

Board 50: LGBTQ+ Advocacy in STEM: Impact Stories from Community of Practice

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Introduction

It is well established that there is a critical need to diversify the STEM workforce to remain competitive in a global economy. Recognizing the need to attract and retain the most talented individuals to STEM professions, the National Academies advocate that diversity in STEM must be a national priority [1]. Furthermore, research suggests that improving diversity in a workforce has positive effects on innovation and productivity.

One of the key reasons that students cite for leaving STEM is the perception of an unwelcoming climate, especially by those who are members of underrepresented groups [2]. Campus and classroom climate is essential for student retention and also for learning. The way in which students experience their campus environment impacts both learning and developmental outcomes [3, 4]. Environments in which students are subjected to harassment or discrimination hinder student learning, and both minority and majority students are negatively impacted by the failure to create an inclusive environment for minority students [5-9]. Further, there is compelling evidence that diversity among students and faculty is crucially important to the intellectual and social development of *all* students [10-13]. The benefits of diversity extend beyond higher education to the business environment as well: research suggests that improving diversity in a workforce can have positive effects on innovation and productivity [14]. Given the need to increase our STEM workforce to remain competitive in a global economy, efforts must be made to attract and retain talented individuals to STEM disciplines and professions. Therefore, increasing diversity in science and engineering is identified as a national priority by the National Research Council [1]. The National Academies calls for elimination of all forms of bias that may hinder academic career success in science and engineering [15].

Recent years have seen significant progress toward LGBTQ equality in the United States through legislation and societal acceptance, but research on the perceptions and experiences of LGBTQ faculty and students on college campuses clearly demonstrates the prevalence of negative experiences that range from exclusionary behavior to overt discrimination [16-21]. A landmark study involving over 5,100 students, faculty and administrators from all 50 states was conducted to explore how LGBTQ people experience campus climate and to examine behavioral and institutional responses to LGBTQ issues [22]. The following examples illustrate several disturbing trends that emerge from the study:

- Within the last year, 29% of LGBTQ students and faculty experienced harassment and discrimination; one-third of respondents believed the university's response to incidents of LGBTQ harassment was inadequate.
- 13% of LGBQ, 22% of transmasculine, 17.9% of transfeminine, and 17.3% of gender nonconforming respondents feared for their physical safety on campus.

- 31% of LGBTQ respondents were not comfortable with the campus climate; an even higher percentage (37%) of students were not comfortable in the classroom. The percentage of those uncomfortable in the classroom was highest (41%) for students who identified as lesbian or queer.
- 30% of LGBTQ individuals seriously considered leaving their institution due to negative experiences and perceptions. This percentage was highest (42%) for faculty and first year students (72%).

These experiences and perceptions are attributed directly to sexual orientation and gender identity, and they extend to both students and faculty. The intersection of multiple marginalized/underrepresented/etc. cultural and social identities (e.g. race, religion) further increases the risk of negative experiences and perceptions of climate [22]. Despite the discrimination and negative perceptions that pervade the campus climate for LGBTQ people, only about 6% of U.S. institutions have centers that offer support services specifically focused on the needs of this community, based on current data from the Consortium of Higher Education LGBT Resource Professionals [23].

Institutions offering support services, programming and appropriate policies are effecting a gradual positive change in climate for LGBTQ individuals [24]. Yet in academic departments, engineering departments have proven more impervious to change than other disciplines [16, 18, 21, 25-28]. Many LGBTQ engineering students are immersed in unwelcoming and often hostile heteronormative environments [18, 28]. Research studies have found that cultural norms and biased perceptions of competence limit LGBTQ students' opportunities for success, which causes stress, social and academic isolation, and anxiety over future job security [18], [29]. A recent study by Hughes [30] showed that LGBTQ+ undergraduate students are significantly less likely to be retained in STEM than their non-LGBQ peers. In the professional workplace, science and engineering professionals report experiences and perceptions similar to those of students [19], [16], [31]. In a study that compared the academic climate and career consequences for LGBTQ faculty, those in STEM fields reported the highest level of discomfort on campus, in departments and in classrooms; those who were not comfortable were more than twice as likely to consider leaving their institution [20].

To respond to the need to improve LGBTQ inclusion, particularly in engineering departments, in 2015 we launched a transformative project that links diversity research with a faculty development initiative to promote LGBTQ equality in engineering. The aims of the research-education-advocacy project [32-34] are to (1) identify aspects of engineering culture that present barriers to LGBTQ equality, (2) build knowledge and skills to disrupt discrimination and promote LGBTQ equality in engineering departments on college campuses and (3) to identify promising practices for promoting LGBTQ equality in engineering. As part of this effort, a Virtual Community of Practice was formed to develop engineering faculty who are aware, empowered and equipped to advance LGBTQ equality in their departments. This paper focuses on the impact of a Virtual Community of Practice (VCP) as their members advocate for LGBTQ+ inclusion in their engineering departments. It is a continuation of a paper published in the Proceedings of the 2018 American Society of Engineering Education Annual Conference

[34]. The introduction and project overview from [34] have been updated for use in the present paper, and the results of this paper focus on the impact of the Virtual Community of Practice on the members as change agents and on their departments.

Project Overview

Research-Action Cycle

This project is a research-informed faculty development initiative that uses social change strategies to foster a positive and welcoming environment for LGBTQ individuals in engineering departments [35, 36]. Our research investigates the factors in engineering culture that hinder LGBTQ inclusion. The new knowledge that is generated from the research is continually incorporated into the targeted Safe Zone interventions to better tailor them to an audience of STEM professionals and students, and is used by the VCP members to develop strategies to effect change within their own STEM departments. This approach is based on the transformative cyclical research model described by Mertens [37].

Research

Cech and Waidzunas [18] and others have suggested that heteronormativity and heterosexism may be promoted through particular ideologies in engineering culture, especially “technical/social dualism” (devaluation of social, communicative and personnel-related aspects) [38-40] and “depoliticization” (relegation of questions of social justice and inclusion as “political,” and thus irrelevant to “real” engineering) [41, 42].

This project used a mixed-methods research plan with surveys of engineering deans [43], faculty and students as well as ethnographic participant observations of a Virtual Community of Practice for LGBTQ inclusion in STEM. The surveys and ethnographic research generated new knowledge and understanding of engineering cultures, which provided empirically grounded ways that the next Safe Zone workshops were contoured to be most effective for engineering audiences. The research findings help the members of the Virtual Community of Practice advocate more effectively as they try to promote LGBTQ equality in their departments, and help shape promising practices for promoting LGBTQ equality in engineering.

Community and Advocacy

The Virtual Community of Practice (VCP): Wenger-Trayner [44] describes three essential elements of a community of practice: the domain (interest in LGBTQ equality), the community (members who engage in discussions, support each other, share information and learn from each other) and the practice (promoting LGBTQ inclusion at the department level). The Virtual Community of Practice relies on technology to support the creation of a scalable and sustainable model for sharing knowledge, tools and resources to promote LGBTQ inclusion in environments that are traditionally difficult to penetrate.

A Virtual Community of Practice was established in the fall of 2015 to promote LGBTQ equality and inclusion in Engineering. VCP participants were recruited via email distribution lists, and ultimately 20 leaders were selected from institutions across the country.

Since the establishment of the VCP, members have met online via Adobe Connect every 2-4 weeks during the academic year to (a) identify LGBTQ inclusion approaches appropriate for their department context, (b) share resources and (c) support each other as they develop and implement an action plan to change climate and promote LGBTQ equality in their own departments.

During Phase 1 (also called Leadership VCP or LVCP) in the fall of 2015, a series of Human Relations Facilitation training sessions was led by two meta-trainers who trained twenty STEM faculty and staff to facilitate Safe Zone workshops. The meta-trainers brought rich perspectives and expertise to the community: The training involved about 10 hours of online facilitator training and practice prior to the start of the Safe Zone Workshops, and two follow-up meetings after the facilitator training was complete. This phase of the VCP focused on the development of human relations facilitation skills, and formation of the community. In phase 2 (also called Action-oriented VCP or AVCP) beginning in the spring, the focus was action-oriented and the online community developed workshop content, produced actionable resources for their Safe-Zone workshops and VCP, and initiated the online Safe-Zone workshops.

Education

Safe Zone Workshops are campus ally training programs that aim to create a visible network of LGBTQ-affirming individuals and contribute to creating a positive and inclusive climate [24, 45]. Conventional Safe Zone Workshops are general training for all members of a campus community, and they address general campus concerns rather than issues that might arise in departments and classrooms. A key aspect of the Safe Zone workshops developed for this project is the emphasis on experiences in classrooms and other academic spaces on campus. Our series of research-informed interactive Safe Zone workshops are specifically tailored for a STEM audience to raise awareness for LGBTQ inclusion *in STEM* and create a network of allies to foster a supportive atmosphere for LGBTQ individuals *in STEM*.

The content of the Safe Zone Workshops was developed to address learning outcomes embraced by the Consortium of Higher Education Resource Professionals [45]:

- (1) understanding LGBTQ concepts and developing awareness of biases,
- (2) understanding LGBTQ issues and recognizing discrimination and heterosexual privilege and
- (3) becoming active support persons to LGBTQ individuals.

A fourth, unique objective of our training is:

(4) to develop an understanding the aspects of engineering culture that act as barriers to LGBTQ equality.

As recommended by Woodford et al. [45], the program offers an incremental design with successive trainings to address audiences with varying levels of knowledge and awareness. The content of the Safe Zone workshops are tailored for an Engineering/STEM audience by incorporating the findings from our research on LGBTQ in Engineering. This is done by various means such as direct presentation of quantitative results, case studies about experiences of LGBTQ individuals in STEM, and activities exploring how STEM culture impacts LGBTQ individuals. Upon completion of Safe Zone training, graduates receive a Safe Zone sticker to display in their workplace. This simple symbol of LGBTQ alliance has been shown to benefit LGBTQ students and faculty in powerful and meaningful ways [24].

Through this project we redesigned the Safe Zone workshops for a STEM audience. Since 2016 we have offered multiple Safe Zone workshops at various professional society conferences, on several college campuses, and have offered a dozen online workshops.

A more detailed description of the Safe Zone workshops and their effectiveness was described previously [33]. The workshops were successful in promoting knowledge and awareness of LGBTQ issues, recognition of heteronormative and cisnormative assumptions, and understanding of heterosexual/cisgender privilege. In addition, the workshop participants indicated strong agreement with statements that they would adopt several promising LGBTQ-inclusive behaviors.

Methods

In spring 2017, the researchers conducted an online survey with the Leadership Community in order to measure and document progress, satisfaction and outcomes for the VCP community. The members of the VCP were asked to provide examples of ways in which the VCP and advocacy activities have made a difference - personally, to students, to colleagues, to their department, or to the profession. The results reflect the perceptions of the members of a Community of Practice after one and a half years of development and will provide an indication of the strength of the foundation of a sustainable community of practice capable of achieving individual and community goals.

The survey was sent to 20 active members of the VCP and received 15 responses. The survey was originally intended to curate impact stories to share publicly. Subsequently, with IRB approval, we requested consent from the participants to use their responses in a research study. To date four individuals have consented to sharing their impact stories in this research study.

Findings

As summarized in Table 1, respondents indicated that their participation had effected change across all aspects of the VCP: domain, community, and practice. Domain changes were seen at the institution-level, namely curriculum and policy change. For example, highlighting resulting curriculum changes, Participant #2, a faculty member at a public university in the southwest, said:

My department has taken a more proactive approach to make sure that diversity issues are addressed not only in our department and among our students, but that it is also reflected in our curriculum. In fact, we submitted a proposal to provide more culturally responsive education to our students. My department also participated in the safe zone webinars provided by the VCP. WE have made also our priority number one to inform ourselves about diversity issues and micro aggressions by attending different seminars and workshops.

Additionally, Participant #1, a faculty member at a public research university in the Rocky Mountain region described how he was able to bring Ally training to his institution and to effect policy change within his engineering college:

We brought Safe Zone trainings to our college from this VCP, which resulted in substantial changes to policy. With the VCP's support we won the right to include LGBTQ+ STEM clubs on our college's website, along with other minority STEM groups.

Table 1. Summary of findings

VCP Aspect	Definition	Examples
Domain	Interest in LGBTQ equality	<ul style="list-style-type: none">• Policy change• Curriculum change
Community	Members who engage in discussions, support each other, share information and learn from each other	<ul style="list-style-type: none">• Knowledge of how to effectively communicate about LGBTQ issues• Empowerment to act
Practice	Promoting LGTBQ inclusion at the department level	<ul style="list-style-type: none">• Proactively advocating for LGBTQ students and faculty/staff

Furthermore, respondents described clear links between the *community* and *practice* aspects of the VCP, noting how the community facilitated changes to their individual practices. These individual practices were oriented toward further cultural and organizational change. More specifically, participants described how they felt better able to advocate for themselves, students, and other faculty and staff because they had gained knowledge, skills, and strength (or confidence) to act as effective advocates. For instance, two participants described increased

knowledge and skills around communication. Participant #2 highlighted the strength they found in the community as well as tools for better communication:

I believe this group has made a huge impact on my life, not only as an academic but as a person in general. It gave me the strength to advocate for other and for the things I believe are important for faculty, staff, students and community in general. It is the first time I feel good about speaking out and understanding that I can be an institutional agent of change. It has provided the tools to better communicate with others and engage in dialogue that is beneficial for me and the people surrounding me.

Similarly, Participant #4, a faculty member at a private institution in the northeast, also focused on learning effective communication through conversations in the VCP:

Being a part of the ongoing conversation represented by the VCP has given me so many more ways to discuss LGBTQ+ issues with colleagues, students, and even friends and family. Hearing all of the ways that other folks engage in educating around LGBTQ+ issues helps me to be a more productive advocate on my own campus and within my social networks. Most notably, I have used the idea that science DESCRIBES (not JUDGES) the natural world, which came from conversations during synchronous meetings with the VCP, to reinforce why intersex folks should be recognized as 1) people who exist and 2) part of the naturally-occurring genetic diversity on our planet. These kinds of "back-pocket" responses to curious STEMists who bring up LGBTQ+ topics have been invaluable in building rapport and openness rather than defensiveness and division.

Participant #3, a faculty member at a public research institution in the upper midwest, also clearly connected the impact the VCP community had on him individually to renewed motivation to be an active advocate. He reflected on passing and covering demands over his 20+ year career as an engineering faculty member, and the factors that led to his commitment to cultivate and support allies and to advocate for students, which he considers his professional responsibility:

I have been out as a gay engineering educator for many years, but over those years I have conformed to expectations expressed to me by senior colleagues and by peers to compartmentalize and limit any expression advocating for LGBT+ equality in engineering. Instead, I have focused over the years on trying to ensure good working relationships and cultivating what I hoped would be increasingly tolerant peers and sometimes even accepting allies. That progress had been noticeable, but slow, and marked occasionally (thankfully, with decreasing frequency over time) with periodic episodes of intolerance.

Around the time that this LVCP started, though, two new developments appeared. First, more out LGBT+ students were making themselves known, and some were expressing (rightly) the expectation that the climate in engineering should be more inclusive. Second, nationally, more allies were also starting to make their voices heard in opposition to intolerance. These two developments made me think that I needed to step up my

efforts to cultivate, and support, allies, as well as to see how to offer advocacy for the students. I knew that some peers would regard these efforts as unprofessional, but I prepared myself to remind them that we are educators as well as engineers, and I regard it as part of an educator's professional responsibility to broaden participation in the discipline.

I was very happy to be able to make a connection... and to learn of the... project! This VCP came just in time for what I needed to learn and develop in this professional responsibility!

Reflecting a similar combination of personal and organizational impact, Participant #1 stated:

The VCP has had tremendous positive impact on myself as a STEM professional and as a gay man. I was relatively isolated in my college as an advocate for LGBTQ+ students and I did not know how to best address conflicts with college leadership, or the hurdles faced by our students in the classroom... As part of this community, I gained the tools and professional connections needed to be able to make real lasting and positive changes for our students, and LGBTQ+ staff.

Evidence of that impact comes from professional recognition this participant received for his work with the VCP - a national award for teaching and advocacy for LGBTQ+ students.

Conclusions

As the Community of Practice develops, the stories of impact from the VCP members show that the VCP is developing well in the three essential aspects of (1) domain (interest in LGBTQ equality), (2) the community (members who engage in discussions, support each other, share information and learn from each other) and the (3) practice (promoting LGTBQ inclusion at the department level) [44]. Moreover, these impacts operated across multiple levels, including the institutional, individual, and organizational levels. Participants indicated gains in communication and advocacy skills, benefits to their professional development, and deriving strength from community. These individual outcomes supported their development as advocates who were able to effect change in their departments and colleges.

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