of oSTEM, “Out in Science, Technology, Engineering, and Math.”

^{vi} This is a relatively long time to put up announcements, but a statement by one of our respondents confirmed that LGB engineering students may have seen the posters, but needed a while to ponder whether they were willing to participate: “[last quarter], in one of the lecture halls I was in, I saw a note on the chalkboard asking for LGB volunteers. I thought about it for a long time, because I wasn’t really comfortable enough with myself...”

^{vii} We did not send messages to engineering students interested in both genders, as there is some ambiguity on this social networking site about whether that indicates bisexuality or just an interest in friendships with both men and women.

^{viii} At the end of the interview, we invited participants to participate in the focus groups, only after they agreed were they sent details about the focus group time and locations. All seventeen respondents agreed to participate in the focus groups, but only nine showed up. We speculate that the reason why eight did not show up is because these had to be held at the end of the quarter, a very busy time for students. However, we do not know exactly why they did not show.

^{ix} An interesting effect of the focus group process was that consensus-formation required the participants to construct the collective experience of being an LGB engineering student. Most respondents said they had never thought through what it meant to be an “LGB engineer.”

^x To protect their confidentiality, we do not specify the degree affiliations of our respondents.

^{xi} “Don’t ask, don’t tell” (10 U.S.C. Section 654) prohibits anyone who “demonstrate(s) a propensity or intent to engage in homosexual acts” from serving in the United States Armed Forces because it “would create an unacceptable risk to the high standards of morale, good order and discipline, and unit cohesion that are the essence of military capability.” It prohibits any LGB person from disclosing his or her sexuality or from speaking about any homosexual relationships while serving.

^{xii} Our study was performed with immense support from the Gold University engineering college administration, and our findings should be understood within the light of the sincere concerns that this administration has for all of its students.

^{xiii} MentorNET has recently implemented an LGBT section, where LGBT students can seek mentorship from LGBT scientists and engineers in the workforce.³

^{xiv} More information on oSTEM can be found at <http://www.ostem.org/>.

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