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Adam R. Smith

University of Nebraska-Lincoln, adamsmith627@gmail.com

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MAKING THEIR OWN WAY:
THE EXPERIENCES OF GAY MALE STUDENTS IN STEM FIELDS

by

Adam R. Smith

A THESIS

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THE EXPERIENCE OF GAY MALE STUDENTS IN STEM FIELDS

Adam R. Smith, M. A.

University of Nebraska, 2014

Advisor: Stephanie L. Bondi

This thesis focuses on the experiences of gay male undergraduate students in the science, technology, engineering, and mathematics (STEM) fields. These fields are often thought to be very masculine or hyper-genderized, which could conflict with the dominant culture's perception of a gay student's identity. It follows, then, that a hyper-genderized environment could have negative effects on those who do not identify strongly with the hegemonic masculine identity that may be present in the classroom.

Using phenomenological principles, students were asked to participate in a series of three interviews, which included two reflective exercises designed to explore their experiences in and out of the classroom in the context of their STEM education. Data collected were reviewed through the use of D'Augelli's (1994) identity development and sexual orientation model, Renn and Arnold's (2003) reconceptualization of Bronfenbrenner's (1979, 1995) process, person, context, and time (PPCT) model, and Young's (2009) five faces of oppression, among others. The results of the study have implications throughout higher education as student affairs professionals begin to understand the impact that higher education environments have on the development of students.

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Dedication and Acknowledgement

Many people deserve acknowledgement for their role in this thesis. I must first thank my participants for their honesty and for allowing me to take some of their time. This thesis would not have happened without them, and I cannot thank them enough for their willingness to share their stories. I hope I have honored them with the retelling of their experiences.

I would also like to thank everyone who has been a part of my coming out process. Writing this thesis has been a major catalyst in my development as an openly gay man, and I am incredibly thankful for the responses I received from my friends and especially my family as I continued in my growth and coming out process. As the participants said in this study, you never really get to be completely out, but my experience makes me thankful that I have started the process.

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I need to also take time to thank my family for all of their support, as well. I waited 18 years to come to all of you, but you have made this process so much easier. Plus, your support while I have been so engrossed in doing this research and writing this thesis has been invaluable. You were all so understanding when I was otherwise completely unavailable. I would especially like to thank my sister, Tara, for her editing

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Chapter 1 – Introduction

College is a period of self-discovery, knowledge acquisition, and maturation. Students learn just as much from their experiences out of the classroom as they do within the brick and mortar walls. But what if, while in the classroom, students are being oppressed, feeling threatened, or finding that their environment is incongruent, inhospitable, and generally uncomfortable because of their sexual orientation? In the present economy, when the need for talented science, technology, engineering, and mathematics (STEM) graduates is high, not fully supporting any group of students wishing to pursue a career in STEM should be considered unconscionable.

Students who identify as members of the LGBTQ community, even if not openly, face an even more challenging process of developing their identity. As noted by Schueler, Hoffman, and Peterson (2009), these students face obstacles such as invisibility, a lack of mentors who represent their identity, homophobia, and an academy that is heavily heteronormative (one that believes heterosexuality is the norm, preferred, or right way of behaving) and heterosexist (built to systematically privilege the heterosexual). Further complicating this development is the gender schema in which the student was raised and has been socialized with and its potential conflicts with the traditional genderization of their field of study. A traditional gender schema in U.S. culture is one that is inherently heteronormative and holds rigid gender roles, such as men who work and women who stay home with the children. For many years, society has viewed fields like nursing and education as female-oriented because they do not conform to the structure of masculinity found in the present hegemony (Acker, 1990). Similarly, fields like STEM have been

dominated by men and genderized as masculine due to their objective, unemotional, hands-on work and their perceived creation of power and dominance (Acker, 1990).

For many students, specifically those who identify as male and gay, these genderizations may be conflicting with the student's perception of their own gender. As noted by Connolly (2000), "Despite their valiant efforts in the midst of educational neglect, LGB students may struggle in their development of an authentic sense of identity and experience difficulty succeeding academically" (p. 125). This struggle is the result of many factors, such as privilege and power, sexual identity development, gender identity, and the impact of the educational environment, which will all be discussed in Chapter 3.

Beyond the altruistic, the research is motivated by my own experiences as a gay, cisgender-male in a science field. As an undergraduate, I found my classroom and laboratory environments to be implicitly hostile and an extremely uncomfortable place to explore my sexuality and be open about those experiences. I even found that hostility to extend to the workplace. While working at a local television station as an intern and eventually as a part-time meteorologist, I often heard juvenile name-calling and anti-gay slurs, and I found general disapproval of the gay identity. This television station, which served one of the only two counties in Kansas to vote for then-Democratic nominee Barack Obama in 2008, was not a truly safe place to work for someone who identified as gay. Eventually, this hostility pushed me out of my originally chosen field and into an environment where not only am I supported, but I am also able to support others on their own paths to self-discovery. This is not to say that I was exceptionally talented as a meteorologist or even a television personality, but rather to say that if one person

experiences this discrimination, then others undoubtedly exist who feel similarly unwelcome in their environment.

Purpose Statement

As a future student affairs professional, I believe in discovering areas where students do not feel supported and examining why this support vacuum exists. Building upon my own experiences and the literature on gender and sexuality, this study will examine the experiences of gay male students in the context of their gender, their sexuality, and their field-of-study's genderized nature. This thesis will ask students to reflect on their experiences to explore ways the STEM environment may interact with a gay student's identity and whether gay students feel supported within this environment. The purpose of this study is to enhance the literature and the education of other student affairs professionals by examining and re-presenting the experiences of gay males in the STEM field.

Research Questions

Four main questions guided this project:

- How do students make meaning of their experience in STEM environments through the interaction of their gender, gender schema, and sexual orientation?
- In what ways is a gay identity (for a male student) mediated by the heteronormative masculinity of the STEM field in which they are majoring?
- How do students' experiences differ considering their openness with their identity?

- To what extent and in what ways do students who identify as gay in STEM fields feel supported by their instructors, advisors, and peers?

In order to answer these questions, members of the NASPA GLBT Knowledge Community, ACPA Standing Committee for LGBT Awareness, and two campus LGBTQA groups were sent an email regarding possible inclusion in the study. Students who identify as gay and male and are majoring in a STEM field were asked to email the researcher directly to set up an interview time. Participants were also asked to recruit other participants to the study through a snowball sampling method, if the participant felt comfortable. Recruiting through the snowball method was not required and did not impact any participant's standing in the study in any way. No participants were recruited through this method.

Data was collected through qualitative methods. In general, the study featured a three-interview model as described by Maxwell (2014) for generating reflective exploration. Additionally, the participants completed two exercises: a peaks and valleys activity and a photo-elicitation exercise. More information about the interview protocol and the two activities can be found in Chapter 3 and in Appendices A, B, and C.

Definitions

Albert Einstein once said, "Most of the fundamental ideas of science are essentially simple, and may, as a rule, be expressed in a language comprehensible to everyone" (Einstein & Infeld, 1938). While Einstein was ostensibly speaking of the physical sciences, the sentiment is equally as true in the social sciences. For many people, the varied language concerning sexuality, gender, and sex, is as confusing as a

discussion on protons and electrons. To help eliminate this problem, the following terms are presented with the definition as they were used in this thesis.

Cisgender. Cisgenderism refers to those individuals whose biological sex and gender identity and expression match (LGBTQA Resource Center, 2012). In a heterosexist and heteronormative society, the idea exists that males/men must be heterosexual to be cisgender (Kimmel, 2008); however, in this research, cisgender will not include any reference to the sexual orientation of the individual.

Gay. The term *gay* is often understood in a heterosexist culture to mean any person who is not heterosexual, which often is assumed to include gender identity (LGBTQA Resource Center, 2012). In this study, however, the term *gay* is used to describe the identity of being a male who is attracted to other males “in a romantic, erotic, and/or emotional sense” (LGBTQA Resource Center, 2012, p. 4). This term differs from bisexual, the identity of attraction to both sexes or genders, and lesbian, which generally would apply to females attracted to other females.

Gender. In this research, the term *gender* is generally understood to be the societal construction of femininity and masculinity (in a heterosexist culture, there can be only two genders).

Gender expression. The idea of gender expression is the outward way in which an individual chooses to represent their inner gender.

Gender identity. While it may seem small, the difference between gender expression and gender identity is actually very important. Gender identity refers to the individual’s inner perception of their gender.

Gender schema. According to Bem (1981), a person's gender schema is the socially learned cognitive framework allowing that person to encode and judge any inputted gender information.

Heterosexism or heteronormativity. Heterosexism or heteronormativity is the societal belief that heterosexuality is normal and normative and that, as a result, homosexuality is not only abnormal, but inherently inferior (LGBTQA Resource Center, 2012). This superiority of heterosexuality is both explicit and implicit.

Sex. Sex will refer specifically to the biological sex assigned to the person at birth. Although the literature raises important questions about the validity of assigning sex to a purely biological definition, it will be done as such in this study for clarity's sake.

Sexual orientation. While in many circles this term refers to specifically the "desire for intimate emotional and/or sexual relationships with people of the same gender/sex, another gender/sex, or multiple genders/sexes" (LGBTQA Resource Center, 2012), for the purposes of this research, the sexual behavior (homosexual, heterosexual, celibacy, etc.) will also be included.

STEM (Science, Technology, Engineering, and Mathematics). The acronym STEM encompasses a wide range of fields. According to the National Science Foundation (NSF), the social sciences (psychology, sociology, anthropology, and economics) are also a part of the STEM designation (Graduate Research Fellowship Program (GRFP) (nsf13584), 2006). However, because of the different genderization of those specific fields, the definition of STEM for this study will be assumed to exclude the social sciences. However, those following a pre-medicine, pre-professional health, pre-

dentistry, pre-pharmacy, or other similar pre-professional program track will be included in the study.

Delimitations

As a phenomenological, qualitative project, there are delimitations in the study; primarily, participants had to identify as both male and gay. Participants were not asked to identify as solely cisgender males. Participants were asked to identify as male, but there was no restriction on identifying as cisgender. Additionally, students had to be engaged in study in a STEM field using the definition explained. Participants were also all asked to be at least 19 years of age to ensure the sample were all of the age of majority and to enhance the probability that participants would have more than one semester of experience in their field. No other criteria were used to recruit participants.

Limitations

As with most qualitative studies, there are innumerable methodological decisions that must be made that inevitably lead to limitations for the study. As many of these limitations require the explanation of their associated methodological choice, these will be covered fully in Chapter 3.

Conclusion

The research literature and the researcher's personal experience suggest that gay men experience an accumulative disadvantage in STEM fields. Accumulative disadvantage is analogous to the idea that the rich get richer as the poor get poorer. Because there are fewer of an already underrepresented population at a given level of the sciences, there are very few sponsors who can help promote and advance their peers to higher levels (Clark & Corcoran, 1986). Combining the accumulative disadvantage idea

with how STEM fields have been so masculinely gendered, the case for an in-depth look at the experiences of those who buck the masculine hegemony in these fields is well supported.

As a student who fits many of the categories from which the participants come, the researcher is well positioned to investigate these experiences and make meaning of them. By using multiple qualitative techniques, the researcher will be able to represent and re-present (Maxwell, 2013) the experiences of these students in a genuine and truthful manner.

The study will explore and examine the experiences of five gay male students majoring in STEM fields, who attend a various postsecondary institutions. By understanding what it means for these students to identify as both gay and male in a masculine-genderized environment, student affairs professionals, faculty, and other concerned individuals will be able to better support and retain these students. Their experiences may not be generalizable, but they are no less real, significant, or valuable.

In Chapter 2, the relevant literature concerning privilege and power, sexual identity development, gender identity, and educational environments will be examined and explored. Chapter 3 will examine the methodology used in the study, including the phenomenological foundation, the three-interview model, the photo elicitation exercise, and the peaks and valleys exercise. The fourth chapter will discuss the themes, outcomes, and reactions of the participants from their interviews. The final chapter will then state the findings of the study and discuss the implications of the research and how the findings can and should impact the environment of the STEM academy.

Chapter 2 – Literature Review

The literature that informs this project has four main branches: sex, gender, gender schema and related theories; gay identity development theory; environmental and campus ecology theory; and theories on power and privilege. These four branches speak directly to the research questions and help frame the interview protocol, the data analysis and discussion, and the study as a whole. As a study that aims to support and build up the literature, it is important for the study to incorporate and build upon the literature that already exists. This literature is incorporated throughout the research from the spark that ignited the idea through the development of the interview questions and through data analysis.

The first section of this literature review will focus on the issues faced by women in STEM fields and the ways they experience advantages and disadvantages based on their group identity. While the connection to the experience of a gay student in STEM may not be readily apparent, the experiences of these women helped shape this research and give context to how gay students may be impacted by their environments. The research on women in STEM also opens the discussion to how sex, gender, and gender schema impact our understanding of gender roles and gender expression, which is the second part of this literature review. These lenses are some of the most common through which people experience the world, and they are important pieces of developing the gay identity in a heteronormative society. The performative masculinity that is intrinsic in heteronormative spaces is directly impacted by the assumption of a gay identity. To understand the experiences of gay students in STEM, student affairs professionals must understand how heteronormativity pervades our society.

Next, I will discuss several theories of gay identity development. Three of these theories are discussed in this chapter, each with its own pros and cons. All three are included to help develop a better picture of the ways any given student may be developing their identity and experiencing the world around them. Understanding these theories is important to answering the first research question. In order to understand how a student's environment impacts a gay identity, student affairs professionals have to understand the ways in which a student develops said identity.

Just as it is important to understand how an environment can affect a student's developing identity, student affairs professionals should learn how the environments themselves become established and impacts these environments could have. Without a clear understanding of what an environment is, how one exists within an environment cannot be studied.

Finally, I will explore some literature on power, privilege, and social justice. This literature serves as a primary lens for this thesis. The five faces of oppression described by Young (2009) provide a framework for understanding both what the participants have said and what they have not said. As powerful as it may be to be able to name your oppressions, many students do not have the combination of experience, vocabulary, and advanced development to understand all the ways in which they have been oppressed. By drawing on the literature of power, privilege, and oppression, I, as the researcher, will be better able to contextualize a student's experiences by exploring how their openness with their identity impacts their experience and by analyzing the level of support they receive in STEM.

Accumulative Dis/Advantage and Women in STEM

Much research has been done on the status of women in academia and the professional worlds, STEM, and specifically engineering (see for example Beede et al., 2011; Rosenthal, London, Levy, & Lobel, 2011; Hyde, Lindberg, Linn, Ellis, & Williams, 2008; & Blickenstaff, 2005). Much of this literature created the impetus for this study and helped inform the development of the research questions and purpose. While being a woman in STEM and being a man who identifies as gay in STEM likely have different challenges and advantages, the lack of literature on identifying as LGBTQ in STEM forces the researcher to look elsewhere. For this reason and because women are minorities in STEM similar to the way gay men are minorities, literature concerning women in STEM has been used as a structural framework for creating this study.

In 1986, Shirley Clark and Mary Corcoran noticed that not only did women demonstrate disproportionately lower levels of success in academia, but also that the research on social stratification – the idea that people are placed into social classes based on some part of their identity – focused most heavily on men. Clark and Corcoran (1986) defined this stratification in terms of the Matthew effect and the Salieri effect. Those who are professionally socialized in a positive manner (i.e., men) will receive more advantages from their sponsors. This is named the Matthew effect, or accumulative advantage (Clark & Corcoran, 1986). Women, on the other hand, are not professionally socialized the same way and may fall victim to the Salieri effect, or accumulative disadvantage (Clark & Corcoran, 1986). This is to say that the dominant group oppresses the subordinated group through implicit and explicit ways. This interaction of power and privilege will be explored in a later section.

Clark and Corcoran (1986) found three major barriers for women in academia, which they termed “penalties” (p. 39). First, women experienced difficulties in achieving entry because of cultural differences. Second, women experienced a lack of sponsorship from their mentors and advisors, who were mostly men. Third, the women described structural or institutional barriers to advancement and success. In general, these penalties are ascribed to women because women are not members of the dominant group of academia.

While this phenomenon still certainly exists in academia, the manifestation thereof may have changed in the nearly three decades since Clark and Corcoran’s (1986) study. For example, women have made monumental gains in society, breaking several proverbial glass ceilings in politics, business, and academia. Because women are still in the minority group, however, barriers to success still exist and are particularly present in academic arenas like the STEM field (Beede et al., 2011).

In 2011, Nancy Cantor, Chancellor and President of Syracuse University issued a paper calling on academics to end the “chilly climate” (p. 1) women experience when entering academia. Hong and Shull (2010) found that this climate may be more present in STEM fields than in areas such as liberal arts when they interviewed undergraduate engineering students about the importance of faculty dispositions on the student’s success:

When asked what college experience was like being a female majoring in a predominately male driven field, the female student responded, “I was very put down from the first day and was told by my advisor that I should be a teacher, not an engineer.” The student felt she was not given a chance to prove herself before she was assessed to be less capable of making it in the field. Even though she has taken advance placement calculus and statistics back in high school, her advisor told her that her scores were too low to compete with everyone else. (Hong & Shull, 2010, para. 22)

Considering also the high proportion of males in STEM (Beede et al., 2011) and Clark and Corcoran's (1986) theory of accumulative disadvantage, it would be logical to assume that the cause of this student's experience may have been poor sponsorship from male advisors. This is not to say that male advisors in general are the problem, rather, Hong and Shull (2010) make the argument that the assumption of what a woman can and should do belies the lack of sponsorship. The over-proportion of males in STEM perpetuates the masculine hegemony, leading to assumptions about what a woman can and should do. According to a focus group conducted at Syracuse University, many male faculty members want to be a part of their female students' success (Cantor, 2011, p. 2). However, without full sponsorship, which Clark and Corcoran (1986) argue is more likely to come from a mentor of the same gender, "Women may not be blocked out entirely, but their progress is limited to a relatively low level of advancement in male-dominated occupations and societies" (Clark & Corcoran, 1986, p. 25). It is important to reiterate that the experiences of women and gay males in STEM are certainly going to be different, but in a heteronormative field like STEM and a heterosexist society in general, the connection between the two groups cannot and should not be ignored. To further exacerbate the challenges faced by the women in STEM, in fields like nursing where women are generally the majority population, men still excel faster and are rewarded more heavily for the same work (Landivar, 2013). Because women exist in a masculine society, they experience accumulative disadvantage, leading to a worthwhile investigation as to whether something similar may exist for gay men living in a heteronormative society.

The Confluence of Sex, Gender, and Gender Schema

For this research, a connection is made between being a female in STEM to being gay in STEM, both of which are based on the concepts of sex, gender, and gender schema. The definitions of gender and sex are exceptionally important in this research since sexual orientation is at the core. Understanding how sex and gender differ and how they interact and intersect with sexual orientation, specifically in a heteronormative and heterosexist society, is central in understanding the experiences of the participants in this study. In general, those in student affairs and other social sciences understand sex to be a biological construct and gender to be a societal construct. Butler (2006), however, outlines that like gender, sex is still a societal construct, as people automatically and inherently apply a gender to one born with a specific set of sexual organs. This application of gender to sex can be attributed to a heteronormative society wherein it is seen as so normal that a female will join with a male that the meaning of biological sex has been socially constructed, as well (Butler, 2006). People are born not simply as a baby, but as a boy or a girl. Meaning is assigned to us as babies based on our genitals. Butler goes on to explain that being a woman or man is unnatural because the expression of woman or man is only developed through repeated societal performance:

If one “is” a woman [or man], that is surely not all one is; the term fails to be exhaustive, not because a pregendered “person” transcends the specific paraphernalia of its gender, but because gender is not always constituted coherently or consistently in different historical contexts, and because gender intersects with racial, class, ethnic, sexual, and regional modalities of discursively constituted identities. As a result, it becomes impossible to separate out “gender” from the political and cultural intersections in which it is invariably produced and maintained. (Butler, 2006, p. 4)

It is this intersection of sex (i.e., male), gender (i.e., man), and sexual orientation (i.e., gay) that are of central concern in this study. As noted by West and Zimmerman (1987),

the “doing” of gender is undertaken by women and men whose competence as members of society is hostage to its production. Doing gender involves a complex of socially guided perceptual, interactional, and micropolitical activities that cast particular pursuits as expressions of masculine and feminine “natures.” (p. 126)

This gender performativity, which is described by West and Zimmerman (1987) and is fully explored in Butler (2006), is key in a heterosexist and heteronormative society, which is to say, homophobic. Kimmel (2008) explored the homophobia of college-aged, cisgender males, and found that masculinity, which is synonymous with being a man, is “largely a ‘homosocial’ experience: performed for, and judged by, other men” (p. 47). The very idea of being a man is judged constantly by fellow men, and to not stay within the “well-drawn boundaries of manhood” (Kimmel, 2008, p. 47) means to be equated with being gay, which Kimmel’s research shows is obviously not congruent with being a man in U.S. culture (2008, p. 48). This judgment is not limited to men, however, as Kimmel (2008) found many women who reported heteronormative views on masculinity wherein any interest by a male in a female companion’s emotional or intellectual attributes, or more generally in any attribute that is non-sexual, automatically makes them “suspect” (p. 49). Kimmel even goes so far as to redefine homophobia as “the fear that people might *misperceive* you as gay” (Kimmel, 2008, p. 50, emphasis in original).

Equating homosexuality with a lack of masculinity and therefore with not being a real man is prevalent throughout all of western society, but can be found in its most concentrated form on the college campus. It is on the college campus that it is not

enough to not be gay or to be straight. To be a man, one must completely and without reservation reject the notion of homosexuality. Kimmel (2008) argues this rejection, to be truly believable, often must manifest in violence, bullying, and unending torment:

Imagine, for a moment, that instead of being gay, [a student] was black, and his assailants white. Or that he was Jewish and his tormentors used anti-Semitic slurs as they beat him up. The issues would have been far clearer. . . . Racism and anti-Semitism are out of bounds even when they don't become physical, and most of us believe that those who openly express those sentiments should be severely punished. Why is the same not true of gay-bashing? (Kimmel, 2008, p. 80)

As Kimmel (2008) noted, this kind of sentiment, in nearly any other form, would be immediately rejected by society, but in a heteronormative and heterosexist society, this overt behavior is often overlooked. Latent acceptance of this behavior is what may lead to feelings of hostility or negativity in the classroom.

Davis and Laker (2004) noted “A lack of understanding related to . . . men’s development leads to either reliance on stereotypical gender scripts or failure to consider men as gendered beings” (p. 49). If educators fail to recognize men as gendered beings, which is how women are viewed, student affairs professionals are unable to intercept, decode, and disrupt the hegemonic messaging that our gender socialization maintains. Davis and Laker (2004) further argue, “ignoring the salience of gender or race in white male students reifies the privilege of those agent groups to the extent that invisibility perpetuates privilege” (p. 49). Indeed, through the lens of masculinity taught by Kimmel (2008), when male students are not considered as a gendered group, the messages of heteronormativity, heterosexism, and hegemonic masculinity – which control nearly all messaging on gender, sex, and orientation – are able to run unchecked and undisrupted.

Performative masculinity is further described in Edwards and Jones’s (2009) theory of men’s gender identity development in college. The theory explains three social

contexts of masculinity: external expectations of what it means to be a man, performing masculinity according to external expectations, and beginning to transcend external expectations (Edwards & Jones, 2009). Through these contexts, the reader is able to understand the impact of hegemonic messaging on the gender identity development of the college male in the U.S. The performance of masculinity is shaped by the external expectations of manhood, which include complex and strict rules for what men do (e.g., be breadwinners, gain positions of authority) and are (e.g., responsible, unemotional, strong) and what men do not do (e.g., cry) and are not (e.g., gay, effeminate or not strictly masculine, vulnerable) (Edwards & Jones, 2009). However, when someone is able to transcend this social messaging and disrupt the hegemony, they still exist in a space that sets rewards and punishments for not meeting external expectations for masculinity.

The theory developed by Edwards and Jones (2009) also helps inform the experiences of men, specifically gay men in STEM fields. If education, psychology, and other helping fields are gendered as feminine, then the rigid, emotionless fields found in STEM would be heavily masculine (Bem, 1983; Phillips & Imhoff, 1997). As Evans, Forney, Guido, Patton, and Renn (2010) said, “The residential, cocurricular, student employment, athletic, and other student life contexts in which peer culture operates play critical roles in reinforcing and challenging gender schema and sex-role stereotypes” (p. 340). Because STEM is regarded as a masculine field, those within the field, including undergraduate students, are being sent messages that reinforce the hegemonic gender schema.

A review of this literature paints a picture of gender in STEM: In Western masculine hegemony, students wishing to study in fields gendered as masculine who do

not exhibit strictly masculine characteristics because they are female, identify as women, identify as gay, or are just not able to keep up with the extraordinarily complex web of rules that define masculinity, are continually sent messages by the dominant group (i.e., cisgender, heterosexual men) that they do not belong. While literature exploring the intersection of sexual orientation and the gender of men and their experiences in the STEM fields is nearly nonexistent, the literature that explores and disrupts the hegemony in other contexts (e.g., women in STEM) allows an important view into the possible negative outcomes of not conforming to the strict gender rules within STEM fields.

Identity Development Theories

Many theories exist which describe the development of the gay identity; however, three of these theories have dominated the discourse in student development theory. These theories, Cass's (1979) model of homosexual identity development, Fassinger's (1998) inclusive model of lesbian/gay identity formation, and D'Augelli's (1994) identity development and sexual orientation models, encompass some of the most important literature regarding the development of a non-heterosexual identity. All three of these theories have shaped and reshaped our understanding of what it means to develop in the gay identity. Furthermore, the theories seem to represent a growth in understanding and empathy as our understanding of the gay identity has grown. I believe D'Augelli's theory, however, represents the most inclusive, mature understanding of the development of the gay identity. As such, D'Augelli's (1994) theory will be the final theory examined here and the primary gay identity framework used in this study.

Cass's model of homosexual identity development. The first of these theories, Cass's theoretical model of homosexual identity formation (1979) was rather

groundbreaking in that it was among the first to attempt to quantify and validate a model of homosexual identity development. Cass's model assumed that the process of development in the homosexual identity was active, dynamic, and not a mental disorder. The model also included males and females rather than just focusing on males, the dominant group. However, no matter how foundational Cass's model is considered to be, I feel there is an underlying current of heteronormativity in the writing evident from the beginning when she writes, "This paper describes a theoretical model of homosexual identity formation, the process by which a person *comes first to consider and later to acquire the identity of 'homosexual'*" (1979, p. 219, emphasis added). In Cass's (1979) model, there is an inherent nod to the antiquated notion of choosing to become gay. Cass uses language, whether intentionally or not, suggesting some people will choose to become gay just because they "find 'being different' exciting, out of the ordinary, as adding something special or extra to their lives" (1979, p. 226). Furthermore, Cass's (1979) model is almost entirely internal to the self. Rarely does the model look out to the impact the dominant culture has or the power of the individual's environment on their development. Instead, Cass's model focuses almost entirely inward as the person ascribes an identity to the self, compares it with others – one of the few external focus points – then tolerates, accepts, becomes proud of, and finally synthesizes the identity.

Even forgiving each of these shortcomings, Cass's model is limiting. McCarn and Fassinger (1996) noted that Cass's sample includes only Australian subjects and, while generally ascribing to a Western hegemony, Cass fails to discuss the contextual differences between an Australian sample and a sample from another Western society. Kaufman and Johnson (2004) also noted that Cass's model implies that if one does not

follow the linear progression or does not complete the progression in its entirety, then one cannot be seen as a “positive happy gay or lesbian person who is ‘out’ in most situations” (Kaufman & Johnson, 2004, p. 810). Kaufman and Johnson (2004) continue by pointing out that the stigma associated with disclosure has changed and is very different than the social context present in 1979. Finally, Cass’s model does not allow for the inclusion of other identities in the development process (Kaufman & Johnson, 2004).

Fassinger’s inclusive model of lesbian/gay identity formation. Fassinger’s (1998) inclusive model of lesbian/gay identity formation was developed out of other research done with colleagues and a survey of the available literature on the topic. The model takes a two-pronged approach to identity development that attempts to be “more inclusive of demographic and cultural influences and less reliant on identity disclosure as a marker of developmental maturity” (Fassinger, 1998, p. 16). When using the word *inclusive*, Fassinger referred to the inclusion of both internal and external processes in the model, the two prongs of her approach. Fassinger calls these two processes “separate but reciprocal” (1998, p.16) in that they interact with each other although an individual may be experiencing different phases of each of them. For example, a person could be exploring their external sense of identity while integrating their internal identity into their overall identity sphere. The model consists of four phases, awareness, exploration, deepening/commitment, and internalization/synthesis, each with a characterization in the individual and group branches of the model, the basis for calling the model inclusive. Fassinger (1998) does assume a pre-phase of non-awareness, which suggests that the development of a gay identity is not a choice, but this awareness still does not make the model the most useful for this thesis.

While Fassinger's (1998) attempt to include both the internal and external processes was a valuable addition to the literature and is an important factor to keep in mind for this study, the model does little to include other identities or the intersectionality between those identities and the gay or lesbian identity. Importantly, though, the model does allow fluidity, re-cycling, and non-simultaneous progression, which I believe is paramount in understanding the development of any non-heterosexual identity. This concept of understanding the fluidity and elasticity of the process of developing a gay identity is explored further in D'Augelli's (1994) model.

D'Augelli's identity development and sexual orientation model. It is D'Augelli's (1994) model that provides the primary identity development framework for this thesis. As a model of lesbian, gay, and bisexual identity development, D'Augelli's (1994) work provides the most flexible and contextually relevant understanding of the gay identity. D'Augelli's theory exists along three important assumptions: (a) because lesbian, gay, and bisexual (LGB) individuals exist in a predominantly heterosexual (or heteronormative) society, they must inherently assume multiple identities; (b) self-definition as LGB requires both a "conscious and purposeful rejection of the heterosexist identity and behavior required by mainstream society and creation of" a new homosocial and homosexual identity; and (c) this process exists across the entire lifespan rather than just late adolescence or early adulthood (Pascarella & Terenzini, 2005, pp. 31-32).

D'Augelli (1994) recognized the importance of the gay identity as being socially invisible as well as the social and legal penalties that can be attached to its disclosure. This recognition is underscored by D'Augelli's (1994) positioning of his research as

being squarely within a heterosexist culture that conditions the individual to feelings of fear and shame:

Even in early childhood, individuals learn that such an identity is problematic. Homophobic comments are routine in elementary schools, and exploration of same-sex physical and emotional closeness is severely punished by parents and others as soon as it appears....The “hidden curriculum” of heterosexism is taught to all, even those children who as adults will self-identify as lesbian, gay, or bisexual. (p. 315)

This heterosexist culture implies a system of privilege and oppression, dominance and subordination, which is consistent with the literature discussed in the section on the confluence of sex, gender, and gender schema. Furthermore, D’Augelli (1994) speaks directly to the development of a gay identity occurring in the context of many other factors. The most notable factor to D’Augelli is race. It can be assumed that gender, sex, and gender schema are also factors that form the context in which the identity is developed. Finally, D’Augelli’s (1994) model is developed with the understanding that the “years in which changes in hormonal development in men and women occur are periods in which cognitive concepts of sexual orientation become especially salient” (p. 321). That is to say, the identity is likely salient and therefore being developed during the late adolescent and early adulthood periods, which happen to coincide with the time a person is traditionally in college. For all of these reasons, D’Augelli’s (1994) model is the most relevant to this study and informs the execution of the research from inception through completion. While the assessment of identity development is not necessarily at the core of this thesis, it is necessary to understand the process through which the identity is developed to understand the ways in which it can be impacted. Perhaps more important than the stages of development in D’Augelli’s model is the understanding of what factors impact that development.

D'Augelli's (1994) model is composed of six stages. The stages are non-consecutive, fluid, elastic, and "mediated by the cultural and sociopolitical contexts in which they occur" (D'Augelli, 1994, p. 324). In the first stage, an individual exits the heterosexual identity. For D'Augelli (1994), this is different from what Cass (1979) described as a rejection of an existing heterosexual identity and more of an internal recognition that the sexual orientation has always been and remains non-heterosexual. This includes the disclosure of the identity to the self and to others, beginning with the very first person to whom one comes out. The second stage finds the individual developing their personal identity status, propelling the individual toward social interaction, including understanding the internalized heterosexism and myths about non-heterosexuality. As the second stage acts as a "mobilizing force" (D'Augelli, 1994, p. 325), the third stage is the realization of that motion into the external as the individual develops their non-heterosexual identity socially. D'Augelli (1994) clearly articulates this stage is a lifelong process and not something that can ever be completed, although its salience will vary. This third stage also describes the process of seeking an affirmative network to help the individual cope with tolerance and implicit and explicit oppression, which are harmful to further development. The fourth stage is concerned specifically with the disclosure of the identity to the parents and family and becoming a lesbian-gay-bisexual (LGB) offspring. Similar to the third stage, the preferred outcome is an affirmative network; however, the possibility of a negative network which either tolerates, seeks to contain, or rejects the identity, exists. The fifth stage further integrates the internal with the external processes as the individual develops an intimacy status. Because a heterosexist society reaffirms the view that homosexual relationships cannot

be successful and only produces cultural scripts that are applicable to heterosexual couples, this stage can be very problematic for the individual. Much of the responsibility for breaking through these barriers falls to the individual, unfortunately. The remaining stage is that of entering the LGB community in which some become activists or simply develop pride and empowerment to fully *be* their identity.

Environmental and Human Ecology Theories

Because this study examines the impact of an environment (the STEM classroom) and its acceptance or hostility on the experiences of an individual who identifies as gay, theories that describe these environments and the ways in which they impact student development must also be considered. In this vein exist two sets of theories: those designated as environmental theories and those designated as human ecology theories. While they serve a similar purpose – to explain the interaction between an environment and the student – they operate in two different realms. Environmental theories tend to focus on how the environment impacts the student while ecological theories help us understand how students adapt to the environment (Evans et al., 2010). As noted by Lewin (1931), behavior is a function of people in an environment (Behavior = $f(\text{people, environment})$), meaning that to understand the behavior of a person, which could be extended to include their experiences, one must understand how the person and their environment are interacting (Strange & Banning, 2001). Because understanding both human ecology theories and environmental theories is integral to answering the research questions, a mixture of both are used as frameworks for this thesis. First, I will explore the importance of human ecology theories before explaining Bronfenbrenner's (1979, 1995) PPCT model and Renn and Arnold's (2003) reconceptualization, which provides

the primary environmental framework for this thesis. I will also explore a number of environmental theories, which impact and inform my understanding of student development, my interaction with students, and my personal philosophy.

Human ecology theories. A significant number of ecology theories exist that attempt to explain how students navigate types of environments. Ecology theorists have sought to explain everything from how the physical spaces of campus impact students, to organizational structure, to physical safety, to online learning, and more (Evans, Forney, Guido, Patton, & Renn, 2010). However, a theory on the physical environment, or online learning, or even physical safety does little to inform a study like this that is concerned with the classroom and academic climate impacting a student. The physical spaces are certainly important in considering student engagement, but are not of concern for this study. What is of concern is how the people within the environment act and behave. According to human ecology theories, people behave in very specific ways, some to the point of even possibly creating an environment. While physical spaces, online learning, and safety certainly can impact a student's development, only human ecology theories explain the impact of human environments on development.

Rather than looking at the environment created by a campus group (known as human aggregate theories), Bronfenbrenner (1979) took a more student-centered, psychological approach (Evans et al., 2010). In Bronfenbrenner's (1979) theory, the interactions between the process, person, context, and time (PPCT), work to either support or inhibit development. The process component is at the core of the model and is the main driver behind the development of the person. Process is described as the interaction between the organism and the environment (Bronfenbrenner, 1979). The next

piece of the theory, the person, is possibly the most variable as each individual has his or her own characteristics and attributes (Bronfenbrenner, 1979). I will skip the context piece of the theory to first talk about the factor of time, which is simpler to describe. Time is merely the understanding that processes take a different amount of time, from the very quick, ongoing processes, through the processes that take several days to weeks, to the long-term processes (Bronfenbrenner, 1995).

Context, the third component of Bronfenbrenner's (1979) theory, is by far the most complex. Bronfenbrenner (1979) defined the context as having four levels: the microsystem, mesosystem, exosystem, and macrosystem. Each of these systems looks different depending on the student, because the student is always at the center of the model (Evans et al., 2010). However, these contexts were constantly under reevaluation by Bronfenbrenner until his death in 2005 (Tudge, Mokrova, Hatfield, & Karnik, 2009). Because of the continuous changes to the context component, the model sometimes creates a "conceptual incoherence" (Tudge et al., 2009, p. 199). Bronfenbrenner himself suggested that he may have overly discounted the importance of the self in the model while over-valuing the context (Bronfenbrenner, 1989).

In 2003, however, Renn and Arnold reconceptualized the context model in a way that was much more adaptive to change. Renn and Arnold's (2003) update also includes the Bronfenbrenner (1995) adaptation of the chronosystem, which was a reworking of the time model that created the three levels of *micro-*, *meso-*, and *macrotime*. Renn and Arnold's version of the context of college student development presented the various systems as a group of nested or concentric circles, which indicated the position of the system relative to a central point, the student (Evans et al., 2010). While the Renn and

Arnold adaptation does leave space for socio-cultural, -historical, and -political influence and takes into account the relative salience of individual characteristics, the model is built on an ever-changing theory, making its use challenging. The Renn and Arnold update is still valuable, however, as a model for understanding the ways in which a student's context impacts their identity and informs their experience. The concentric circles remind researchers there are many levels of environment, all of which can influence the student.

Environmental theories. Environmental theories represent the second part of the function that governs behavior (recall Lewin's (1931) equation Behavior = f(people, environment)). Rather than representing how people adapt to an environment, environmental theories focus on how the environment impacts the student.

Sanford's (1966/2009) theory of readiness, challenge, and support (generally referred to as *challenge and support*) is one of the first theories that incorporated the idea of development into the person-environment interaction (Evans et al., 2010). As students mature or experience positive environmental factors, they become ready to experience developmental processes (Sanford 1966/2009). According to Sanford (1966/2009), this development occurs through a balance of challenge and support. When students are presented with challenges to their traditional ways of thinking, they experience dissonance. If students are provided with support through this dissonance, they can positively develop. Sanford offers a caution to the developmental agent (e.g., the student affairs professional) that if a student experiences too much challenge or not enough support, they can regress to earlier stages of development, solidify or foreclose upon their current behavior, or simply ignore the challenge. However, if not enough challenge is

presented or too much support is offered, a feeling of safety and security can also prevent the student from developing (Sanford 1966/2009).

Schlossberg's (1989) theory of mattering and marginality operates within a similar framework but reflects a more positive psychological approach than Sanford's (1966/2009) theory. In a sense, Schlossberg's (1989) concept of marginality is analogous to Sanford's (1966/2009) challenge, while the concept of mattering is analogous to support. Rather than the student being presented with challenge either by the environment or through intentional practices, Schlossberg (1989) describes marginality as an almost entirely internal sense of not feeling as though one fits within an environment. Marginality can lead to feelings of self-consciousness, irritability, and depression, which is important to remember, because for many non-dominant groups, marginality is a nearly permanent condition (Evans et al., 2010). On the other hand, the concept of mattering is generated by feelings of attention, importance, being appreciated, being needed, or others' finding pride in your success and sympathizing with your failures (Evans et al., 2010).

Some may describe the feeling of mattering as an effect of validation, a theory presented by Rendón in 1994. Validation theory can be defined as "an enabling, confirming and supportive process initiated by in- and out-of-class agents that foster academic and interpersonal development" (Rendón, 1994, p. 46). Evans et al. (2010) present validation theory as being more valuable in supporting academic and social ability. However, Rendón's (1994) similarity to Schlossberg (1989) is valuable to this thesis, particularly through the lens of power and privilege and validating a student's experience and existence.

Power and Privilege

The problem with privilege is that the concept is so rarely tangible for those who have it (Evans et al., 2010) that creating a definition satisfying all the intricacies therein is nearly impossible. Because power often begets oppression, the fact that most major social identity theorists disagree about the definition of oppression (Evans et al., 2010) is especially disconcerting. Defining privilege is perhaps better done through the use of examples than attempting to string together an objective group of words. As Johnson (2006) writes:

If people take me more seriously when I give a speech than they would someone of color saying the same things in the same way, then I'm benefiting from white privilege. That a heterosexual black woman can feel free to talk about her life in ways that reveal the fact that she's married to a man is a form of heterosexual privilege because lesbians and gay men cannot casually reveal their sexual orientation without putting themselves at risk. (p. 21)

Many different types of privilege can be present at any time, but what they all have in common is their benefit to those in the dominant group. In the United States, this might refer to the quintessential WASP, the White, Anglo-Saxon, Protestant. If this WASP happens to be male, as well, they then also benefit from male privilege, and if the person is heterosexual, then yet another layer of privilege can be added. The unfortunate truth is that individuals in the non-dominant groups are inherently subject to oppression because of this privilege. Put in a different way:

The experience of oppressed people is that the living of one's life is confined and shaped by forces and barriers which are not accidental or occasional and hence avoidable, but are systematically related to each other in such a way as to catch one between and among them and restrict or penalize motion in any direction. It is the experience of being caged in: all avenues, in every direction, are blocked or booby trapped. (Frye, 2003, p. 16)

Cody Charles, associate director of the Office of Multicultural Affairs at the University of Kansas uses a fantastic analogy. Imagine having your foot stepped on every day by the same group of people. At some point, the apologies lose their meaning and you are still left with an injured foot. You have no control over your foot placement, but everyday, it continues to be stepped on. This is not necessarily an experience intentionally perpetrated by a member of the dominant group. Instead, the dominant group member has likely been socialized to believe that they have every right to step right where your foot is (Charles, personal communication, November 2013). While social justice is certainly an intensely complex subject, Charles's analogy makes it much more accessible.

As Kimmel (2003) says:

To run or walk into a strong headwind is to understand the power of nature. You set your jaw in a squared grimace, your eyes are slits against the wind, and you breathe with a fierce determination. And still you make so little progress....Being white, or male, or heterosexual in the United States is like running with the wind at your back. It feels like just plain running, and we rarely, if ever, get a chance to see how we are sustained, supported, and even propelled by that wind. (p. 1)

Power and privilege is often invisible to those who have it, but to those who are oppressed by it, the power and privilege of the dominant group are as obvious as anything.

Just as privilege shows up in many ways, so does oppression. According to Young (2009), there are five faces of oppression: exploitation, marginalization, powerlessness, cultural imperialism, and violence. Oppression through exploitation is evident, according to Young, in situations like heterosexual marriage, wherein the western view of marriage has long been that of a woman dependent on a man. This dependency creates a kind of exploitation in that to maintain her quality of life, the woman must please or satisfy the man. Young describes marginalization as a type of

unequal citizenship, much of which is institutionalized into the very fabric of our society in the form of a welfare state that is fully dependent on keeping people in the same social strata. Powerlessness in the way described by Young can be exemplified through the current debate on immigration laws and undocumented students wherein those who are excluded from many of the full benefits of citizenship have little or no power to change the laws. As Young describes it, “To experience cultural imperialism means to experience how the dominant meanings of a society render the particular perspective of one’s own group invisible at the same time as they stereotype one’s group and mark it out as the Other” (2009, p. 66). Consider the proclivity of college-aged partiers to wear costumes depicting crude stereotypes of Mexican culture or the consistency with which television shows portray gay men as having limp wrists, high-pitched voices, lisps, and an all-consuming crush on the straight boy-next-door. Finally, violence is perhaps the most obvious form of oppression and the one that needs the least explanation but also has the most disgusting examples.

The fact remains that whether or not the participants in this study can name their oppression or even recognize it as such is unimportant. The participant has likely experienced and will likely continue to experience moments of oppression throughout their undergraduate education. This oppression is present in every facet of life, whether or not it is salient to the individual. Oppression might come from parents who want you to “find the right girl,” friends who use language like “no homo,” or environments like STEM which, due to their masculine nature, may be incongruent with a student’s identity. Understanding the types of oppression and ways in which the oppression can impact an individual’s experience is important in making meaning of and understanding

these experiences themselves. For the student affairs professional, this knowledge is valuable in learning how to create a more inclusive, supportive environment. For the student, being able to name their oppressions can give them the power to push back against the environment until it becomes a more comfortable space.

Conclusion

The literature that informs this study is not and could not be pulled from one single area. As a study that wishes to understand the experiences of undergraduate gay male students in STEM fields, there must be consideration of each of these identities. Understanding what it means to identify as gay and how the identity develops is just as important as understanding how power and privilege interact in the American culture. Because this study is built from a perspective of how women have experienced the STEM field, there must also be an understanding of how people interact with their environment and how that impacts the experience and fit for each student. This literature has directly impacted the purpose and research questions of this study and many of the methodological choices. Those choices, and how they impact the study, will be covered in the next chapter.

Chapter 3 – Methodology

As a qualitative, phenomenological study, this project will utilize an interview-intensive approach. In an effort to help build a rapport with participants and develop a level of trust in which participants can honestly share their experiences with the researcher, a type of episodic interviewing will form the main structure of the methodology. Embedded within this structure are two activities designed to help the participant explore and make meaning of their experiences and the power and privilege that impact their identity/identities. These activities, photo-elicitation and peaks and valleys, borrow heavily from previous research.

Epistemology

This research is conducted from a hybrid transformative and constructivist viewpoint. As transformative research, this study seeks to confront and begin dismantling the systems of power and oppression inherently present in society. In order to do the transformative work, the research was conducted through a constructivist lens, wherein the experiences of the participants are taken as their own truth and validity is assumed, not assigned. The understanding that all people create their own reality is exceptionally important for this study because the geographical spread of the participants means many of the students' contexts are different from my own. Through my own experiences as a gay male undergraduate student studying in a STEM field at a large, Midwestern university, I believe that the experiences of students are vastly different depending on the context in which they are lived. In my context, many of my experiences were negative, although this was unknown to me at the time. It is with this knowledge that I have reached a constructivist viewpoint that each individual constructs

their own truth through their experiences. My experiences are my truth, but not necessarily truth for all. Conversely, the experiences of the participants are their own truth, which is not necessarily the same as my truth. Similarly, my experiences with power and privilege – specifically heterosexism, the masculine hegemony, and homophobia – have led me to the understanding that in each of our daily interactions with peers, authorities, and environments, we experience the impact of systems that reinforce and manifest power and privilege. By combining transformative and constructivist lenses to conduct this research, I was able to re-present the lived truth of the participants to confront and dismantle the systems of power and privilege that created those experiences to begin with.

Qualitative Research

Attention to human forms of life, to the subtle details of people's talk and action, to human bodies in material surroundings, can open our eyes to unnoticed aspects of human life and learning, to unexplored characteristics of the relationship between humans and the world we inhabit, and to unsuspected ways in which we could improve our lives on this planet. (Packer, 2013, p. 2)

If researchers are to, as Packer (2013) says, “open our eyes...to unexplored characteristics of the relationship between humans and the world we inhabit,” (p. 2) then qualitative inquiry is our clearest avenue of inquiry. Qualitative research is not necessarily limited by numbers and does not require meaning to be imparted by a researcher; meaning exists (in some paradigms) because the participant has said the meaning exists. To this end, extensive reflexivity and journaling were done. The journaling allowed me as the researcher to more fully understand my experiences and identities. By sharing this with my advisor both orally and written, we were able to together identify when my voice may have been more dominant.

Understanding how my identities, as the researcher participating in the interview process, can impact my results and interactions with my participants is paramount in keeping “a focus on learning the meaning that the participants hold about the problem or issue, not the meaning that the [researcher brings] to the research” (Creswell, 2014, p. 186). As a researcher and professional, I tend to work from the constructivist and transformative paradigms. I believe that each person has a story that is worth telling and qualitative research gives us the opportunity to explore these stories and re-present them in meaningful ways. As mentioned in Chapter 1 and discussed more fully at the end of this chapter, my own experience as a gay, male, undergraduate student in a STEM field heavily influences my work. Because I come into this research with extensive experience and background, I must, as Maxwell (2013) warns, develop a clear plan that takes into account the goals of this research, whether personal, practical, or intellectual. Sharing my journals and having reflexive conversations with my advisor were integral to developing a deeper understanding of how my experiences have shaped my worldview.

Similarly, because the meaning exists and is interpreted by the researcher and reader, reflexivity is a built-in component of any qualitative study. Creswell (2014) explains that this is “more than merely advancing biases and values in the study, but how the background of the researchers actually may shape the direction of the study” (p. 186). According to Maxwell (2013), in interview-based studies, “what the informant says is *always* influenced by the interviewer and the interview situation” (p. 125, emphasis in original). This is the purpose and reason for the reflexivity found in this chapter and was ongoing throughout the research process. Reflexivity allows me, as the researcher, to explore and understand my feelings, thoughts, and reactions to what happens in the data

collection and analysis process. Similarly, as a new researcher, sharing my reflexivity with my advisor gives me the opportunity to explore and understand the anxieties and challenges that I face throughout the research process. My advisor and I were able to use my reflexive exercises as a sounding board to understand my impact on the research.

In the end, qualitative research remains the best overarching way to achieve the goals of this research. Certainly, there is a need to collect and understand quantitative data regarding LGBTQ populations, but the experiences of these students in the classroom can only be quantified so much before the meaning of those experiences is expunged from the numbers. Qualitative research allows the experiences of these students and their meaning-making processes to exist in their own space.

Because of these reasons, I used a phenomenological approach for this project. The purpose of the study is to understand the classroom experiences of these students and how those experiences have impacted their development. Using Creswell's (2014) descriptions of qualitative methods, only phenomenological research provides the researcher the ability to re-present the stories and experiences of the participants. Phenomenology "attempts to ground any academic discourse in its definitive experiences" (Owen, 1994, p. 2) making it the ideal perspective for this research.

Interviewing

While qualitative research provides an avenue to conduct this research project, the qualitative paradigm is only an umbrella term for a much larger group of research methods. As Creswell (2014) notes, interviewing is the cornerstone of phenomenological research. Creswell (2014) does not, however, give a template for how these interviews should be conducted. Using Maxwell's (2013) view of qualitative research as a *bricolage*

or do-it-yourself activity, the task of determining how best to conduct interviews falls to the researcher.

Maxwell (2013) writes often about building rapport and creating deep, rich data sources. In an interview-based project, this requires the participant to be intellectually, emotionally, and physically engaged in the interview. Extended contact with the participant in more than one instance may encourage the participant to engage critically with the interview process and offer deep, meaningful reflection (Maxwell, 2013).

Seidman (2013) offers a three-interview series as a way to generate the context necessary to understand and explore the meaning of the participants' experiences. The three-interview model was designed for qualitative, phenomenological research to help participant and researcher develop the solid context and rapport necessary to explore meaning-making processes (Seidman, 1991). The three-interview model also helps build the rich data necessary to validate qualitative research.

In the first interview, Seidman (2013) describes a line of questions that help build a context for the experiences of the participant. In general, Seidman (2013) recommends the use of the "how" question rather than a "why" question in order to have the participant "reconstruct and narrate a range of constitutive events in their past" (p. 21). Seidman (2013) terms this interview a "focused life history" (p. 21).

The second interview helps build the details of the "present lived experience in the topic area of study" (Seidman, 2013, p. 21). In this interview, the importance is not placed on why the experiences happen or how the participant feels their experiences have affected them. Rather, Seidman (2013) places import on exploring the facts and details of the experience as they happened. By asking for stories and eliciting long-form

responses, the researcher can begin to construct and understand the experience in the context of the participant's social setting.

The third and final interview asks the participant to reflect on the meaning of their experiences. Making meaning of their experiences requires the participant to examine the experience in the context of their life history and social context (Seidman, 2013):

The combination of exploring the past to clarify the events that led participants to where they are now, and describing the concrete details of their present experience, establishes conditions for reflecting upon what they are now doing in their lives. (Seidman, 2013, p. 22)

Seidman (2013) suggests using a futuristic tense to help the participant explore the meaning of their experiences through a different lens.

Although Seidman (2013) argues for a strict adherence to the three-interview structure, Maxwell's (2013) *bricolage* approach suggests the model can be stretched, shifted, and molded to better fit the researcher's goals and processes. Combining these two approaches to phenomenological research, the three-interview model was injected with two other research techniques to help elicit the critical reflection and meaningful thought processes required by this study. The first of these techniques is photo-elicitation, taken from Comeaux (2013). Photo-elicitation is "a graphic technique whereby the investigator assembles selected photographs to stimulate responses from participants" (p. 457). This activity occurred in the second interview to encourage reflection on the experiences of the participant and to act as segue into the second activity, the peaks and valleys exercise (Weichman, 2013). The participant completed the peaks and valleys exercise between the second and third interviews and then the participant and researcher reviewed the exercise in the third interview. The exercise

allowed the researcher and participant to together explore the impact and the meaning of the experiences discussed in interview two.

Photo-Elicitation Technique

In his 2013 study, Comeaux used photographs of students to elicit responses from faculty members to understand dominant racial schemas. Snyder and Kane (1990) defined the very purpose and value of photographs as “to evoke thoughts, reactions, and feelings from individuals about some aspect of social life” (p. 256). Because Comeaux (2013) used unsupervised written responses to collect these thoughts, reactions, and feelings, each photo was accompanied with a written vignette that gave the readers a prompt. To better fit in a face-to-face interview environment, this activity had to be adapted somewhat. Primarily, the photos were not accompanied by any prompt other than a question of how well the participant relates to the image and why they did or did not relate to the image.

Peaks and Valleys Technique

Weichman (2013) used a peaks and valleys timeline technique to generate discussion and conversation during each interview with second-year college students to explore the challenges and successes of their first year and college transition. In this study, however, the peaks and valleys exercise was conducted between the second and third interview, rather than before each interview. At the end of the second interview, participants were given a sheet of paper with a straight, black line drawn straight across the middle of the page. Participants were then asked to draw their experience as a series of peaks and valleys where the solid line is considered neutral. The height of the peaks and the depth of the valleys were up to the interpretation of the participant (Weichman,

2013). Then, in the third interview, the researcher and participant together analyzed the image. According to Weichman (2013), the exercise takes the participant between 30 and 60 minutes to complete before the interview; however, students in this study reported times nearer to 10 minutes.

Interview Protocol

The first interview focused mainly on introducing the reflective process to the participant and lasted roughly 30 minutes. Questions were tailored to exploring participant's identities, gender schema, and classroom experiences. At the beginning of the interview, questions were focused on exploring the lifetime-level experiences of the participant. This helped build a rapport with the student and put their micro-level experiences (in the STEM classroom) in context. As the interview progressed, questions began to focus more on the experiences leading up to college and in college. This line of questioning was intended to help build rapport with the participant and encourage them to freely discuss their experiences in the STEM classroom. While this interview did not explicitly adhere to the guidelines for a three-interview model discussed previously, the deviation was intentionally used to encourage reflective thinking before the second interview.

The second interview continued exploring open issues from previous interview. Questions were dependent on the previous interview and participant. The participants were asked to discuss specific classroom interactions within their major. I also asked the participants to take part in the photo elicitation activity in which they were shown a series of images on flashcards and asked to determine how closely they identified with the images in the context of their classroom experience. Participants were also asked to

complete a peaks and valleys activity before their next interview. This interview began the process of exploring the STEM classroom and the experiences the participant had there.

The third and final interview focused on exploring the participant's peaks and valleys activity and discussing their choices in their image. Questions and prompts such as, "Describe the peaks and valleys on the image you drew," "What makes each peak and valley as high or low as you drew it?" "In what ways, if any, do you think your sexuality shaped those experiences?" and "How did people's perceptions of you as a man/male shape each experience?" were included in each participant's third interview.

Participants were also asked to reflect on their interview experience and to share any other pertinent information. I also shared with participants some key phrases and passages from their previous interviews. Sharing these passages allowed the participant to take part in member checking and also allowed them to explore their experiences more completely in the context(s) they had already used.

In this study, the three-interview model can be thought of as a three-dimensional funnel. In the early part of the interview sequence, the participant was asked to explore larger themes occurring in the life-span level. As the interview sequence progressed, the participant was asked to begin contextualizing their experience in the STEM classroom. Then, with the help of the photo-elicitation exercise, the participant was able to concentrate their reflection to individual experiences. Finally, the participant was asked to explore how those experiences impacted them as a student and as a person who identifies as a gay male. Each interview and question is a little further down on the spiral into the funnel.

Participants

The participants of this study are gay males enrolled as students in a STEM degree program in a post-secondary setting. Participants were recruited through three listservs: the ACPA Standing Committee on LGBT Awareness listserv, the NASPA GLBT Knowledge Community listserv, and the researcher's local LGBTQA resource center listserv. This sampling process was derived from the purposeful selection idea in qualitative research as described by Creswell (2014), and the criterion sampling described by Mertens (2010). This purposeful selection of participants is done in a way "that will best help the researcher understand the problem and the research question" (Creswell, 2014, p. 189). Criterion sampling allows the researcher to select only participants who meet certain criteria (Mertens, 2010); in this study the criteria were that the participant identify as gay, male, and be a student in a STEM field.

Using the listservs allowed the researcher to reach individuals who were potentially more open about their identity, which limited the risk of participating in the study while also legitimizing the study by its connection to these groups. Students who are members of the two national listservs or open enough about their identity to have been forward the information from a mentor or their local LGBTQ resource center may have a better understanding of their experiences and be able to articulate them in a more meaningful way. This sampling technique was also valuable because very few schools track sexual orientation as a demographic data point, so finding the population can be a challenge. A backup snowball sampling method was also available but was not used to recruit any participants.

In order to better tell the stories of the participants in this thesis, I have chosen to write a brief profile of each. These profiles allow me to introduce each participant as an individual with their own background, experiences, and goals. Furthermore, the use of these profiles helps ensure that I re-present their experiences in Chapter 4 using their own voices.

Bill. Growing up in a small town in the Deep South, Bill often felt the pressure to hide his identity and instead adopted a certain coldness or aloofness so as to not have to discuss the fact that he was attracted to other men. He had grown up hearing discriminatory epithets and negativity, so getting the opportunity to attend Central Appalachia University, a large, flagship, land-grant, research institution in the region, meant the opportunity to be open and start living authentically. Bill had known he was gay since he was 11 or 12, but was not able to acknowledge it to anyone else until he was a senior in high school, when his then-girlfriend stole and read his. While that experience turned out well, Bill never told his family about his sexuality. Instead, they came to him to let him know that they knew and that they loved him.

As a biological systems engineering major at Central Appalachia University, Bill had the opportunity to travel to South America as a first-year student. As he and his classmates bonded on the trip, his classmates realized Bill was gay. Now, those three other students feel like his family. Between this chosen family and a graduate student in his department who is gay, Bill has been able to find a kind of support net as he develops in his identity. He has also mentored a fellow student, a first-year taking the same trip to South America that Bill took. It feels as though he is able to help himself when he's helping this other student.

Bill finds the impersonality and objectivity of engineering attractive. Here, he is not going to be judged for his identities, but rather for his talents as an engineer. This talent has earned him some respect in the classroom as the hypermasculine agricultural engineering guys come to him for help with their homework, an irony not lost on Bill. Now, as Bill finishes up his last year at Central Appalachia University, his first romantic relationship has made these his best semesters yet.

Chip. Downtown University was Chip's first post-secondary institution. There, he had intended to pursue a degree in athletic medicine, a program with intensive anatomy and physiology requirements, and he was doing well. Chip had been given the opportunity to work as a trainer with the school's football team, a job possibly even more important than being governor in that state. Chip was talented, too, and was even being considered for the position of head trainer, which would have kept him with the team for the next year. Inside, though, Chip knew that it was time for him to begin living authentically. When he came out to his mother, Chip received some hard advice: If he wanted to be successful, he would need to leave athletic medicine. Chip had planned to go to medical school and pursue a career in orthopedic surgery.

Rather than continue in an environment that would likely be incongruent with his identity, Chip chose to accept an offer to teach human anatomy as an undergraduate teaching assistant. Although Chip was talented in the biology and biochemistry fields, he eventually settled on a degree in psychology. After completing his degree at Downtown University, Chip began graduate training at Rocky Mountain State. Unfortunately, his advisor and mentor took an opportunity to move to the east coast and work at a prestigious institution. Chip soon followed and found himself at Upstate University,

beginning work on a combined MD/PhD. At Upstate, Chip is researching the relationships between patients and healthcare providers, educating providers on working with sexuality, sexual orientation, and advocacy to make sure people do not run into the same barriers he did.

While it is unfortunate that his experience forced him out of the STEM field, Chip has found new purpose in his work at Upstate University. Plus, he is now closer to his mentor and advisor, which means they are finally able to really work together on some of Chip's research. Chip has also married his longtime partner, is teaching courses to undergraduate students, and has begun building a social life outside of the university.

Jim. Jim is a quiet individual. He speaks softly and shyly. Growing up in the Rocky Mountain region, Jim grew up with fairly traditional gender roles and in a fairly conservative home – his mother was Catholic but has now converted to a more Protestant faith. Still, he did not realize he was gay until he reached his senior year in high school. Jim had been taught that being gay was not normal. He believed there was something wrong with him. That is, until he found the Gay-Straight Alliance at his high school. Shortly after he realized he was not abnormal, Jim came out. Rather than tell everyone in his family, though, Jim decided embrace the stereotypes and pierce his ear in hopes that his family would figure out his sexuality.

Jim's shyness usually means that he does not have to confront many issues from his sexuality while he is in the classroom. At Downtown University, Jim is pursuing a degree in forensic sciences, is an active volunteer with the campus LGBTQA resource center, and is a member of a couple of student groups out of that office. The majority of Jim's support comes from the resource center, its staff, and the community he has been

able to build with the other students. While Jim had experienced some negative reactions and some teasing in his high school career, his experience at university has been much more positive.

John. Most of John's experience at Fidelity University, a mid-sized, private, Jesuit, nonprofit research institution in the mid-Atlantic region, comes from his work in the housing department. This is John's second year as an RA at Fidelity. Last year, in his first year, John began his coming out process. He first came out to his mentor, a professor of psychology, who felt like John, who was the only freshman in the class, showed promise. John's mentor continues to be a source of support.

After coming out to his mentor, John attended a men's retreat, where he participated in a session on vulnerability. During the session, John felt compelled to make himself vulnerable and come out to the group. The outpouring of support, though, was completely unexpected. John also came out during his RA training. Unfortunately, that time, a fellow RA who was also gay, although closeted, took the opportunity to take advantage of John. When John told him that he no longer wanted to be in a relationship, the other RA threatened to tell the administration about John's drug use. Rather than stay in the relationship, John chose to come forward to his supervisors about his drug use, resign his position, and get clean. After attending a rehabilitation program and spending a semester and summer away from Fidelity, John was able to come back to school and resume his RA duties.

Now, as a biochemistry and mathematics double major, John is getting more comfortable with himself at Fidelity. He has joined an LGBT student group and is active in the outreach.

Payton. Payton grew up in the Sierra Nevada region with his two sisters and religious conservative parents. He was exposed to very traditional, hegemonic gender roles; while his sisters were allowed to participate in nearly any activity they wanted, Payton was forced into more traditionally masculine activities. Payton first came out as a sophomore in high school, while he was dating a girl. In his junior year, came out to his entire school. Then, in his senior year, Payton decided to come out to his parents. Unfortunately, his parents were not as receptive as his classmates. After first coming out to his mother, Payton felt like things were going well, but once his mother told his father, Payton learned otherwise. Lots of arguing, yelling, threatening to send him to military school, and awkward interactions later, Payton was able to finish his education at home. When moving to Rocky Technical University, a small, public, engineering and applied science university in the Rocky Mountain region, Payton was pressured by his father to stay in the closet.

Rather than follow his father's advice, Payton chose to live mostly openly at school. Payton is quick to note, though, that as a varsity track athlete at Rocky Technical University, he never came out to teammates. Now that he has left the team, Payton has come out to some individuals from the program. In mechanical engineering, where Payton is majoring, he does not often talk about his sexuality but believes most people know that he identifies as gay. As a member of the honors program, Payton is very open about his identity and speaks authentically about his experiences to his classmates.

After completing his undergraduate work, Payton actually plans to leave the STEM field, but not necessarily because of negative experiences. Payton plans to pursue law and is the founder of the pre-law society at Rocky Technical University.

Research Site

Because participants were spread across the country, defining a true research site can be difficult. Participants represented regions as far apart as the Rocky Mountains and New England. While I was confined to one place, participants were invited to participate no matter their geographical location. One participant was interviewed in person and the remaining four participants all participated via Skype. However, my own experience and context is grounded in the culture and social norms of the Great Plains region and the two universities I have attended. My geographical location has played an important and powerful role in developing my own schemas, lenses, and biases. As such, the proxy university, Downtown University, will serve as the research site.

Downtown U is a large, public, land-grant university in the central Plains region. Although more than 25,000 students attend Downtown U, diversity and multiculturalism is still a very present challenge, as the university is situated in an extremely conservative and rural region. The city of Downtown is home to more than 250,000 people, with thriving financial and entertainment districts. Downtown U is considered an urban campus, as the city center is less than one block from the edge of campus. Downtown U also boasts an independent office for LGBTQA resources, women's and gender programming, and a large multicultural center that focuses on students of color and ethnic minorities.

Participants were given the option of utilizing my on-campus office at Downtown U, or a different private location of their choice in which to conduct the interview, if they were local. Other participants were instructed to find a private, comfortable space from which to conduct their interviews via Skype. As the researcher, I took special care to

only conduct these interviews in private locations like my office or home. These precautions were intended to ensure that participants felt as safe and open as possible in sharing their experiences.

Data

Data was primarily collected through the use of qualitative interviews. Interviews lasted for half an hour on average and were episodic. In the first interview, I used a loosely-structured interview protocol to ensure that I was asking all participants the same questions while still leaving room to explore deeper when necessary. This interview focused mainly on the background and experiences of the student on a macrotime scale and macro-level context (Bronfenbrenner, 1995). The second and third interviews were unstructured but focused on discussion of the activity related to each interview. In the second interview, I conducted a photo-elicitation activity and in the third, the participant and I discussed a peaks and valleys timeline that the participant had completed before the start of the interview. These two interviews delved more deeply into the experience of being gay in a STEM field and ask the participants to discuss more personal and complex feelings.

The use of semi-structured and unstructured interviews in an episodic format allowed the participants to tell their stories at their own pace and allowed me as the researcher to dig deeply into their experience. The participants and I were able to build trust and rapport, making the data that much more rich and saturated. Further increasing the richness and saturation of the data, participants were recruited from across the country through the use of two national listservs and two more local listservs. However, only two of the listservs, the Downtown U LGBTQA Resource Center listserv and the NASPA

GLBT Knowledge Community listserv were successful in recruiting participants to the study. Although the project was begun in 2013, the majority of interviews took place in March 2014 because of recruitment issues. All but one of the participants completed all three interviews (one participant could not complete the final interview due to his midterm exam schedule). Interviews were transcribed and returned to their respective participant to ensure internal validity through the use of member checks (Maxwell, 2013). All data collection was complete in mid-March 2014.

While I would have preferred to conduct all interviews in-person and face-to-face, I do not believe the use of Skype interviews was, in any way, a detriment to the data collection process. Rather, because I was forced to open my study to a larger population, I believe the data has been strengthened. By finding similar experiences across the country, the transferability of this study is only heightened. Furthermore, the non-regionality of the study validates the findings.

In addition to the interviews and their transcriptions, I consider the peaks and valleys worksheet and the photo-elicitation activity to be essential parts of the data. The photos were chosen by me to explore a wide range of in-class and out-of-class experiences as well as both traditionally feminine and masculine traits to encourage discussion on gender and sexuality. The peaks and valleys worksheets allowed each participant to consider their own experience as a larger picture and emphasize or de-emphasize as they saw fit, providing an invaluable insight into their personal story. A copy of the photo-elicitation flashcards, in the order they were presented to participants can be found in Appendix B. Copies of each of the peaks and valleys worksheets, with my hand-written notes, can be found in Appendix C.

Data Analysis

During and immediately following data collection, I transcribed all of the interviews. When time permitted, interviews were transcribed before the next interview in their sequence. This process allowed me to begin processing and understanding the data and develop questions and lines of discussion for follow-up interviews. Otherwise, interviews were transcribed following the data collection period. Interviews were transcribed using a free transcription software and Microsoft Word (for formatting). Interviews were analyzed using a hybrid *a priori* (Thomas, 2006) and inductive approach (Miles & Huberman, 1994). This coding process allowed me to establish and situate the experiences of the participants into the larger theoretical picture while also letting me see “how [the data] functions or nests in its context, and determined how many varieties of it there are” (Miles & Huberman, 1994, p. 58). Together, this coding scheme allows me to understand the data in the context of the literature that built the project while also honoring the participants’ individual realities.

Transcripts were all coded following the transcription period. Completing the coding in such a short time span generated many conflicting thoughts and assumptions, many of which were put into short memos to myself to later re-read and incorporate or discard. I also used focused conversation with my advisor as a form of verbal memoing. These conversations and my written memos allowed me to triangulate my findings and find cross-validation. The aim of this project was not to confirm, challenge, or validate any hypothesis or theories, as the *a priori* coding scheme might suggest. Rather, I was able to situate experiences within the existing frameworks or find points where the current frameworks fall short.

Data Validation

Throughout the project, I used several different data validation techniques. As the sole researcher, data collector, and interpreter, there is a possibility that my own experiences could skew the data, even with my best efforts to re-present the participants' stories and experiences. Primarily, I utilized a member check process where each participants' data was returned to them with the instruction that they review and revise anything they did not feel represented their reality. I asked the participants to return their transcripts to me within a week. This validation process resulted in minimal corrections and changes amounting to not much more than typing errors.

During the analysis and writing period, I also used memos and peer examination (Merriam, 2009). The memos helped me to more fully develop and process my reactions to the data, separate findings from implications, and find connections within the data. Meanwhile, during the peer examination process, I asked my peer researchers to review my findings for clarity and cohesiveness. This process was used to ensure the findings were valid in the context of the existing literature and my theoretical frameworks. I again used in-depth conversations with my advisor to better formulate findings and bring together similar experiences in the data. Because this study used a constructivist lens, it was important that I remember these experiences are the individual truths of the participants. To ensure that the findings were consistent with respective realities of the participants, I asked each participant to review the findings and inform me if they were consistent with their experiences.

Because the research was conducted using episodic interviews, I was able to continually check my understanding of the participants' experiences with them (Maxwell,

2014). The prolonged engagement generated by using an episodic interview scheme further strengthens the goodness of the data. Furthermore, because of the richness of the data and the multiple sources of data (interviews, peaks and valleys, photo-elicitation), I am able to triangulate the data as a type of validation (Merriam, 2009).

Limitations

There are many limitations inherent to conducting qualitative research. Among them is the implicit understanding that this research is not intended to be generalized to a larger population. Viewing the research through a constructivist lens confirms this ungeneralizability, as each of these experiences is unique to the individual reporting them. The sum of these experiences has created an unalienable Truth for the participant, one that may or may not exist for other members of this population. At the same time, other gay men who are studying in the STEM fields may experience many of these phenomena, and those experiences should be of concern to faculty, staff, and administrators in STEM degree fields.

As a phenomenological study, only a small sample size is required for the research, which could certainly be viewed as a limitation. However, the goal of this research is not to chronicle the experiences of every student who is studying STEM. Rather, the goal was to generate a data pool that was fully saturated with the experience of being a gay man in STEM at a post-secondary level. The three-interview model and activities used in the interview process produced exceptionally rich data, which is certainly saturated in many aspects.

Researcher Experience and Reflexivity

As a researcher conducting a qualitative study, my own experiences and values will be inherently present throughout the research process from the early design through my interactions with my participants, data analysis, and reporting of the whole study. Borrowing from feminist theory and feminist methodology, I find the need to challenge “the norm of objectivity that assumes that the subject and object of research can be separated from each other and that personal and/or grounded experiences are unscientific” (Fonow & Cook, 2005, p. 2213). According to feminist methodology, the best scholar to conduct research on a specific oppressed group is someone who is a member of that group (Cook & Fonow, 1990; Sarantakos, 2004). It is through these lenses that the following reflexivity is undertaken.

While much of the inspiration for this study was explained in Chapter 2, the initial spark is an important part of my individual purposes and goals. In 1986, Clark and Corcoran published an article in *The Journal of Higher Education* arguing that because women in academia had few role models, resources, and mentors who were also women, they were accumulating disadvantage the higher they climbed on the academic ladder. According to Clark and Corcoran (1986), each rung of the ladder had not just fewer women elders, peers, or sponsors, but a much smaller proportion thereof, creating an accumulative disadvantage. Reading this article in an introductory student affairs course completely changed my understanding of the representation of women in STEM. As I processed the article, I realized that, while women are still grossly underrepresented, their advancement in the field might have opened the door for other underrepresented populations in STEM to be studied. I began to consider my own undergraduate

experience and realized I could relate to many of the feelings expressed by participants in the Clark and Corcoran (1986) study.

As a young graduate student working in an engineering college and reading about the challenges women faced in academia in the late 1980s, I began to wonder who else might be experiencing these challenges. It occurred to me that I, as a (then-closeted) gay male in a STEM field, had experienced many of the same challenges described by and about these women. I was uniquely positioned to explore how the sexual and gender identities interacted within the field.

Being in the closet as a student in the sciences was not easy; I constantly found myself surrounded by the hyper-masculine ideals often perpetuated by the masculine sciences. There was no place for feelings or even for close or intimate relationships in the Eurocentric masculinity of my major, atmospheric sciences. There was no need to believe or feel about anything. It all made keeping my secret much easier. I found myself often experiencing micro-aggressions (although I did not have a name for them at the time) and found myself feeling hopeless, though fortunately never to the point of depression. It was my involvement with the advising center and multicultural center at my undergraduate institution that eventually helped me develop the courage and comfort with my self to begin exploring my experience as a closeted gay male in the sciences. In summary, hegemonic masculinity was not only prevalent, but also heavily impacted and shaped my experiences in the sciences.

These feelings stuck with me as I began my career exploration. As a student in atmospheric sciences, I had chosen news media forecasting as my emphasis and had planned to pursue a job in television. Even as an intern at the local news station, I could

tell I did not belong and was not welcome as a gay man. It is widely known in the field of television meteorology that gay male television meteorologists are not uncommon and may even be in the majority, but that knowledge only made those who belong to the heterosexual culture that much more vitriolic and hateful. The knowledge that I would never find a station with which I “fit” and that I would always be just another “f** on screen” nearly made me change my major.

These experiences allow me to connect with my participants on a level that others who do not belong to these groups could not. Because I have progressed through much of my coming out process, my identity connection allows me to make clearer meaning of their experiences and understand the emotions and feelings that accompany those experiences. As someone who has reached several major milestones in the coming out process, I have insight into the gay identity that is invaluable in this research. At the same time, I need to be aware of how my experiences and values could be projected onto the experiences of others.

Conclusion

This chapter explained the methodological choices made in this study. These choices contain inherent limitations that have also been discussed. Information presented in this chapter will be called upon in future chapters, as well. In Chapter 4, the findings of this study are reported and analyzed using the coding mechanism described previously. In the final chapter, these findings will be discussed and implications for the field presented.

Chapter 4 – Findings

This chapter will present the findings of this research project. In general, the purpose of this thesis was to begin understanding the experiences of gay, male STEM students, the ways in which the STEM environment may impact those experiences, and to begin a dialogue in the literature on how to better support students who are part of the LGBTQ community. Through episodic interviewing, a photo-elicitation activity, and an interpretive exercise called Peaks and Valleys, I was able to collect data from five students with varied backgrounds, majors, and geographic locations. This chapter will explore themes of their experiences.

Four main research questions guided this project. These questions helped shape the interview protocol, guided the use of the photo-elicitation and peaks and valleys activities, and the overall methodology. The first question, which asks how students make meaning of their experiences in STEM environments through the interaction of their intersecting identities, is answered through all of the themes gleaned from the data. The first theme, students using their STEM spaces as a place of escape from social norms and pressures, provides the most complete answer to this question. It is important to remember, however, that because each participant's reality is his own, there is no single, generalizable answer.

The second research question, which asks in which ways a gay identity might be mediated by the heteronormative masculinity of the STEM environment, is largely answered by the second theme, that students feel uncomfortable revealing their identities in STEM spaces, with some additional support from the first theme.

These data do not answer the third research question, however. That question, which asked how student' experiences might differ based on their openness with their identity was not answerable from the data provided. This question will be discussed further in Chapter 5.

The final research question, which asked to what extent and in what ways students who identify as gay in STEM fields feel supported by their instructors, advisors, and peers, is answered most completely by the third theme presented in this chapter. The third theme says that students may experience challenges in the STEM environment because of their sexual orientation but that even small gestures of support can have a big positive impact on students.

Overview of Themes

Three main themes emerged from the data. Each theme is also made up of two supporting subthemes that create a more detailed picture of what it is like to be gay in STEM. For example, the first finding, that students may use their academic spaces as a place of escape from heteronormativity and hegemonic masculine spaces, is supported by the two subthemes: "STEM creates objective viewpoints where orientation is not considered," and "gender and sexuality are not important to efficiency of work," which are both thoughts and feelings expressed by the participants.

The second theme that emerged from the data was that students feel uncomfortable revealing their sexual orientation in STEM spaces. This theme was supported by two subthemes. In the first subtheme, participants continually reported feelings of not wanting to make anything awkward for other people and characterizing themselves as socially awkward. Secondly, when the participants did choose to come

out, they reported feeling as though they had to continually come out and be constantly vulnerable. This meant that not revealing their identity in this space was a safer, easier route.

The third and final finding is that gay men experience extensive challenges in STEM because of their sexual orientation. This theme carried two subthemes: finding support through small and large gestures and the necessity of mentors and allies.

It is important to keep in mind these findings may be ascribed to only these participants. This study is not intended to create a generalizable set of experiences that every gay man in STEM goes through. To attempt generalization would suggest the population of gay men in STEM is homogeneous and strip them of their individuality. However, the geographic spread, age range, and differences in station of life of participants are diverse and provide multiple perspectives. This potentially creates higher transferability of these findings to others. The themes will now be described in greater detail including examples from the data. A visual representation of the themes is also available in Table 1.

Theme #1 – Students use the STEM spaces as a place of escape from social norms and pressures

In STEM environments, participants used their academic space as a place to escape from the norms and pressures of society. Participants talked about how STEM encourages an objective and individualistic viewpoint where orientation, gender, and other identities are not considered important. In STEM, it may be more about solving the equation than building interpersonal relationships and partnerships. This can be an attractive trait when

Table 1

Themes and Subthemes of the Data

Theme #1	Students use the STEM spaces as a place of escape from social norms and pressures	
Subthemes	The STEM environment socializes objective viewpoints and individuality where orientation, gender, and other identities are not considered important	Discussing identities is not an efficient way to complete the work
Theme #2	Students feel uncomfortable revealing their identities in STEM spaces	
Subthemes	Some discomfort stems from not wanting to make others uncomfortable or because they describe themselves as awkward	Students feel they constantly have to be vulnerable because they must come out to each new person or group
Theme #3	Students may experience challenges in the STEM environment because of their sexual orientation	
Subthemes	In a world of challenge, even small gestures can mean big support	Mentors and allies are essential to the experience

you constantly feel like you have to be vulnerable and know you have to come out to each new person or group all over again, a feeling relayed by Bill:

[It's] one thing that attracts me to [engineering], at least initially. That kind of impersonal... ideally they don't care who you are or what you do as long as you can do the calculations correctly. That was one thing that kind of attracted me to engineering. It was like... this chance to kind of get recognition and not be judged based on who you are.

This is one way gay students in STEM make meaning of their experience. The vulnerability it takes to be open leads them to escape into their academic spaces. This theme also speaks to one way the students' experiences as gay men are mediated by the heteronormative environment of STEM, which provides some support for the second research question.

Bill suggested individualism is a learned or socialized behavior in STEM. When discussing the graduation picture in the photo-elicitation portion of the interview, Bill said, “Somehow I imagine that I’m taking a graduation picture, I should—it should be like an individual photo...I’m getting a sense of camaraderie from the picture. That’s not particularly my experience.” Payton took it one step further by saying:

But at engineering school, we are given a set of problems, like a set of initial values, and we just come up with the final value. And that’s just like...since we do it so commonly, it’s so applicable to so many different things in life. And we do it straight for four years like day in and day out, day in and day out, day in and day out, and it just, like, shapes how we look at everything. And just, like, getting everything we know and solving for an answer.

In Payton’s experience, the individualistic nature of the STEM environment is not just a feeling, but a directive and way of learning in STEM. As a student, you do not just work alone, but your work is strictly objective. This trait is repeatedly drilled into the student to the point of even finding applicability outside of the classroom.

John suggested this socialization may come from the competition inherent in the field, noting, “If we’re in a physics class, sometimes it’s gonna be a little bit competitive, when people think, ‘OK, I just need to gather the data and I’m good; I already have what I need to do the homework.’” Chip’s experience suggested that the objectivity and individuality might have to do with the workload. After changing his major from athletic medicine to biochemistry, Chip said:

The worst part for me was I knew basically social isolation at that period. There wasn’t a lot of people that I was really able to connect with outside of like classes. Um, and at that point, I was so busy with school stuff that—there just wasn’t really a lot of opportunities to do things other than classes, especially when it came to, like, trying to make new friends and get in to a new group of people.

Payton’s experience supported the possibility that the workload is the cause of the objectivity, noting that he can usually be found with his head down, close to his book,

and his hands on his head. Plus, he said, being an engineer means that he does not have to care about those other things, like being gay, because, “They can just plug the equations and they can just solve that problem and they’re done with it,” because, “They just want to be an engineer, they want to go into an engineering field, they want to make money, like that’s just it.” Payton thought the focused competition created an environment where discussions of sexuality would be unwelcome:

Payton: Yes, I would be comfortable talking about [my sexuality] if it were to come up but it’s just kind of like—I don’t know if there would be a reason for it to come up when I’m learning about mechanics and materials and learning about the stress of a beam under a load. It doesn’t really talk about my sexuality or anything like that. So, I feel like if it were to ever come up in a technical course like that, people would probably react negatively to it because they wouldn’t see the need for it.

Adam: Ok. So, not necessarily react to the fact that you are gay, but the fact that we’re not focusing on the work?

Payton: Yeah, I think so.

As John said, “In our particular majors, people tend to be pretty independent. But I think on the whole, that’s a pretty common trend, as well, that people like to function—people function the best kind of at their own pace,” and perhaps in their own space.

This socialization to individuality and objectivity can also lead to very negative experiences, as Jim noted:

I feel a lot more alone because there used to be one guy but he switched to business. But now, I don’t really know anyone. I don’t know any gay guys in my major....I’m kind of not sure how to describe it because I’m used to being alone, but I don’t know, it just kind of feels normal, but I know, like, how it feels to not be so alone now, so I guess it’s just kind of a little depressing.

For Chip, the fact that there was no room for his identity in athletic medicine was part of the reason he eventually left STEM and moved into a social psychology program.

On the other hand, John found his STEM classroom to be a place of social interaction and positivity:

I think last semester when I was in a biology lab, um, with a group of four other girls, at first, I felt like it was pretty competitive and I kinda felt like an outsider obviously being the only male. But as the semester went on, we got to know each other a little bit more and we developed pretty good friendships, and now this semester two of the girls are in the same microbiology class as me and we, even though the labs don't call for so much collaborative work, we still tend to talk and spend some time together during the lab.

While John's experience in this class is different from Chip's, John did add that he believes, in this case, it was more a connection between his and his classmates' personalities, not the STEM environment, which created the positive experience. Jim also found that his classmates were independent, saying, "People in STEM fields usually just focus on the work rather than interpersonal bonds." Payton expressed feelings of frustration at not being able to discuss events important to his sexuality in class and at how those feelings actually impair his work. Payton said that, usually, when something happens, you talk about it and move on, but in engineering that is not the case:

You just keep on thinking about it and it just gets really hard to concentrate on other things because you have this event going on in your life, but then you can't pass that event in your life because you can't really talk about it with the vast majority of people you know, so, I lose concentration of what I need to concentrate on because I'm focusing on—other things.

One of the consequences of isolation in an impersonal and heterosexist environment was expressed by Bill, who has felt the impacts of heterosexism since he was a child in a rural town:

You know you've got a secret, you can't tell anyone, so instead of trying to fake heterosexuality – pretending like I like girls – I just kind of adopted a...almost an asexual, solitary exterior....And I guess I just kind of carried that over with me into um, college....When you first come in...you're not sure...is this ok to talk about? Is it appropriate? Will people mind? You kind of just default to better safe than sorry.

By using STEM spaces as a place to escape from incongruities in the macrosystem, students can find some level of peace in their academics. In this case, the incongruence is found in the macrosystem, which Renn and Arnold (2003) define as the larger societal norms and influences. There is conflict between a heteronormative environment, which rewards impersonality and objectivity, and the student's non-heterosexual identity. However, the STEM environment as a microsystem may be providing additional sources of incongruence by socializing students to believe their non-heterosexual identity does not belong as part of the conversation. This socialization also leads to students believing that just expressing their identities should not occur because it is not an efficient way to complete work. This type of environment may result in distraction, diminished learning, and eventual attrition to a different major that is more inclusive.

Theme #2 – Students feel uncomfortable revealing their identities in STEM spaces

D'Augelli (1994) was well aware of how difficult the coming out process can be and how one never is truly out: “‘coming out’ begins with the very first person to whom an individual discloses and continues throughout life, decreasing only to the extent that the person is consistently and publicly identified with a non-heterosexual label” (p. 325). According to the participants, this is also true in the STEM environment. In this part of the coming out process, the participants shared conflicting feelings. They felt as though they *could* come out in the STEM space, but also reported not feeling comfortable doing so. In general, the participants did not feel they would be negatively received, although Chip was forced out of his original STEM major of athletic medicine and the biology and biochemistry fields by perceived possible homophobia. Rather, the participants said they did not come out because they would not want to make things awkward *for others*, or felt

they were *too awkward* themselves and avoided the vulnerability of the coming out process in a more personal way. This finding is related to the second research question, which asks how a gay student's identity may be mediated by the heteronormativity of the STEM environment.

While each of the participants was very easy to talk to as a researcher and were very willing to share their stories, they consistently described themselves as socially awkward, introverted, or not able to establish personal relationships in STEM. As Chip said, "Especially in undergrad, I was pretty introverted and, I think, unless I was extremely comfortable with all the people there, I don't know if [building that kind of relationship] would have been something I would have enjoyed all that much." Chip also found himself working as an undergraduate teaching assistant in several anatomy and physiology courses. Even in this role where he ostensibly held the authority, Chip said he felt uncomfortable coming out:

The only students that I ever really confirmed being gay to were students that I was working one-on-one with as research assistants, essentially. And so unless I actually had developed some sort of relationship with them, I really didn't make that, you know, clear. Uh, and that in itself was a little bit of an interesting process because some of the students that I worked with just kinda needed some education around LGBT issues.

Chip sometimes avoided coming out to his students because of the lack of knowledge about LGBT issues his students displayed. Not only would Chip have had to make himself vulnerable by coming out, he would then have had to represent the identity in the education of these students.

Bill wanted to be able to talk openly about his relationship when his heterosexual male classmates discussed their girlfriends and love lives, but rather tended to refrain from conversation entirely:

Well, if I'm ever asked about it I do not lie. I made that promise to myself and I keep it. Um, that being said, I don't invite the subject a lot. Like if people are talking about their dates, I don't jump in, 'Yeah, me and my boyfriend went in.' So even though I could probably contribute to a conversation, even though doing so would probably reveal the fact that I'm gay, I usually just kind of keep to myself. Um, yeah, that being said, I don't lie, so I give myself a little bit of credit for that.

Bill believes that his classmates would probably label him as "a bit cold" because he tends to remain very impersonal in order to avoid the subject of his sexuality coming up. Bill also believes that his classmates label him as "an odd ball" because his gender expression may not conform to the dominant masculine discourse. As he says, "you've got all these ag guys, agricultural engineering guys, here that are real country, deer huntin', and drinkin', and football games, and I'm just not into that."

Payton was more intentional in noting that he was concerned about making it awkward for others, saying,

For me, it's really different because when I'm just sitting in the classroom or, like, when I get around, like, really random groups of people, I don't feel very comfortable, because I know probably my sexuality would be something that would be very awkward for everybody. Um, so I don't feel comfortable in that situation.

I think for me to feel 100 percent comfortable, if it wasn't a thing [with which people were concerned]. Like, if I could come out to people and they would just—their response would be, like, 'OK' and then just walk away....At the same time, it's like it's not that big of a deal for me. Like, it is what it is. Like, I like guys. Like, woohoo. Like, whatever. But, like, I think that in order for me to feel comfortable if it were just to not be a thing [about which people cared]. And I think when people make it a thing, that's when I get like, awkward-ed out by it.

Chip suggested that his awkwardness was really an attempt to preserve his career opportunities:

So, I know over the last several years, I've had to really think about my identity, the way that I present myself, the way that I communicate myself to others, a lot more than I necessarily thought I was going to have to do, just because, again, how somebody thinks of me and how comfortable they feel with me and kind of

how they judge me, essentially, it does have a huge impact on my career, and so that's... It's something where I feel like I have to...like I'm doing a lot of self-monitoring and feel like I'm having to do that because of the expectations and what my field has for these different things.

This feeling of either making things too awkward for others or being too awkward themselves to breach the conversation and reveal their identity to others in the STEM environment continues throughout the data. However, if the STEM environment, as a microsystem, were not telling these students their identities were abnormal and something to be ashamed of and perpetuating the hegemonic script of the macrosystem, then having these conversations would be much easier and not something to be held back to avoid awkwardness. Similarly, the heteronormativity present in the macrosystem, which says the gay identity is abnormal and, in some cases, perverse, means revealing your non-heterosexual orientation requires an immense amount of vulnerability. As Payton said:

I'm perfectly open and...I care to a certain extent what people think of me, but I don't care as much as I'd like to in my own emotions, but I still hate coming out. I just don't like it for whatever reason. I don't know why. I've been trying to figure this out. Because I know my being vulnerable and that with people, I just hate the fact that I have to expose myself in order for people to understand me....And so, like, the thought of coming to college and having to go through that experience again, like, even to this day, I don't know if all the residents know...I know all the residents in the building don't know...it's just this big mess. And it just sucks, because you're always thinking, like, 'Do you know or do you not know? Can I talk about my relationship with you? Can I not talk about my relationship with you? Can I talk about anything? Can I not talk about anything?' So, it just creates a lot of constant worrying and constant stress of having to think about people finding out and knowing and reacting and that kind of stuff.

For Payton, this feeling may come from his previous negative experiences with coming out to his parents, or it could be a feeling developed over time. Payton said his avoidance of the vulnerability was a source of constant stress and worry, which affected his classroom experience, which, in engineering or any STEM field, can be the difference

between earning a degree and changing your major.

On some occasions, this vulnerability can be extremely negative. Chip's vulnerability forced him to leave his originally chosen STEM major:

The climate on campus kind of [was] especially [contentious], but also just stuff that was going on with marriage equality and that sort of thing. And it wasn't exactly a great time. Um, there was also just a lot of anti-gay language that I heard quite a bit kind of being in [the athletic medicine] environment. And it wasn't clear to me that if I did come out that I would actually be able to continue doing the work that I was doing...part of my decision to leave athletic medicine was actually coming out to my mother. She's a physician and she told me that if I wanted to get into medical school at that time, I probably needed to not be open...about my sexual orientation.

For John, being open, honest, and vulnerable had very real and tangible negative outcomes, including a relationship that might be described as abusive, drug use, and having to remove himself from school for a semester. Fortunately, John's vulnerability also had positives in an environment outside of STEM:

I attended this um, men's retreat, uh, and I...one of the topics dealt with vulnerability and one of the issues that came up was why people are, or why men specifically...are so often put down and called certain names and, uh, in this, I talk...I just kinda felt compelled to, kinda out of the blue, come out. Um, I really wasn't expecting it. It wasn't very comfortable for me, um, until, you know, kinda afterwards, because I think every...it was about 40 guys in a room that I'd only met for like a couple days, really....Uh, pretty much every single one of them, uh, after that session and basically since the retreat...was just really supportive and appreciative of the fact that I was willing to, um, share, what was admittedly a pretty difficult thing to talk about. And I wasn't expecting this like ovation that they gave me or anything at all.

John's experience suggests that when students experience negativity in specific microsystem areas such as their workplace, living space, or classroom, external support is valuable in mitigating the fallout from the incongruence created in the mesosystem – the interaction space of an individual's microsystems.

Whether it is because of perceived awkwardness or an avoidance of the constant

vulnerability foretold by D'Augelli (1994), these STEM students were uncomfortable revealing their identities in the STEM spaces they inhabited. This prevented the students from living authentically, which two of the students recognized as being important to their processes. John said:

It's been a little easier to be at peace and come to terms with the notion that, um, I'm only gonna convince people, um, by living authentically and just being who I am over a certain period of time. There's no, like, profound argument I could make that's going to persuade one person one day.

Chip echoed John's sentiment, saying:

I also just knew [psychology] would be a much safer kind of major to be in and also to be out. Which at that point, the most important thing to me was to be out and being able to be authentic.

Living authentically is clearly important to these students, but in their STEM spaces, they were not able to do so. Vulnerability and awkwardness created by the heteronormative environment may be throwing the context systems into conflict for gay STEM students.

Theme #3 – Students may experience challenges in the STEM environment because of their sexual orientation

In Clark and Corcoran's (1986) work on accumulative disadvantage, they described the Salieri effect. Adapted to this study, the Salieri effect may be described as follows: If a student who identifies as gay is surrounded by only heterosexual advisors, or surrounded by a majority of advisors who express heteronormative views, they may not find the help and sponsorship necessary for advancement. In a worst-case scenario, these students may be actively held back.

While the students in this study reported mostly positive advising interactions, they still described experiencing significant challenges because of their sexual orientation. This challenge may not be identical to the challenges faced by the women in

Clark and Corcoran's (1986) study, but it can have similar effects. According to the participants, though, this challenge can be mitigated by even small gestures of support. When confronted with challenge, the participants said their mentors and allies were essential to their success. This finding speaks directly to the fourth research question of how and to what extent students who identify as gay in STEM feel supported by their instructors, advisors, and peers.

Students of any major and of any identity certainly experience challenges in the collegiate setting. However, when these challenges bring different systems into conflict within a student's context, it can lead to displeasure with the academic experience and possible attrition from the academic program. For Chip, just the challenge he would face by coming out to his peers in the athletic medicine department led to his departure to biology and biochemistry and eventually to psychology:

Actually part of the problem was...it was very clear that if you were a competent female, you still weren't going to get a leadership position. It would be more willing to put an incompetent male in that leadership position as opposed to a competent female. So that was one of the main deciding factors to me actually getting out of that field was feeling like if I came out as gay, people would see me differently even though I kind of see myself as masculine, like they would kind of group me in some more feminine category and that may actually impair my ability to advance myself and be successful.

For Bill, hearing "that's so gay" in his classroom meant keeping himself more guarded, saying he would "sit somewhere else across the room from that... You know, not a positive thing."

Payton found challenges in the reception of his coming out, noting how people immediately connected the fact that he was an engineer to his sexuality, saying, "It's kind of like making my sexual orientation identify what I can and can't do. Now, it bugs me a lot – that definitely frustrates me."

Through this challenge, though, the participants found support, which was vital to their persistence. Chip was able to connect with a computer science student through chance encounters at coffee shops:

For me, what was helpful was there was one upperclassman that I knew that was, um, more computer-science focused, but he was kind of out and identified as bisexual. And I just remember that him and I had some great conversations because he was one of the few kind of out STEM-type people that I knew, and so it was actually...I just remember that he had, it was basically just a little rainbow pin, basically, on his bag that he always carried around.

Chip was also able to find a mentor in his current graduate advisor:

I feel like I got really lucky in the type of advisor that he is, the type of relationship that we have. Being able to go to a conference and have my husband there and him have his husband there and be able to kind of just connect and go out and meet other, kind of, queer researchers is kind of nice. It just kinda builds a little bit of community and makes it feel a little less isolated.

In John's experience, the small things were also really valuable in feeling supported and accepted in his STEM environment:

I do know there are a few teachers who would be supportive, who would probably call themselves allies. Because I've seen, you know, just little things, like on their door, I've seen the Human Rights Campaign thing, the little equality sticker. So, whenever I see that, it kind of lets me know that they've thought about it enough and they're allies so, um, usually that's enough to get me pretty happy.

In Bill's experience, having a fellow gay engineer in the department was valuable to his experience, and seeing safe space stickers was important to his comfort:

There is a faculty member, um, he's a graduate student, who is gay – it's very funny because he's probably the most masculine guy in person in the department. He will outdrink, outdrive, outfight anyone, by his attitude. And it's really funny because all the other ag guys look up to him, you know, like kind of this masculine role model, but he's definitely gay.

But he does have one of those safe place stickers, you know, like, faculty people put those up where people can come in and talk any time they want. So just knowing that he's there, he's gay, it's like, oh my gosh, someone else here is gay; I'm not the only one in my department.

In the absence of a mentor or ally for his study-abroad experience, Bill found a positive experience in mentoring a first-year student who also identified as gay, who was taking the same trip Bill had:

For me, I mean, it's nice to help someone who's up on their way. Because obviously I can see a lot of, what do you call it, similarities between his situation and mine. Both freshman engineering, you know, kind of a little bit awkward, smart guys, um, even headed off to the same trip, you know, kind of on the same track, and within biosystems engineering. So yeah, it felt nice to me to help him. It's kind of like helping yourself.

Support can be as small as a sticker in a window or as large as a faculty member or fellow student giving their time to help you feel comfortable. In any case, the support from faculty is a key to a positive experience for these participants. Conversely, lack of support can further embed feelings of isolation.

Conclusion

This research and thesis is one of very few scholarly works concerning the experiences of gay men in STEM academic environments. However, this study is not intended to be generalizable, nor are the findings exhaustive in explaining the breadth of experiences the queer community in heteronormative academic spaces like STEM. However, these three findings provide important information and context to understand what may be happening in STEM environments.

The data in this thesis suggest that gay STEM students may be using their academic environments as places of escape from social norms and pressures. This escape is aided by the socialization of the environment which says that space is to be an objective and individualistic one where discussing things like social identities is inefficient and to be avoided. Students may also feel uncomfortable revealing their identities in the STEM academic space because they do not want to make others feel uncomfortable or feel they

are too awkward to have the conversation. Furthermore, the coming out process requires that these students be continually vulnerable, which makes it hard for them to focus on their academics, so they simply avoid the revelation of their identity whenever possible. Finally, students may experience challenges not unlike the Salieri effect described by Clark and Corcoran (1986): lack of mentors who also identify as gay, few role models to look up to, and a heteronormative environment. However, small gestures of support, strong mentors, and allies make it possible for these students to persist. In the next chapter, I will explore these findings in the context of student affairs as a profession and discuss their implications.

Chapter 5 – Implications and Discussion

The previous chapter detailed the findings of this study through the themes and subthemes found in the data. The data came from a group of episodic interviews with each of the five participants as well as two activities completed by each through the three-interview format. The five participants are all gay men who are or were enrolled in a STEM field at a post-secondary institution in the US. Participants represent five different regions of the country and seven post-secondary institutions of various size and type. The heterogeneity of this group of participants and their unique stories and viewpoints give insight into their individual experiences.

This chapter builds on the findings presented in Chapter 4 and examines the significance of this study on the experiences of gay men in STEM academic programs. I will begin by summarizing the findings in the context of the research questions that guided the project. I will also connect these findings to the literature that supports this project and provides its framework. This will give me the ability to examine the significance of these findings and provide recommendations for practice. Finally, I will offer several areas for future research that are relevant to this project.

Summarization of Findings

Four research questions guided this study. These questions were developed from my own personal experiences as well as from the literature that supports the project. Unfortunately, there is a noticeable lack of literature concerned with the experiences of gay men in STEM. However, literature in identity development, environmental theories, masculinity and gender, and power and privilege helped build a foundation for this research.

All but one of the four research questions was addressed by the data collected. The third question asked how students' experiences may differ considering their openness with their identity. While participants were asked to discuss their openness about their identity and even give themselves a rating on a scale of 1-10, the data were not sufficient to draw any conclusions at this time. This topic will be discussed further in the areas for future research later in this chapter. The other three research questions, however, were all addressed by the data. Next, I will present the data by research question to situate these findings within the existing literature.

Connection to the Literature

How do students make meaning of their experience in STEM environments through the interaction of their gender, gender schema, and sexual orientation? The literature suggests there are many ways for a student to make meaning of their experience. One approach using feminist theory would suggest students make meaning through their gender and gender schema, but an approach from queer theory is more likely to apply a lens of sexual orientation. Renn and Arnold (2003) suggest meaning is constructed through the interaction of any number of systems of which the student is a member. The intention of this question was not to apply a lens, like the ones listed above, to the students and attempt to classify their experience. Rather, I wanted to give the participants each of these lenses to look through and see how they expressed their experience in each context. Because this question has a necessarily and intentionally wide scope, essentially all of the findings addressed this research question.

In general, participants did not express much concern for issues related to their gender, although some mentioned the masculinity of those around them. For most of the

participants, separating gender from sex and defining their gender schema was difficult and ultimately resulted in conveying mostly traditional gender roles and expectations. For example, Bill, whose image of masculinity included a lack of personal fashion, as well as physical characteristics like muscles and facial hair. The participants did report feeling uncomfortable in masculine spaces. This was not exceptionally surprising considering the heteronormativity that is inherently part of the dominant masculine discourse. Kimmel (2008) explained that it was not enough to just not be gay or to be straight, but that being a guy, which is a kind of catch-all term for college-aged men, requires the wholehearted rejection of male homosexuality.

Considering the masculinity of the STEM environment to be a part of the macrosystem, which Renn and Arnold (2003) describe as the larger societal forces like cultural expectations and historical trends and events, researchers can easily make meaning of these experiences through environmental theories. These social forces, like Western masculine hegemony, from the macrosystem, may also be part of what creates the objective and individualistic viewpoints that the STEM environment socializes into its students, which was a major part of the first finding. For example, Western hegemony says that men do not show emotion, which suggests a more objective, rather than subjective, viewpoint. In the second finding, in which students reported feeling uncomfortable revealing their identity in the STEM environment, external social forces are also at work. In this instance, a heteronormative society could be telling gay students that they are different, weird, and not normal (Kimmel, 2008). In this type of environment, gay students are socialized to be ashamed of their identity, or at least feel awkward discussing something so personal. Furthermore, Western society tends to treat

topics of sex as taboo, so explaining to others that you are attracted to the same sex means you must also overcome that barrier of speaking about sex in general. When you combine the masculine tenet that prohibits vulnerability with the vulnerability it takes to explain to another person that you have a non-hetero sexual orientation (D'Augelli, 1994), the literature makes it very easy to see why students would feel uncomfortable revealing their identities in STEM spaces.

Student affairs and higher education professionals have known for many years how important it is for students to feel comfortable and supported on campus. Sanford (1966/2009) says that when students are experiencing challenge in their lives and are unable to find support, they will either drop out and remove themselves from the challenge, undergo a developmental process and grow from the challenge, or resist change and regress to an earlier developmental stage. For a student who is beginning to explore their sexuality, which D'Augelli (1994) suggested is most likely to happen during the traditional college-going ages, experiencing challenge like this and not finding the requisite support could mean regressing to a point in their identity development where they are not comfortable living openly.

In general, the students in this study have shown that they do approach their STEM education through the lens of their sexuality. These students are still developing their sexual orientation identity, continually coming out, and trying to navigate a heteronormative society. When looking through the lens of their sexual orientation, the students found their experience to be generally negative and unsupportive. If higher education professionals are asking students to be successful and give their all, then educators and student affairs professionals must provide these students with the support

they need to navigate the sexual orientation development.

In what ways is a gay identity mediated by the heteronormative masculinity of the STEM field in which they are majoring? According to some participants of this study, staying in the closet can make a person feel isolated, generate high levels of stress, and create an uncomfortable environment. On the other hand, participants discussed how coming out opens the person to the threat of verbal abuse, exclusionary practices, and even violence (Corrigan & Matthews, 2003). This is an enormous amount of challenge for an individual to take on while also attempting to be successful in an environment as challenging and competitive as STEM. So, it is no surprise that the participants of this study felt uncomfortable revealing their identities in the STEM environment.

In this study, participants reported discomfort in two different ways. First, students described feeling awkward. In some cases, the participants said they did not want to come out because doing so might make their interaction awkward for another person. In other instances, the participants described themselves as awkward and therefore uncomfortable discussing their sexuality in the STEM environment. Second, the participants described discomfort with the vulnerability required to come out to each new person or group. Both of these feelings are supported in the existing literature. First, D'Augelli (1994) described the coming out process as taking place throughout the lifetime from the first time the identity is revealed to another person until the person with a gay identity is generally known socially as someone who is gay.

Every time the students in this study encounter a new classmate, a new group of students, or have a new professor for a course, there is a chance they will need to make themselves vulnerable and come out. In D'Augelli's (1994) model, a person really

begins the gay identity development process once they accept the identity within themselves. This can happen just once, or it can be a continuous process, depending on the environment in which a person exists. For a STEM student, this environment may be their academic spaces, which, according to the data, are not exceptionally welcoming and supportive. An unwelcome and unsupportive environment may mean students have to continually accept their identity internally and are never granted the opportunity to move forward in their development.

To what extent and in what ways do students who identify as gay in STEM fields feel supported by their instructors, advisors, and peers? Sanford's (1966/2009) environmental theory of challenge and support and Schlossberg's (1989) mattering and marginality have both been instrumental in the development of college student support systems like developmental advising, multicultural centers, and some student organizations. However, the data from this study, and specifically from the third finding, suggest that students may not feel supported and as though they matter. Instead, students experience massive amounts of challenge – their academics, families, and identities, to name a few sources – and may feel marginalized by the environment because they are not allowed to participate as fully as their heterosexual peers. For example, Bill described not being able to participate in some conversations with his classmates because he did not feel comfortable discussing his boyfriend and also hearing his classmates use insensitive language. These experiences are challenging for any student, but for one who already feels as though they must hide their identity from their classmates, this kind of challenge can mean regressing to questioning your own identities.

However, as the participants of this study reported, out mentors and allies are

essential to the positive experience. For Chip, having a mentor and advisor who also identified as gay has helped him feel validated and welcome as a gay man. That advisor has also kept him on track toward his dual MD/PhD. Bill was lucky enough to find an openly gay graduate student in his department, which he said was a nice resource to have available as a gay undergraduate. Bill also has taken on the role of mentor to a freshman student who is also gay. John's mentor, a straight ally, was instrumental in supporting John through his difficult coming out process and his rehabilitation. These mentors are an example of how the Matthew effect (Clark & Corcoran, 1986) can positively impact a student's experience. These students found enough value in these relationships to continue in the STEM field and, in the case of Chip, to take on an activist role. Chip's experience suggests that the Matthew effect (Clark & Corcoran, 2003) may have encouraged development in his sexual orientation identity like D'Augelli's (1994) sixth stage of entering the LGB community.

Significance

This study is significant for several reasons. For many years, there have been reports of a STEM crisis, and whether or not a person believes such a crisis exists, it is important for student affairs professionals and academic staff and faculty to consider the demand for talented, STEM-trained students in the workforce. While some suggest that U.S. colleges and universities are not churning out STEM graduates at high enough rates to staff the cutting edge of American innovation, Charette (2013) says this is just a myth. Rather, he says that American colleges and universities are simply turning out graduates without the requisite scientific and mathematic literacy to take on the responsibilities of a STEM professional on the cutting edge. In any case, continuing to accept students'

departure from the field simply because they are gay is unconscionable in light of the need for highly trained and talented graduates in the STEM fields. As student affairs professionals and academic faculty and staff, we have a duty to ensure that every student who wishes to pursue a degree in STEM (in any field, truthfully) has the opportunity to do so and will not be turned away or feel forced to leave because of their identity. A student's sexual orientation should not be a deciding factor of their success in any given field.

Unfortunately, the data in this study suggests that we are not doing enough to support gay students. For those professionals concerned about equity, this study should serve as a major red flag. By not supporting students who identify as gay and choose to pursue a degree in a STEM field, student affairs professionals risk further marginalizing this population (Young, 2009), maintaining the status quo of heteronormativity (Kimmel, 2008), and perhaps detracting from the goal of graduating more STEM-trained students. While the individualistic and objective view of the STEM environment does breed a type of equality where students are ostensibly judged on their academic merits rather than their identities, the data suggest that a student whose identities are incongruent with the STEM environment experiences additional challenge in their academics. If an otherwise well-prepared and talented student is under-performing, educators must be aware that there could be an issue outside of the student's cognitive ability. The data suggest being gay in STEM could affect classroom performance.

Recommendations for Practice in Student Affairs

There is no easy way to remove all of the challenges facing gay students in STEM programs. However, through the implementation of several small-scale changes, I

believe student affairs professionals can make the STEM environment a far more welcoming and inclusive space. First, student affairs professionals should strive to extend the reach of LGBTQ resource centers into the academic space. Second, student affairs professionals are uniquely positioned to inject the curriculum and co-curricular experiences with team-, community-, and relationship-building techniques, which can foster positive and inclusive environments.

Not every campus is fortunate enough to have a standalone LGBT resource center, but some campuses have absolutely no space for students who identify as part of the LGBT community to call their own. While a physical space where these students can locate themselves would be ideal, having at least one dedicated staff member or supporter can be valuable. This can even be done in individual departments or academic units regardless of the existence of a centralized institutional resource center. As the third finding suggests, even a small gesture of support, like conducting allyship and inclusive spaces training or displaying a safe space sticker can be valuable to a student who identifies as gay.

In many STEM programs, curricular focus is shifting away from the well-established scientific courses to introducing more leadership and interpersonal skills-focused courses. This is a great opportunity for student affairs professionals to impact the STEM environment in a very positive way. As campus leaders in equitable practices and social justice, student affairs professionals can offer our time to instruct our students on building teams and being a member of a team in a cross-cultural space. By injecting a conversation on social justice or interpersonal team building into the curricular requirements, professionals in higher education can disrupt and positively affect the

individualistic nature of STEM environments. As I said, these solutions need not be paradigm-shifting. Rather, by supporting each student who walks in the door, student affairs professionals can positively impact every student's experience. Small gestures, such as earning and displaying a safe space sticker, providing an accepting and encouraging environment for students to express their frustrations and their victories, and checking heteronormative language in the academic space, can help a student whose experience would otherwise be negatively impacted because of their sexual orientation.

Areas for Future Research

This study opens many areas for possible research in the future. Because of the multitude of issues inherent to a conversation on power and privilege, any number of topics for future research are present. Furthermore, as the demographics of college students in the U.S. continue to change, researchers must continually update their topics and methods to include new groups. Among the topics that could be studied, three stood out in particular to me. Because of the prevalence of the concept of vulnerability in the findings, future research should be done to determine the source and impact of vulnerability in this realm. As sociologists have studied the concept of gender performativity in Western hegemony, researchers should also begin to look more critically at the concept of closetedness, or the performance of heterosexuality, within a heterosexist society. Finally, future research is needed to answer the third research question of how a student's level of openness about their identity impacts the positivity or negativity of their experience.

The concept of vulnerability was central to the findings of this study. Participants felt frustrated by the need to continually make themselves vulnerable in the coming out

process. Future research should approach this feeling from both a psychosocial viewpoint, and also a power and privilege lens. This could help determine whether vulnerability is a product of a masculine hegemony, a heterosexist society, or simply the socialization of STEM students to be objective and focused on the science in front of them. Of course, it could also be a combination of all three of these options. However, understanding the source of the feeling of vulnerability for these students can help student affairs professionals find ways to confront and disrupt the environment in meaningful ways.

Among the ways male students perform a masculine gender is through the abject rejection of the gay identity (Kimmel, 2009). However, this may not fully encompass the experience of students who do identify as gay but are not open or choose to not perform masculine gender roles. Recently, the idea of closetedness has gained some traction in queer theory. The creator of the term, which is different from simply being in the closet, Sedgwick (1990) says closetedness “is a performance initiated as such by the speech act of a silence – not a particular silence, but a silence that accrues particularity by fits and starts, in relation to the discourse that surrounds and differentially constitutes it” (p. 3). Essentially, closetedness is the performance of heterosexuality by someone who does not identify as heterosexual. In the same way that gender performativity is considered to be the performance of traditional gender roles, closetedness can be considered the performance of the dominant sexual orientation (i.e. heterosexuality). Future research should investigate closetedness, its impacts on the performer, and the ways in which systems of power and privilege enforce, judge, and ultimately reward or discipline based on its success.

Conclusion

Being gay in the heterosexist society is never easy, but being gay in a heterosexist environment and in an academic program that devalues your sexual orientation identity and encourages you to hide your identity for the sake of efficiency can have very negative consequences. The stress generated by the vulnerability it takes to come out, and by the need to hide one's identity, can negatively impact the classroom experience of a student. In a field like STEM, any negative impact in the classroom could mean a more challenging academic load than the student would have otherwise encountered. While there is very little to no literature detailing the experiences of gay men studying in STEM fields, the literature on gay identity development, gender identity and performativity, environmental theories, and systems of power and privilege closely follows the experiences of the participants in this study. Using a constructivist lens and the framework of the research areas listed previously, this study includes the experiences of five gay men in STEM programs.

The data collected from the participants through the use of episodic interviewing show that gay students in STEM attempt to use their academic environment as an escape from their identities, feel uncomfortable disclosing their identities in the academic environment, and experience extensive challenges because of their identities. By checking heteronormative language and designating spaces where the student can find support, some of these negative experiences may be mitigated. This information should be used as part of a larger set of conversations on the experiences of minority groups in every academic environment. Continued research on this population and other minoritized groups is essential to the continued growth and development of students in higher education, specifically in STEM.

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Appendix A

Interview Protocol

Interview #1 – Will focus mainly on introducing the reflective process to the participant. Length: Roughly 1 hour. Questions will be tailored to exploring participant’s identities, gender schema, and classroom experiences.

- Participant will be asked to sign the informed consent form first.
- Tell me about yourself.
- Tell me about your experiences as a gay male throughout your life.
- How would you describe your view of gender?
 - i.e. Traditional gender roles, non-conforming, fluid, etc.
 - What does it mean to you to be a man? To be a woman?
 - Do you think your view of gender, which we can call a gender schema, impacts the way you interact with others?
 - What gender would you give your major?
- For sexual orientation, how do you identify?
 - Are you open about your identity?
 - On a scale of 1-10, how open are you about your identity?
 - Has your identity ever been questioned, brought up, threatened, or covertly or openly oppressed in a classroom setting?
- Where are you in the coming out process?
 - Tell me about coming out to your parents, family, friends, teammates, roommates, etc.
- In your opinion, are any of your instructors also gay, lesbian, or bisexual?
 - What makes you think this way?
- Do you feel that, as a gay man, you have any role models in your chosen field?
- Have you ever felt the need to hide your identity in the classroom because of potential negative outcomes?
- How do you think people perceive your gender?
 - How do you think this impacts their view of you and your interactions with them?
- There is a body of literature that suggests women do not flock to STEM fields because of something called accumulative disadvantage. This means that because there are few women who enter, there are fewer who graduate, and that because fewer graduate, only few continue to enter. Why do you think this is?
 - Can you think of other ways this might apply to other students in the STEM fields?

Interview #2 – Interview will continue exploring open issues from previous interview. Questions will be dependent on previous interview and participant. Participant will be asked to discuss specific classroom interactions within their major. Participants will also take part in the experiential flashcard activity in which the participant will be shown a series of images on flashcards and asked to determine how closely they identify with the images in the context of their classroom experience. Participants will also be given a peaks and valleys survey and asked to complete the activity before their next interview.

Interview #3 – This interview will focus on exploring the participant’s peaks and valleys activity and discussing their choices.

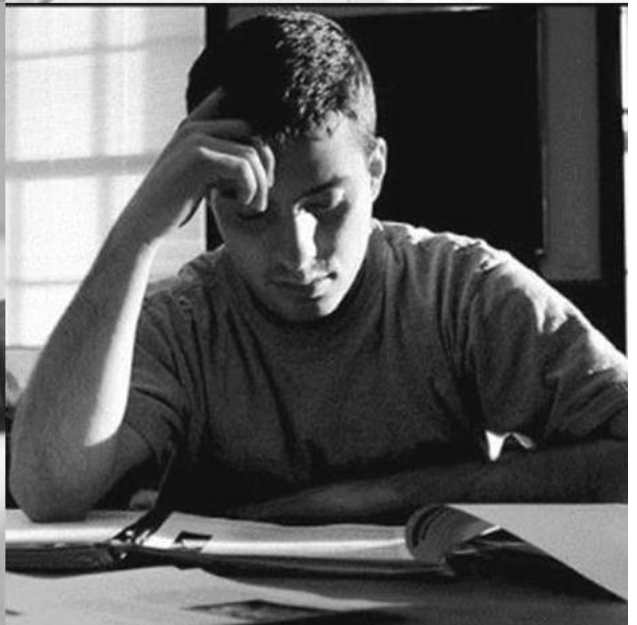
- Describe the peaks and valleys on the image you drew.
- What makes each peak and valley as high or low as you drew it?
- In what ways, if any, do you think your sexuality shaped those experiences?
- How did people’s perceptions of you as a man/male shape each experience?

Participants will also be asked to reflect on their interview experience and to share any other pertinent information. Researcher will also share with participants some key phrases and passages from their previous interviews. Participants will have the opportunity to take part in a member check. This interview will also be used to have students reflect on the most recent semester (the semester during which they have been participating in the study) to explore whether their perceptions of their experiences have changed at all.

Appendix B

Photo Elicitation Images

Students will be asked to review the following images and determine whether the image relates to their undergraduate experience. The researcher will then ask the participant why the image does or does not relate to them.

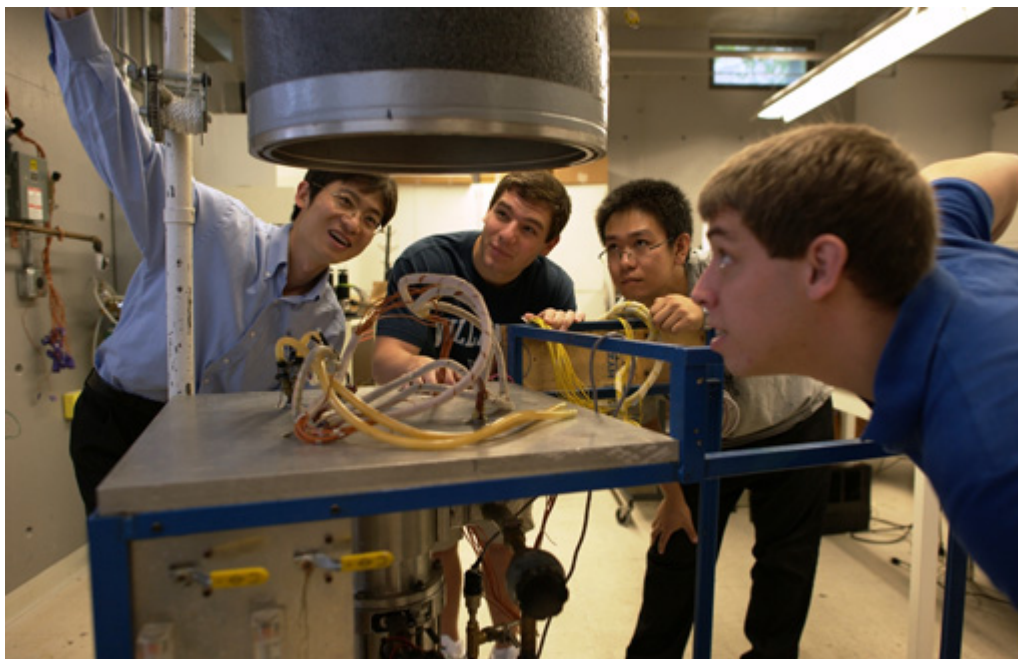
















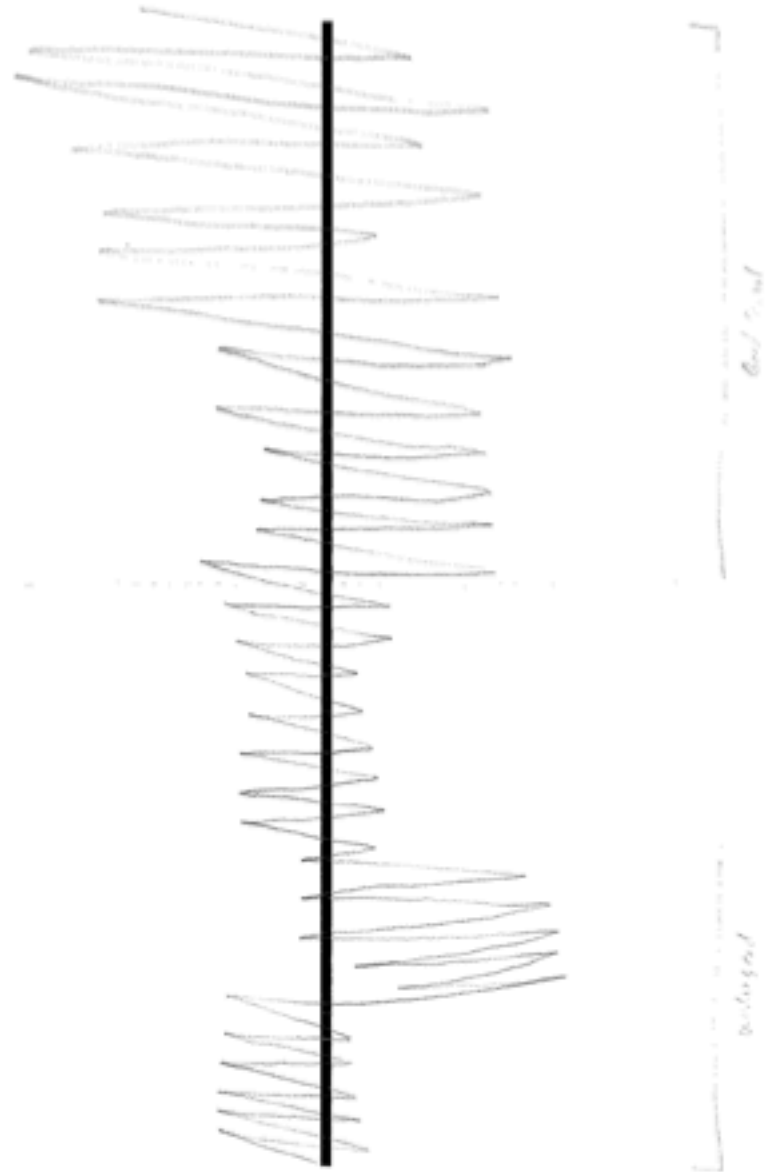


Appendix C

Peaks and Valleys Worksheets

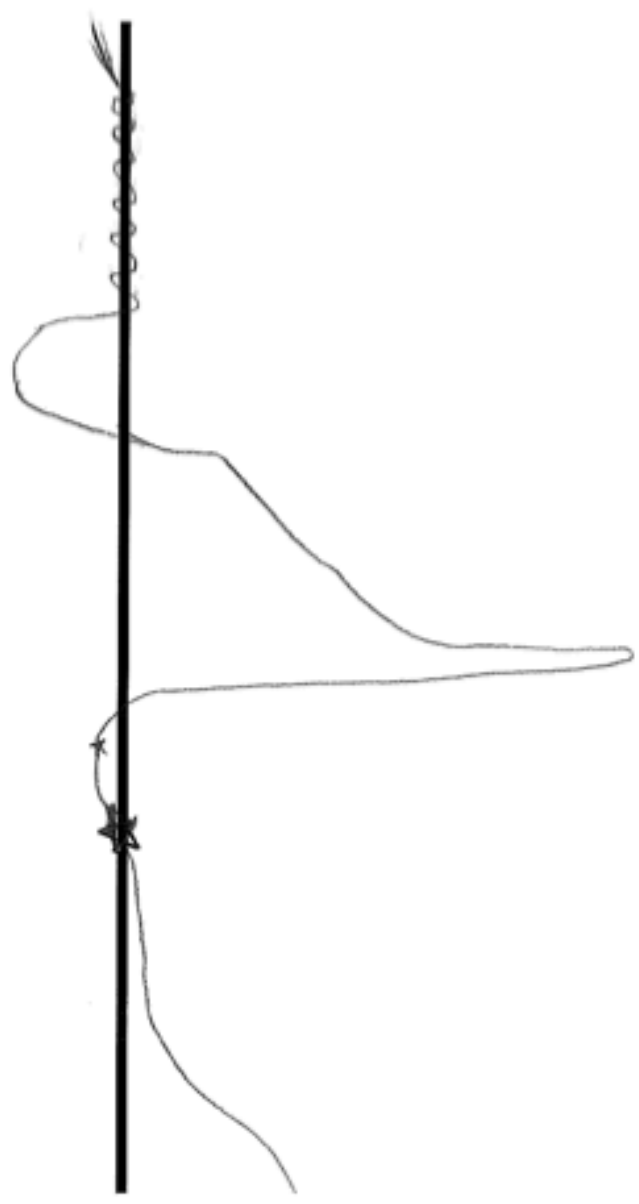
Chip

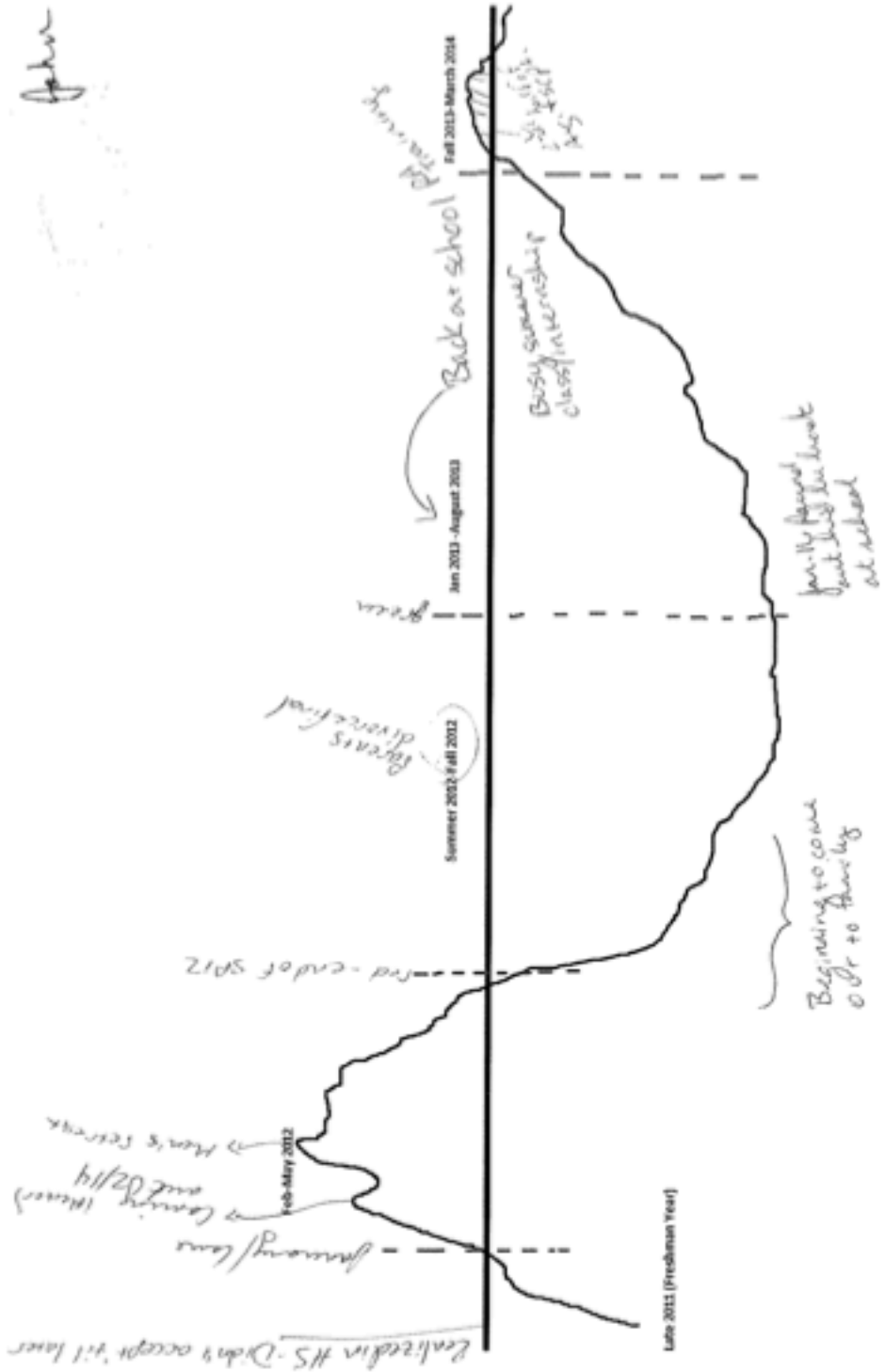
Using the line below as a guide, draw a series of peaks and valleys as related to your experience as a gay male studying in a STEM field. Valleys may be as low as necessary and peaks may be as high as necessary. How you segment your time across the line is up to you. Remember, the entire drawing is relative to your experience only, so you have the freedom to make the peaks and valleys look however you choose. The black line represents a neutral or indifferent experience.



Jim

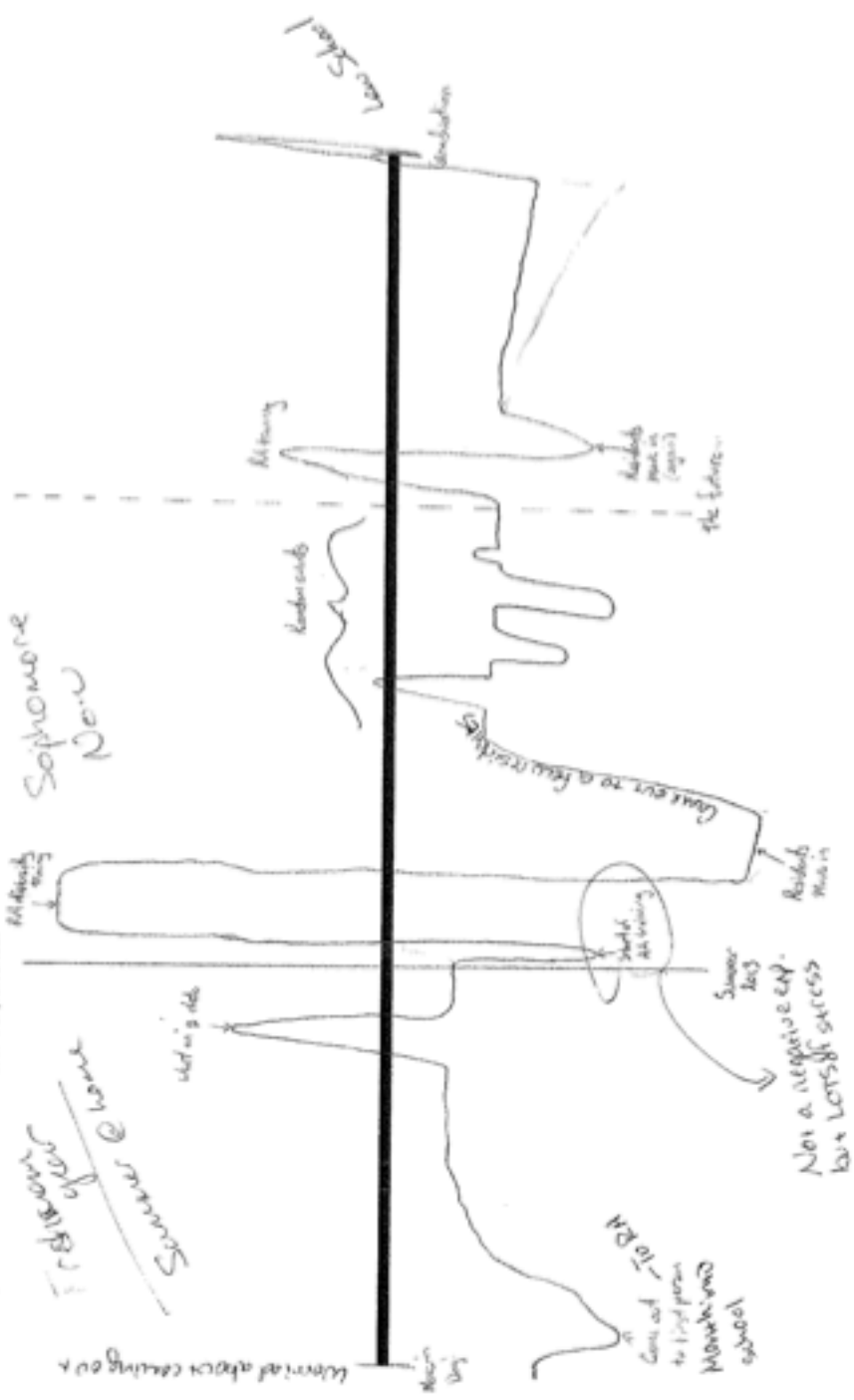
Using the line below as a guide, draw a series of peaks and valleys as related to your experience as a gay male studying in a STEM field. Valleys may be as low as necessary and peaks may be as high as necessary. How you segment your time across the line is up to you. Remember, the entire drawing is relative to your experience only, so you have the freedom to make the peaks and valleys look however you choose. The black line represents a neutral or indifferent experience.





Payton

Using the line below as a guide, draw a series of peaks and valleys as related to your experience as a gay male studying in a STEM field. Valleys may be as low as necessary and peaks may be as high as necessary. How you segment your time across the line is up to you. Remember, the entire drawing is relative to your experience only, so you have the freedom to make the peaks and valleys look however you choose. The black line represents a neutral or indifferent experience.



Appendix D**IRB Approval Letter**

February 19, 2014

Adam Smith
Department of Educational Administration
3063 Vine St Lincoln, NE 68503

Stephanie Bondi
Department of Educational Administration
117 TEAC, UNL, 68588-0360

IRB Number: 20131113759EP
Project ID: 13759
Project Title: Making Their Own Way: The Experiences of Gay, Male,
Undergraduates in STEM Fields

Dear Adam:

The Institutional Review Board for the Protection of Human Subjects has completed its review of the Request for Change in Protocol submitted to the IRB.

It has been approved to include graduate students within the targeted sample and to conduct new recruitment at the following sites:

- The ACPA listserv at St. Louis University
- University of Nebraska-Kearney
- University of Nebraska - Lincoln
- NASPA LGBT KC

We wish to remind you that the principal investigator is responsible for reporting to this Board any of the following events within 48 hours of the event:

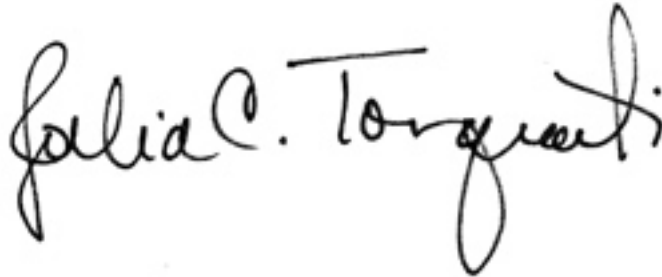
- * Any serious event (including on-site and off-site adverse events, injuries, side effects, deaths, or other problems) which in the opinion of the local investigator was unanticipated, involved risk to subjects or others, and was possibly related to the research procedures;
- * Any serious accidental or unintentional change to the IRB-approved protocol that involves risk or has the potential to recur;
- * Any publication in the literature, safety monitoring report, interim result or other finding that indicates an unexpected change to the risk/benefit ratio of the research;
- * Any breach in confidentiality or compromise in data privacy related to the subject or others; or

* Any complaint of a subject that indicates an unanticipated risk or that cannot be resolved by the research staff.

This letter constitutes official notification of the approval of the protocol change. You are therefore authorized to implement this change accordingly.

If you have any questions, please contact the IRB office at 472-6965.

Sincerely,

A handwritten signature in black ink that reads "Julia C. Torquati". The signature is written in a cursive style with a large, looped initial 'J' and a distinct 'C' before the last name.

Julia Torquati, Ph.D.
Chair for the IRB



Appendix E

Informed Consent



Participant Informed Consent Form

COLLEGE OF EDUCATION AND HUMAN SCIENCES
Department of Educational Administration

Title: Making Their Own Way: The Experiences of Gay, Male Students in STEM Fields

IRB# 13759

Purpose

This research project will aim to understand the experiences of gay, male students in science, technology, engineering, and mathematics (STEM) fields. You are invited to participate in this study because you are a student of at least sophomore status, 19-years-old or older, are male, are majoring in STEM field, and identify as gay.

Procedures

You will be asked to participate in three, hour-long interviews at the private location of your choice (if in Lincoln or travel is possible for the researcher) or via phone, Skype, or Adobe Connect if travel is not possible, over a one semester period.

Benefits

By participating in this study, you will help further a body of literature regarding the experiences of gay, male students in STEM fields. Developing this body of literature will help faculty, instructors, and other staff understand these experiences and create a supportive and accepting environment for all students.

Risks

There are no known risks associated with this study beyond the stress that comes from living these experiences daily.

Confidentiality

Any information obtained during this survey which could identify you will be kept strictly confidential. The data will be stored on the investigator's password-protected computer and will only be seen by the investigator and the faculty advisor during the research and will be deleted following the completion of the study. The information obtained in this study will be published in a thesis and may be published in scientific journals or presented at scientific meetings but the data will be reported as aggregate data or under pseudonyms.

Compensation

You will receive no compensation for participating in this project.

Opportunity to Ask Questions

You may ask any questions concerning this research and have those questions answered before agreeing to participate in or during the study. Or you may contact the investigator(s) at the phone numbers below. You can also contact the UNL LGBTQA Resource Center for support at (402) 472-1652 or lgbtqa@unl.edu. Please contact the University of Nebraska-Lincoln Institutional Review Board at (402) 472-6965 to voice concerns about the research or if you have any questions about your rights as a research participant.

Freedom to Withdraw

Participation in this study is voluntary. You can refuse to participate or withdraw or skip any question at any time without harming your relationship with the researchers or the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which you are otherwise entitled.

Consent, Right to Receive a Copy

You are voluntarily making a decision whether or not to participate in this research study. Your signature certifies that you have decided to participate, having read and understood the information presented. You will be given a copy of this consent form to keep.

Signature of Participant:

Signature of Research Participant

Date

Name and Phone number of investigators:

Adam Smith, Principal Investigator
Office: (402) 472-7036

Stephanie Bondi, Ph.D., Secondary Investigator
Office: (402) 472-8977

141 Teachers College Hall / P.O. Box 880360 / Lincoln, NE 68588-0360 / (402) 472-3726 / FAX (402) 472-4300

Appendix F

Recruitment Email

Dear Student,

You are invited to participate in a research project that will explore the experiences of gay men in STEM (science, technology, engineering, and mathematics) degree programs.

If you are a male, at least 19 years old, identify as gay, and are majoring in a STEM degree program, you are invited to directly contact the researcher, Adam Smith (adam.smith@unl.edu) by email.

If you do choose to participate, Adam will contact you to set up a meeting time. An Informed Consent form is attached for your review.

I am sending this email on behalf of the investigators, so if you have any questions, please feel free to contact Adam at the information below or his advisor, Dr. Stephanie Bondi at sbondi2@unl.edu.

Thank you for your help and participation.

Adam Smith
Primary Investigator
adam.smith@unl.edu
Office: (402) 472-7036