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ASEE Safe Zone Workshops and Virtual Community of Practice to Promote LGBTQ Equality in Engineering

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Abstract

Even though recent years have seen significant advances in LGBTQ (lesbian, gay, bisexual, transgender, and queer) equality in the U.S. through legislation and social acceptance, research shows that LGBTQ students and faculty on college campuses still experience exclusion and discrimination. This paper describes a transformative project that links diversity research with a faculty development initiative to promote LGBTQ equality in engineering. The aims of the project 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 best practices for promoting LGBTQ equality in engineering.

Safe Zone Workshops create a visible network of LGBTQ-affirming faculty who contribute to creating a positive and inclusive climate in engineering departments. A Virtual Community of Practice (VCP) works together to support individual members to take action to advance LGBTQ equality in their departments. Over 270 engineering educators have attended the 20 Safe Zone Workshops offered at the ASEE Annual Conference in the last two years. Evaluation results indicate that the content of the Safe Zone Workshops has been appropriately tailored to an audience of engineering educators, and that there is a clear call to expand the workshops and nurture the conversation about LGBTQ inclusion in engineering. Online technology is being used to create a scalable and sustainable model for sharing knowledge, tools and resources to promote LGBTQ inclusion in environments that are traditionally difficult to penetrate. Using a two-tiered, train-the-trainer structure, two experts trained a cohort of twenty leaders to facilitate online and face-to-face Safe Zone Workshops and lead a Virtual Community of Practice for engineering faculty. The workshops and VCP are being launched in early 2016.

This project uses a transformative, cyclical mixed-method research model to provide a basis for social change. The transformative research generates new knowledge of engineering culture through surveys of engineering deans, faculty and students as well as ethnographic participant observations during Safe Zone training sessions with engineering faculty. The cyclical aspect of the project plan integrates this new knowledge into another level of Safe Zone training sessions that address engineering culture more specifically.

1. Introduction

In its 2012 “Engage to Excel” Report to President Obama, the U.S. President’s Council of Advisors on Science and Technology (PCAST) called for producing one million more STEM professionals over the next decade than would be produced at the current graduation rates. This equates to a 34% annual increase in undergraduate STEM degrees awarded annually. Citing a very low average undergraduate STEM retention rate of 40%, the report recommends the fastest and most economically viable option for achieving the workforce goal is to retain more STEM majors [1].

One of the key reasons that students cite for leaving STEM is the perception of a chilly climate, especially by those who are members of underrepresented groups [1]. Campus and classroom climate is essential for retention and also for learning. How students experience their campus environment impacts both learning and developmental outcomes [2], [3]. Environments in which students experience harassment or discrimination hinder student learning [2-6]. Failure to create an inclusive environment for minority students affects both minority and majority students, and there is compelling evidence that diversity among students and faculty is crucially important to the intellectual and social development of *all* students [7-9]. The benefits of diversity extend well beyond the university years: research suggests that improving diversity in a workforce can have positive effects on innovation and productivity [10]. 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. To this end, increasing diversity in Science and Engineering (S&E) has become a national priority [11]. The National Academies calls for elimination of all forms of bias that may hinder academic career success in S&E [12].

Federal funding programs have been established to increase the representation of underrepresented groups in STEM, for example, the National Science Foundation’s Broadening Participation in Engineering Program which aims to increase the representation of ethnic and racial minorities. However, other groups such as LGBTQ, which are also underrepresented in STEM [13], have been underserved by previous efforts to increase diversity.

Recent years have seen significant progress toward LGBTQ equality in the United States through legislation and societal acceptance, but research examining perceptions and experiences of LGBTQ people on college campuses clearly demonstrates the prevalence of negative experiences that range from exclusionary behavior to overt discrimination [14-18]. 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 [19]. 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 cultural and social identities (e.g. race, religion) significantly increases the risk of negative experiences and perceptions of climate. Despite the discrimination and negative perceptions that pervade the campus climate for LGBTQ people, only 4% of U.S. institutions offer support services specifically focused on the needs of this community [20].

Initiatives such as Safe Zone ally training are effecting a gradual positive change in campus climate for LGBTQ individuals [21]. Yet engineering departments have proven more impervious to change than other disciplines [14], [16], [18], [22]. LGBTQ engineering students are immersed in unwelcoming and often hostile heteronormative environments. Prejudicial cultural norms and perceptions of competence limit opportunities for success, causing stress, social and academic isolation, and anxiety over future job security [16], [23]. S&E professionals report experiences and perceptions similar to those of students [17], [14], [24]. 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 2.56 times more likely to consider leaving [18]. More research is needed to understand the institutional and cultural processes in engineering education that promote or hinder LGBTQ inclusion and how interventions like Safe Zone trainings might improve the climate.

This paper describes a transformative project that links diversity research with a faculty development initiative to promote LGBTQ equality in engineering. Our motivation to improve the climate for LGBTQ engineers in academic departments is based on research that shows (1) evidence of negative campus climate for LGBTQ engineers, (2) a link between climate and academic/career consequences, and (3) the importance of diversity in the intellectual and social development of students and in increasing innovation and productivity in business. These research findings point to the need to improve the climate for LGBTQ individuals in engineering [14, 17, 18, 22, 23].

2. 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 [25], [26]. Our research investigates the factors in engineering culture that hinder LGBTQ inclusion. The new knowledge that is generated from the study will be incorporated into a research-informed model for targeted interventions for effecting social change and advanc-

ing LGBTQ equality. This approach is consistent with a transformative cyclical research model.[27].

This project comprises four main activities: (1) Transformative mixed-methods research on aspects of engineering culture that impact LGBTQ inclusion (2) Leadership Virtual Community of Practice (LVCP), (3) Safe Zone Workshops, and (4) Action-oriented Virtual Community of Practice (AVCP).

Research

Cech and Waidzunas [16] 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) [28-30] and “depoliticization” (relegation of questions of social justice and inclusion as “political,” and thus irrelevant to “real” engineering) [29, 31]. Little is understood about these cultural factors and how they undermine the advancement of LGBTQ equality. Further, manifestation of this culture within engineering departments likely varies significantly by region, policy environments, and student and faculty demographics. Research is needed to advance our scholarly understanding of cultural factors in engineering that impede and promote LGBTQ equality, which in turn will allow us to contour the content and best practices of Safe Zone workshops to be most effective for engineering audiences. Our research plan is based on a transformative mixed methods design [27] using surveys of engineering deans, faculty and students as well as ethnographic participant observations of Safe Zone workshops to answer research questions that include: How are engineering faculty and staff disadvantaged by heteronormativity and heterosexism?

- What aspects of engineering culture serve as impediments to LGBTQ equality?
- How can Safe Zone workshops be tailored to promote LGBTQ equality in engineering?

The surveys and ethnographic research generate new knowledge and understanding of engineering cultures, which provides empirically grounded ways that the next Safe Zone workshops can be contoured to be most effective for engineering audiences. It will help the members of the Virtual Community of Practice advocate more effectively as they try to promote LGBTQ equality in their departments, and it will help shape our recommended best practices for promoting LGBTQ equality in engineering.

Surveys of Engineering Deans, Faculty and Students

In the fall of 2015 the survey of Engineering and Technology Deans was completed. The purpose of the survey was to understand the extent to which deans serve as formal and informal advocates for (or blockades to) positive change. The survey was distributed via the ASEE Dean’s Council which has 370 members representing over 90% of U.S. deans.

Deans who participated in the survey were asked to forward separate survey links to faculty and students in their college. These surveys, which will be conducted in the spring of 2016, explore personal support for LGBTQ equality and inclusion measures, assessment of climate among peers and in their college, and experiences of LGBTQ faculty in comparison to their non-LGBTQ peers.

Ethnographic Participant Observations of Safe Zone Trainings

The goals of participant observation in Safe Zone workshops is to richly illuminate participants' assumptions about LGBTQ persons and needs for inclusion, and to develop best practices in Safe Zone workshops for engineering audiences in general and also for different engineering school environments. Participant observation involves closely following interactions and engaging in discussions with participants during the Safe Zone trainings about, for example, appropriate topics of conversation in an engineering college, whether and how LGBTQ exclusion happens and how it can be addressed.

Action

The Leadership Virtual Community of Practice (LVCP) was led by two meta-trainers who trained twenty faculty to facilitate Safe Zone Workshops and to lead an action-oriented VCP for LGBTQ equality in engineering. The meta-trainers brought rich perspectives and expertise to the community: Christian Matheis is an applied ethicist with expertise in community organizing, Safe Zone training, and activism. Masa Sugie has a degree in chemical engineering and ten years of professional experience as a facilitator and facilitator trainer, LGBTQQIA student services and advocacy, and national service program leadership. LVCP participants were recruited via email distribution lists, and ultimately 20 leaders were selected from institutions across the country. The participants bring diverse personal and professional experiences to the community.

The LVCP 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. The participants learned human relations facilitation skills, developed workshop content and produced actionable resources for their Safe-Zone workshops and Action-oriented VCP.

Safe Zone Workshops are campus ally training programs that create a visible network of LGBTQ-affirming individuals and contribute to creating a positive and inclusive climate [21, 32]. 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. This project has created a series of research-informed interactive Safe Zone workshops to raise awareness for LGBTQ inclusion *in engineering* and create a network of allies to foster a supportive atmosphere for LGBTQ individuals *in engineering*.

The content of the Safe Zone Workshops was developed to address learning outcomes embraced by the Consortium of Higher Education Resource Professionals [32]:

- (1) understanding LGBTQ concepts and developing awareness of biases,
- (2) understanding LGBTQ issues and recognizing discrimination and heterosexual privilege and
- (3) becoming 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 [32], the program offers an incremental design with successive trainings to address audiences with varying levels of knowledge and awareness. Safe Zone participants will be prepared to adopt best practices on an individual level to help create a more welcoming environment for LGBTQ individuals. Upon completion of a four-hour 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 [21].

At the 2014 and 2015 Annual Conferences, the ASEE Diversity Committee offered a total of 20 Safe Zone workshops running parallel to the technical sessions. These workshops were led by volunteer facilitators, and have been attended by over 270 participants from institutions across the United States. Eight face-to-face workshops at the ASEE 2016 Annual Conference in June are also planned. We have also established a unique partnership with AIChE, with joint sponsorship from Dow, to run Safe Zone workshops at the April and November 2016 Annual Meetings.

To expand the impact of the face-to-face conference workshops, in Spring 2016 we will launch online workshops facilitated by the LVCP. Numerous online workshops will be offered during the period 2016-2017.

An Action-oriented Virtual Community of Practice (AVCP) A pair of LVCP members is currently leading the first virtual community for action to promote LGBTQ equality. The AVCP community aims to (a) identify 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.

A community of practice has three essential elements: 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 LGTBQ inclusion at the department level) [33]. Both the workshops and the VCPs use tools for synchronous and asynchronous communication based on the model implemented in the ASEE VCP project sponsored by NSF [34]. Adobe Connect is used for synchronous communication; this web conferencing tool provides a broad range of capabilities for real time collaboration. An open-source web portal hosted on ASEE server is used to support asynchronous interactions; the portal also serves as an archive for communications, resources and materials developed. ASEE staff provide technical support for both collaboration platforms.

3. Results

In 2014, a general session feedback evaluation was administered after the Safe Zone Training. This evaluation form asked questions related to the presenter's knowledge, whether the speaker should be invited back, and overall effectiveness of the session. These questions were changed in 2015 to evaluate the effectiveness of workshop topics, as described below. The original 2014 evaluation included one open-ended question for participant comments. All responses were carefully analyzed by a single coder who identified recurring themes. Participant comments provid-

ed insight into the meaning and impact of the workshops and meaningful feedback for improving future iterations.

Overall, participants appreciated the opportunity to start the conversation about LGBTQ equality in engineering and found the conversations informative. Some comments from participants included:

“I am so excited that this program exists and is running multiple times throughout the conference”

“Expand this training for next year”

“Have a level 2 Safe Zone Workshop for people who feel comfortable with the basics”

“This was the MOST informative session I experienced at this conference. Please do these sessions again next year. I thank you so much. I appreciate the sensitivity of the presenters!”

“The discussion was very rich.”

“Thank you for offering this. It was a great and eye-opening workshop. For future events I would love to hear a few personal anecdotes of successful Safe Zone interactions.”

“It’s about time!!!!”

“What took so long?????”

“I appreciate that people volunteered to help thereby allowing a number of workshops”

“These workshops really created a safe space at the conference!! Thank you!”

To summarize the comments, participants were very enthusiastic about the initiative and appreciated starting a much-needed conversation. Feedback from participants indicated a clear call to offer more workshops and nurture deeper conversations. Participants in the 2014 workshops also offered very valuable suggestions for improvement. Many participants commented that they would like a more discussion-oriented forum in which participants and facilitators can share stories, ideas, and best practices. Participants suggested involving students in the workshops and also making the workshops more STEM-specific and including a section on microaggressions. These suggestions were incorporated into the 2015 workshops. One participant noticed that the ASEE diversity statement did not include gender identity or gender expression; as a result, the Diversity Committee revised the organization’s diversity statement in the fall of 2014 to include gender identity and expression (see <http://www.asee.org/about-us/diversity>).

In 2015 the questionnaire was revised in order to evaluate the effectiveness of the workshop topics in increasing understanding and awareness of LGBTQ concepts and issues, and the usefulness of strategies and tools offered to create a more inclusive classroom. The questions consisted of nine Likert-scale response items and three open-response items. The specific questions are listed in Box 1.

Box 1. Questions on the 2015 Safe Zone Training Evaluation

Part 1. Participants were asked to indicate their agreement with the following statements (4-point scale from 1=strongly disagree to 4=strongly agree)

1. I have a better understanding of LGBTQ terminology and concepts.
2. I have an increased awareness of assumptions and biases faced by LGBTQ individuals.
3. I have a better understanding of the challenges of campus climate for LGBTQ individuals.
4. I have a better understanding of the coming out process.

Part 2. Participants were asked to indicate how likely they would be to use the following strategies and tools (4-point scale from 1=very unlikely to 4=very likely)

5. I will assume a lesbian, gay, bisexual or transgender or intersex person might be present in my class.
6. I will use inclusive language in my classroom.
7. I will ensure that my syllabus has a diversity welcome statement that includes gender, gender expression, gender identity and sexual orientation among the minority groups that are welcomed and respected in my class.
8. I will provide a mechanism for students in my class to indicate a preferred name and/or preferred pronoun.
9. I plan to display my Safe Zone sticker in a visible location in my office on campus.

Part 3. Open-ended questions

10. What aspect of this workshop was most useful to you?
11. Do you have suggestions for improvement?
12. Do you have other comments or suggestions?

Table 1. Summary of survey results for the 2015 Safe Zone Workshops

	What is your level of agreement with the following statements?	Distribution of Responses				Average
		1 - Strongly Disagree	2 - Disagree	3 - Agree	4 - Strongly Agree	
Terminology	I have a better understanding of LGBTQ terminology and concepts.	1	1	22	24	3.4
Biases	I have an increased awareness of assumptions and biases faced by LGBTQ individuals.	1	0	25	22	3.4
Climate	I have a better understanding of the challenges of campus climate for LGBTQ individuals.	1	2	28	17	3.3
Coming Out	I have a better understanding of the coming out process.	1	3	23	21	3.3
	How likely is it that you will use the following strategies and tools?	1 - Very Unlikely	2 - Unlikely	3 - Likely	4 - Very Likely	
LGBTQ Presence	I will assume a lesbian, gay, bisexual or transgender or intersex person might be present in my class.	0	0	18	30	3.6
Language	I will use inclusive language in my classroom.	0	0	13	35	3.7
Syllabus	I will ensure that my syllabus has a diversity welcome statement that includes gender, gender expression, gender identity and sexual orientation among the minority groups that are welcomed and respected in my class.	0	0	19	29	3.6
Pronoun	I will provide a mechanism for students in my class to indicate a preferred name and/or preferred pronoun.	0	1	21	26	3.5
Sticker	I plan to display my Safe Zone sticker in a visible location in my office on campus.	0	0	11	37	3.8

The original evaluation was completed by 48 participants at the 2015 Annual Conference workshops. The results indicate that the workshops were very effective in increasing understanding and awareness of LGBTQ concepts and issues. Almost all of the respondents indicated that they would use the tools provided to create a more inclusive classroom. The tools for creating an inclusive environment were very highly rated. With two exceptions, all of the participants indicated that they would use all of the tools and strategies that were suggested; one exception was a participant who hoped to display the Safe Zone sticker in the office but was in a shared space and needed to discuss this with office mates first. Another participant thought it was unlikely that they would provide a mechanism for students to indicate a preferred name. The results are summarized in Table 1.

There were three open-response questions on the 2015 evaluation: What aspect of the workshop did you find most useful? Do you have suggestions for improvement?, and Do you have any additional comments? Many of the participants cited specific workshop topics as most useful; these responses were broadly distributed across all workshop topics, suggesting that the workshop content is appropriate and useful for the engineering educator audience. Some participants found the most useful aspect to be the specific STEM perspective. As in the previous year, some participants commented on the opportunity for conversation, the safe space to ask questions, and the overall experience as being most useful:

“Being able to ask questions and talk through my experience”

“Being exposed to different perspectives and realizing why it is more important to be inclusive”

“I did not get attacked for being [a member of a majority group] and for disagreeing or asking for clarification”

Participants offered several suggestions for improvement. Some were content-specific, for example, clarification of a concept or additions of examples. These comments were used as formative feedback to modify the workshop content before the next session. Other suggestions for improvement related to allowing more time for the workshops and offering more workshops. One participant suggested offering 1-2 workshops outside of the normal session times, and another suggested developing content for environments that are particularly adverse or difficult to penetrate. These suggestions are being incorporated into the online Safe Zone programming. Finally, this participant’s comment captures another important impact of the Safe Zone workshops – the significance of seeing that others are interested in the cause:

“Being encouraged that peers in ASEE are interested in training”

4. Summary and conclusions

College campuses are making gradual progress toward improving the climate for LGBTQ individuals through LGBTQ-inclusive policies, programming and practices. Most of these efforts focus on student life and general campus environment, and little has been done to improve the climate within academic departments and classrooms. Findings from previous research reveal that engineering students and faculty experience an unwelcoming atmosphere which limits opportunities for success and causes stress, isolation and anxiety [16], [23]. These findings clearly demonstrate the need to improve the climate for LGBTQ individuals in engineering [14, 17, 18, 22, 23].

This project addresses the need to increase the participation of LGBTQ students and faculty in engineering and help to create a more diverse STEM workforce by promoting LGBTQ equality in engineering. A total of twenty Safe Zone workshops have been offered at the last two ASEE Annual conferences, impacting a total of over 270 participants. This is resulting in the creation of a visible network of engineering faculty with the awareness, knowledge and skills to create a more inclusive environment for LGBTQ faculty and students. To reach a larger audience of engineering educators, a model using was developed to use online technology to offer workshops

and provide ongoing support to engineering faculty who are committed to advancing LGBTQ equality in their own departments. In an ongoing cycle of research and action, research findings on aspects of STEM culture will generate new knowledge about barriers to and support for LGBTQ inclusion in engineering; this understanding of engineering culture will be incorporated into the Safe Zone workshops and advocacy strategies to make them more effective for an engineering environment.

We anticipate that this model is scalable to a larger audience; transferrable to different audiences such as STEM students, deans, policy makers and non-academic STEM professionals; transferable to other cultures outside of engineering, particularly those resistant to change; and sustainable. The research on engineering culture will generate new knowledge that may be generalizable to processes of exclusion and inclusion of other underrepresented groups.

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