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Cultivating an Inclusive Culture in STEM: Understanding the Role of Scientists in Shaping Diverse and Inclusive Communities

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CULTIVATING AN INCLUSIVE CULTURE IN STEM

Understanding the Role of Scientists in Shaping Diverse and Inclusive Communities

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Honors Senior Capstone Project
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Introduction

After four years of studies in biochemistry, I can count on one hand the number of times race was brought up during my science classes. Science education is primarily focused on learning technical skills, which leaves few opportunities to talk about the ways race, gender, and other intersectional identities shape our experiences studying and doing science. However, as students attending an institution, we encounter bias, oppression, and inequality regularly. Given this context, I found myself asking, *how come conversations about race, equity and inclusion so often get overlooked in science education?*

The STEM community at Western is beginning to acknowledge the importance of diversity in science. The College of Science and Engineering (CSE) has been working to make its departments more inclusive by developing roles and hiring individuals specifically to work on expanding diversity and equity initiatives. Last year, a workshop series was put together for faculty in the CSE to raise awareness about issues of race, oppression, and inclusion. However, these structural changes are slow, and have yet to reach the student body. Although many students actively seek out and participate in communities and clubs that value inclusion and diversity in STEM, there is a clear need for more spaces where students can explore the relationship between science, society and identity.

So I created one. I developed a workshop specifically for students in STEM where these connections can be explored. The two-hour interactive workshop was run twice in May 2018 and was attended by almost 60 students. This project contains information about my process developing and facilitating these workshops, and my thoughts on how the students who participated understand the role of scientists in intentionally addressing inclusion in our field.

Throughout this process, I asked myself repeatedly, *why is diversity important? Why do these conversations matter?* I was honestly surprised that I did not get this question from others—in fact, most people were supportive of this project. I couldn't help but wonder, if the students, faculty, staff, and communities I talked to all think talking about diversity is important, what is stopping us from having these conversations?

If nothing else, I hope this project challenges you to think about your role in engaging with these conversations. Our positions as scientists do not excuse us from the responsibility of fighting for equity and justice. No matter how many hours we spend in lab or how many grants we have to write, we are first and foremost humans deserving respect and support from our peers. And as part of the STEM community, we have an obligation to cultivate a culture of inclusion in the sciences.

Workshop Concept and Design

The purpose of the Community and Identity in STEM Workshop is to provide students a place to critically examine how scientific disciplines and science education contribute to and perpetuate interpersonal and institutional biases against minorities historically excluded from or underrepresented in the sciences.

The workshop focuses on three major concepts: identity, oppression and community. First, we engage with our own identities and examine the biases and privileges that shape our relationship to science. Second, we practice identifying and responding to subtle and overt forms of racism, sexism, and bias through interactive scenarios. Finally, we establish our roles in shaping the values of the scientific communities we work and study in, with an emphasis on action and inclusion.

Development

Focus groups

As I began the development process, I reached out to friends, faculty and student organizations for suggestions about what to focus on. I connected with six STEM clubs that already value and advocate for inclusion and equity in science, including: Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), Women in Physics (WiP), Women in Geology (WiG), the Association for Women in Computing (AWC), Out in Science, and Chem Club. Although I came to each

meeting with a set of [focus group questions](), I took a flexible approach to leading discussions. The focus groups ranged from a 5-min introduction of my project and a request to fill out a survey, to a full hour long structured discussion.

My experiences with different clubs varied dramatically. I met with SACNAS first; the group was smaller, and they needed little prompting to carry on an hour-long discussion about their experiences and what they want to change at Western overall. On the other end of the spectrum, when I led a structured discussion with AWC, I struggled to get anyone to share their thoughts with the whole room. The students were hesitant to talk about inclusion and oppression, at least in front of a large group of their peers. This contrast reminded me that students are coming to this conversation with different levels of awareness and comfort.

Regardless of comfort talking about race and inclusion, almost every student I talked to wanted more opportunities to practice identifying and confronting bias. Many students also expressed a desire to engage faculty in the workshops, and to bring more conversations about inclusion into classrooms. More detailed notes from the focus group sessions are described in [Appendix A]().

Although the feedback from my questions was useful for planning, watching how each club interacted was much more valuable. For example, WiP started their meeting by asking members for a high point and low point of their week. I was immediately struck by the sense of community and support in the room. This support was present in all the clubs I attended. It made me wonder, what is it about a community that makes us feel welcome? As one person from Out in Science put it, **it is powerful to find your people.**

I decided to make the workshop just for students, despite requests to include faculty. I wanted to recreate the environment I witnessed in these clubs, and to focus on the role of community in shaping the experiences of underrepresented minorities in STEM.

Advertisement
While planning how to advertise my workshop, I wrote the note, "TQ has friends." Although meant as a joke, I underestimated the significance of personal connections. I asked a lot of my friends to come, and they brought their friends, who brought their friends. The workshop was also more formally advertised with:

- [Workshop Flyers]() posted around campus
- Emails sent to STEM club presidents, with a request to pass information on to club members, and
- Emails sent to faculty and departments to share with the students in their classes

During the workshops, I asked a few people I did not know how they heard about it. Everyone I talked to said a professor or friend told them about it. One professor even gave out extra credit for attending. In the end, it is still our connections that bring us together.

Lesson Plan and Learning Outcomes
The workshop begins with an activity to meet new people in the room. This is followed by three sections, exploring the concepts of identity, oppression and community that I came up with from the focus groups. It is an ambitious amount to cover in two hours. However, students are hard to pin down for two hours, let alone two sessions. To truly get students engaging with science as a community and a culture, we must first understand ourselves and our identities and how oppression can manifest in STEM. Considering this foundation, the workshop has four scaffolded outcomes:

1. Understand your identity and how it influences your biases, perceptions of, and interactions with the scientific community
2. Practice identifying and confronting microaggressions and implicit bias demonstrated in the actions of yourself, your peers, or faculty

3. Explore ways to engage with and build a community that is supportive and inclusive of minorities historically underrepresented in the sciences
4. Establish your role as a scientist in **continuing this dialogue about community, identity and inclusion in STEM**

Making these conversations part of what we do—this is how we really create change: by putting inclusion at the center of all our work. I do not expect every participant to reach outcome four, but rather to work towards it by acknowledging privilege and practicing responding to oppression.

The workshop is designed to be interactive and discussion-based. There is some framing and facilitation of large group discussions, but most of the conversations happens in small groups to give everyone a chance to speak and offer their unique perspective. My unspoken outcome for these workshops is that participants leave with a friend, or at least with a connection they can continue these conversations with. Small groups optimize opportunities to network, and networking is how we build community, especially in science careers.

Below is the workshop outline with timing in parentheses and activities bolded. For a detailed lesson plan, including notes for facilitation and activity rationales, see Appendix B.

Welcome and Introduction (5 mins)
Bonding Activity (5 min)
Learning Outcomes and Ground Rules (5 min)
Identity and Privilege (25 mins)
 Self-Reflection
 ***Cross the Room* Activity**
Confronting Bias (35 mins)
Community Values (15 min)
 Whiteboard *Chalk-Talk*
What Next? (20 min)

To explore identity, participants begin with an independent self-reflection. We then think about privilege and group identity with a *Cross the Room* activity, where participants step into the circle if a statement applies to them. To practice confronting bias, participants are given a scenario based on real experiences of students. In small groups, they are prompted to examine the scenario and come up with sentences to start a conversation in each situation. Finally, we begin exploring the idea of community with a whiteboard *chalk-talk* where students silently write values or aspects of STEM culture that are detrimental or exclusive, and that are positive and inclusive.

The workshop ends with the question: *what is the next step towards making STEM communities more inclusive?* This last piece is about action and accountability and allows people to walk away from the workshop with a direction. After the two workshops I facilitated, I hung up responses to this question around campus. I wanted the greater Western community to also be able to engage with and witness the responses participants came up with.

Workshop Participant Responses

The workshop was conducted twice, a week apart. There were 38 participants at the first workshop, and 20 at the second. Since the workshop mostly consisted of discussions in small groups, I did not actually hear most of the conversations that happened. However, I did collect some of the independent self-reflections and all the *Cross the Room* Handouts. Without any formal assessment process, the responses below are my interpretation of some thoughts from the participants who attended. These responses are intended to provide insight into how STEM students perceive and engage with identity, community, and social justice.

Identity Self-Reflection

We started the conversation about identity with an independent self-reflection. I collected a total of 24 responses to the question, *"How has your identity shaped your experience in STEM?"* As I read through the reflections, I noticed some interesting patterns. For a more detailed breakdown of how I categorized these responses, see Appendix E.

Gender was mentioned in 80% of the responses; both race and socioeconomic status or family were mentioned half as often. A handful of responses also addressed religion or sexuality. This aligns with comments from the focus groups I led: our campus overall is much more comfortable talking about gender than about race. I see this pattern in the greater science community as well. When I approached a professor at the beginning of my project and described my desire to engage with race, gender and discrimination in the sciences, they redirected the conversation towards gender discrimination and made no mention of race. **Sexism is something we are comfortable talking about, because we talk about it often.** However, to move forward, our efforts to make the science community more inclusive must include intersectional identities.

It was clear while going through the responses that some individuals came in to this workshop better equipped to articulate their identity and its impacts on their actions and behaviors. I created a scale of "Identity-Consciousness" to better understand how students who attended the workshops engage with identity.

There were a handful of individuals who responded that they did not think about their identity or worry because of their identity. Within this group, those who mentioned gender all identified as male. Beginning to recognize identity is the foundation of identity-consciousness.

About a quarter of participants acknowledged their own identity, privilege or biases, but did not address how it affects their experience, thoughts or actions. Many of these responses mentioned the privilege of coming from an upper- or middle-class family. Those who discussed race all identified as white or European.

The third level of identity-consciousness is understanding the impact your identity has on your experiences. About a third of the responses described ways their identity has changed their behaviors. For example, many of these reflections mentioned feeling like an imposter in the sciences or feeling pressure to work extra hard because of their gender. The individuals in this group all identified as women and recognized that their experiences represent the experiences of a whole group.

The ability to connect identity to big picture systems—what I consider the fourth level of identity consciousness—was seen in four responses. These individuals demonstrated motivation to consciously challenge the social status quo and understood how their identity can shape their community. The responses all focused on the future, not just present or past experiences. They recognized how their identities have pushed them to continue inclusion work and they see anti-oppression as part of their identity. This is where I hoped everyone would be by the end of the workshop.

Women, in general, came into this workshop with greater awareness of their identity and how it impacts their experiences. As people on the margins, we are sometimes better equipped to see the way the mainstream system functions. One person mentioned that it is tough to know how to be an ally when you are part of the "in-crowd." It takes conscious effort to acknowledge our privilege and use it in productive ways.

Cross the Room Activity

This activity was intended to bring awareness to different types of privilege someone might have in the sciences, or types of discrimination someone might face. Every group has a collective identity, comprised of unique experiences that we cannot always see. For example, I was surprised that 95% of students in the room attended a high school that offered AP classes. I wondered if the percentage was that high in non-science majors. Appendix F contains all the questions from this activity and the percentage of individuals who responded yes during each session.

One discrepancy between answers that was discussed during the first workshop was between the questions: *Can you imagine yourself in a science career?* and *Do you believe the science community is inclusive?*

Can you imagine yourself in a science career?
14%
86%
Yes
No
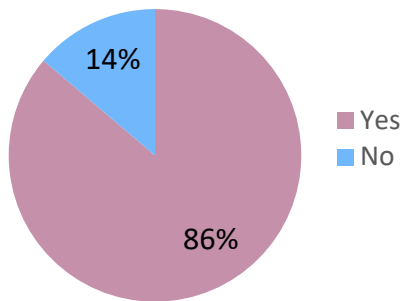
Do you believe the science community is inclusive?
17%
83%
Yes
No
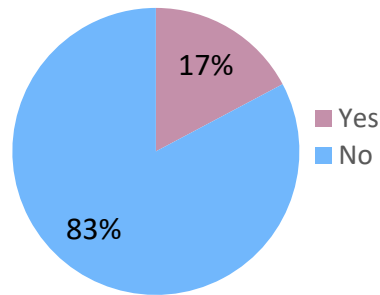
This is probably the clearest indication that the STEM community still has work to do. It is unfathomable to me that almost everyone who attended the workshops can imagine themselves in a career—in a community—where they do not feel supported. I personally cannot imagine myself in a science career *because* I often feel like I do not belong in this community.

However, after the first workshop I changed my answer to *Do you believe the science community is inclusive?* from no to yes. Witnessing so many people engage with this conversation and seeing how they responded to the scenarios inspired me. There are people from all different majors and backgrounds who care and are putting in effort to change the culture around us; they just need a place to gather.

Community Values

Every community has values, whether we talk about them or not. Typically, we gravitate towards groups with priorities or beliefs that align with ours. Often, we do not consciously think about these collective values. I challenged workshop participants to think about the values that are around us by answering the question: *What aspects of the science community promote inclusion and support between peers, and what aspects are detrimental or exclusive?* Appendix G contains images of the responses from session 2.

Some of the exclusive aspects that came up in the two sessions include:

- The idea of stupid questions; this shuts down curiosity and excludes the people who don't "get it" right away
- Lecture-based teaching or grades based entirely on exams; "success" is measured with only one type of learning (typically memorization) and those who learn in different ways are less supported in class
  - The Moore teaching method (in Mathematics) is a prime example
- Competition in classes and curves; the emphasis on being "smart"; the sense of "elitism" that can occur between different science disciplines or between people who do or don't study science
- Research can only be published in one language (translations of science journals are not a thing); not supporting (or acknowledging) multilingualism in our science classes
- White men taking credit and not acknowledging the work of those with underrepresented identities
- When we are not seen as people; when faculty do not acknowledge that we have family, struggles, and lives outside of science and academia that often take priority over school

Many of the inclusive aspects that were described seem to directly parallel the things listed as detrimental. This activity made me incredibly hopeful. There are people, faculty, and communities that are already cultivating a culture in their classrooms and friend groups that is supportive, and students are noticing. Inclusive aspects of the STEM community include:

- Creating an environment where we can ask questions; encouraging curiosity

- Group work and collaboration in classrooms or studying together outside of class; giving time for students to talk during class and get to know one another (especially in intro level classes)
- Inquiry-based and place-based learning; teaching to other types of learning styles
- STEAM – incorporating **art** into science
- Clubs run for and by minorities; opportunities for minorities to attend conferences, conduct research and get involved
- The peer-review process, because it encourages challenging one another and the continual examination of our biases
- Professors with cookies at their office hours
- Seeing scientists as JUST PEOPLE

One of the recurring themes from both sessions and from the focus groups was seeing scientists as people. So often we get caught up in the myth of scientists as objective observers that we overlook the human emotions we all have. Last quarter, one of my professors was visibly upset when I told them that I would be missing class to attend an Ultimate Frisbee tournament, making it clear they believe I shouldn't prioritize sports over science. Seeing scientists as humans is also about deconstructing the elitism surrounding our field and diversifying our interests.

What Next? Workshop Outcomes

Campus Dialogue

At the end of each session, participants brainstormed actions we can take to continue these conversations and make STEM communities more inclusive. These responses were written on posters and hung up in six departments around campus; the goal was to involve the greater community in reshaping our culture, and to hold us accountable for following through with the actions we wrote.

Sticky-notes were glued onto each poster, with an invitation to "Add Your Thoughts." The posters in the Biology and Physics departments had the most responses (Appendix H contains all the comments left on posters). It was also these two posters that featured an ongoing dialogue and a few problematic responses:

- "Stop assuming the system is inherently flawed."
- "anyone can already do science"
- [written directly on the poster, over other comments] "Remove grievance seeking shit like this"

All three of these comments are reactionary and dismissive. However, they demonstrate an important point. As our conversations about inclusion and diversity expand, there will inevitably be push-back. We must be willing to face those who disagree and find ways to bring them into the conversation as well.

When I received an email from WiP and the Physics department about the last comment, my first reaction was excitement. Someone took the time to write that comment, which means they noticed something changing and responded. They engaged with the poster, even if they did not see the importance of having it. This was an opportunity to bring them into the conversation, a teaching moment for everyone on the fence who was not quite sure why these posters suddenly appeared, or what to make of them.

I put up a second poster giving context for the first poster and asking the question: *why do you think this dialogue is important?* I chose to respond with another question to keep the dialogue going and to give voice back to the community. It is easy to focus on negativity; reactionary comments are meant to draw attention. I wanted to show that **there are more people in the community who care about inclusion than people who don't**. I was able to witness this in the workshops. I hope others could see it on these posters.

People noticed. Someone from the Journalism department who was writing an article about campus climate reached out to me to inquire about the posters. A student who knew nothing about the project mentioned that they were excited about

inclusion posters they noticed around campus. For at least a handful of individuals, these posters were a conversation starter. Now it is on us to find ways to continue this conversation.

Impacts on Participants

I did not incorporate an evaluation into the workshops, so most of the feedback I received was from my friends and was probably biased in my favor. However, I did hear about two stories of tangible impacts my workshop had on participants.

1. A group of students from WiP met with faculty to talk about inclusion in their department. After attending the workshops, some of these students felt more prepared to ask challenging questions to the faculty.
2. A member of WiP brought her boyfriend to the workshop. He previously did not attend WiP, because he thought the club was not meant for him. However, after the workshop he started attending meetings because he realized that he can be an ally by participating in conversations about inclusion and diversity.

In both cases, participants walked away with tools to engage in difficult conversations and a sense of responsibility to continue this dialogue.

Conclusion

Critical, real and productive conversations about race and diversity are difficult. So often it becomes about "them" and "us," and places both the blame and the work of changing onto others. It is much harder to make this about us, to challenge ourselves, analyze ourselves and ask ourselves if we are doing enough or if we can be doing more. This work is uncomfortable.

We need to take it upon ourselves to shift the culture we live in. This takes time and patience, because it means reframing what STEM education is about. The most important part of our education is not the content, but the process. We all know that students forget everything they learned at the end of the quarter; so how can we use education to develop as critical human beings who are willing to question and change the world?

We can start by bringing conversations about identity, race and inclusion into our classrooms and our science curriculum. During my focus group with Out in Science, one student said that they feel torn between putting energy into academics and engaging with social justice. **Students should not have to choose between fighting for what they care about and getting good grades.**

Continuing the conversation also means creating opportunities for faculty and students to connect. The most valuable experience I had putting together this workshop was working alongside my faculty mentor and getting to know her as a person as well as a professor and scientist. Students want to know that faculty care, and faculty need to hear how we perceive the spaces they curate.

Scientists excel at making mistakes, so we should not fear engaging in difficult conversations, even if it means getting criticized or challenged. We are not all coming from the same place of understanding, but we cannot become complacent by blaming the people who make disrespectful comments without looking at ourselves. We cannot accept "filling a quota" as an end-goal. We cannot shy away from the conversations that are both difficult and essential.

So, I ask you again. *Why is diversity important?*

Acknowledgements

Appendix A – Focus Group Questions and Notes

A.1 Focus Group Questions

1. Describe in one word what you think the campus climate is like overall.
2. What experiences or types of experience have made you feel marginalized in your STEM classes (or non-STEM classes)?
3. As a witness or bystander, how do you respond to bias (microaggressions) from peers? From faculty?
4. Do you feel like you are able to consciously recognize actions that are motivated from bias towards a marginalized identity (microaggressions) while they are happening? How often? Why or why not?
5. What have you seen peers do has positively contributed to inclusion in STEM? What have you seen peers do that reinforces bias? What would you like to see your peers do differently?
6. What have you seen faculty do has positively contributed to inclusion in STEM? What have you seen faculty do that reinforces bias? What would you like to see your professors do differently?
7. What is your previous experience with anti-oppression, inclusion, justice and equity work? What was the context?
8. In what ways has your STEM education provided more (or less) opportunities to examine these issues?
9. What has your club (or you personally) already been doing to be more inclusive/support diversity? What does your club hope to do in the future?
10. How can the science community at western become more inclusive? What would you like to see Western doing more of as a whole?

A.2 Focus Group Notes

Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)

I attended a weekly SACNAS meeting to introduce myself and my project. It was a relatively small group of individuals, so we held a conversation as a full group. I began with question 2: "What experiences have made you feel marginalized in your STEM (or non-STEM) classes?" After presenting that initial question, little prompting was needed to continue the discussion for almost an hour. Some of the main ideas from our conversation were:

- Experiences:
  - "Easier to be gay than a student of color"
  - "You don't look brown enough"
  - Hard to bridge cultural differences and connect with students/faculty (ex. White faculty don't understand the desire to miss school to visit family when sick)
  - Socioeconomic gap often taken for granted; students talk about "advanced" classes from high school as if everyone had access
  - Afraid of being "whiney and petty" when confronting people who don't know about oppression (especially afraid of this as people of color)
- Areas for Campus/Western to Improve:
  - Increase awareness and accessibility to resources, particularly for minorities (having info in multiple languages; have faculty learn about the STEM clubs as part of their training/professional development)
  - Practice ways to confront microaggressions
  - Want to see equity and inclusion incorporated more into classrooms
- Large-scale changes beyond the scope of my project
  - Create a club hub for the sciences—a physical space where clubs can collaborate, and students can access resources easily
  - Make a required course for all science majors focused on communication, ethics, and social justice in STEM
  - Having a mentor you can identify with helps; increase faculty diversity

Women in Physics (WiP)

The weekly meetings for WiP begin with introductions and an opportunity for everyone present to share a highlight and a low point of their week. I was struck immediately by the strong sense of community and support present in this group—it was evident the people cared a lot for one another. Since this group was larger, we split into three groups with five people each,

and went through a hand-out with questions. We briefly discussed some take-aways at the end; the total discussion took about 20 minutes. Here are some notes taken from the small-group discussions:

- Campus climate was described as: unaware, shallow, hypocritical, complex, divergent, white, outliers, average
- Positives that contribute to an inclusive culture
    - Faculty spending time on inclusion or classroom norms
    - WiP has strong departmental support (funding, faculty attendance) and is well known in department
    - When men stand up for women
- Women in room could all describe times when they felt marginalized; a white man said "I have never felt marginalized"
- Many members had previous experience with inclusion or equity work in college or in their club; only one person who went to a diverse high school did similar work earlier
- WiP was founded with the intention of creating a safe haven
- Students want to hear more experiences from other people and about what departments are doing

Women in Geology (WiG)

For this meeting, I introduced my project and forwarded a link with a survey to the geology department email list. While introducing the workshop, I asked if anyone had attended similar events focused on anti-oppression and inclusion. The room (which appeared mostly white) shook their heads no. I followed up by asking what people would want to learn and got two responses:

- How to confidently recognize when things others say to you are hurtful and how you can respond
- How to identify your own biases and recognize instances where you might unconsciously hurt or exclude others

Association for Women in Computing/Association for Machine Computing (AWC/AMC)

Prior to attending the AWC meeting, I met with the president of the AMC. She recommended that I plan a full-hour long discussion activity and encouraged me to consider a mostly white-male audience while preparing. I began with an introduction of my project, and then had people find a partner and discuss an instance where they either witnessed or experienced discrimination, disrespect, or unfair treatment because of any characteristic they possess. Next, I had participants independently write down answers to the question: *what is the role of CS students (or STEM students) to respond to instances of discrimination or oppression? How do you respond to discrimination or oppression?* Finally, we formed small groups and discussed what circumstances make it easier or more difficult to respond to discrimination. After each activity, I brought the room back together as a whole group and asked for one or two comments on the prompts. I was largely met with silence—the small group discussions were full of conversation, however there was a hesitance to speak up in front of everyone.

Out in Science and Chem Club

I attended a potluck with members from Out in Science, Chem Club and SACNAS. After going around and doing introductions, I gave a brief description of my project and explained that I was gathering student input. While people were eating, I informally went around the room and had conversations with a handful of individuals and learned more about their experiences, perceptions and stories. Some major ideas I took away from those conversations include:

- People want to engage with social justice, but don't have the time. Social justice is not talked about in science classes, so students have to split time between academics and equity or inclusion work
- It is powerful to find your people, people who are like you and are also in science
- Students want faculty to be part of the conversation; faculty play a big role in shaping classroom communities
- General chemistry classes are less inclusive; it is hard to talk to or interact with the people around you regularly
- There is a big difference between non-science and science classes: the atmosphere is less friendly in science, and sometimes feels cliquey or elitist

Survey Responses

I created a survey, primarily as a way for people to provide more thoughts if they did not get a chance to speak during my visits to clubs. There were not many responses, however I noticed some interesting trends. The few examples of

microaggressions offered were about gender. Most respondents have engaged with anti-oppression in the context of clubs and felt they can usually identify bias when it is happening. Overwhelmingly, people felt uncomfortable confronting bias, particularly in instances where the oppression is subtle. This was the topic people wanted to work on most during a workshop. The majority also preferred a workshop co-facilitated by students and faculty and attended by both.

Personal Connections

A theme that I found throughout the many meetings I attended was the importance of community in making people feel welcomed and supported. These clubs are a form of community, but our classrooms, study groups, and departments are communities as well. I reached out to a mentor of mine who has worked a lot in community building and asked for her thoughts on what is needed to build community.

- Ways to build community:
    - Form and create relationships with people as individuals
    - Learn how to navigate conflict
    - Learn the skills to navigate *being* in a community (if you don't have skills to build community)
- Ways to navigate being in community(they exist whether we talk about them or not; values tend to be what the dominant culture tells us to care about)
    - Envision your community: what do you want to create?
    - Acknowledge the values you hold
    - Create situations where people can gather with your values and vision in mind
    - Examine the things your community is already doing—are you supporting or contradicting your values?

B.1 Lesson Plan

Learning Outcomes:
1. Understand your identity and how it influences your biases, perceptions of, and interactions with the scientific community
2. Practice identifying and confronting microaggressions and implicit bias demonstrated in the actions of yourself, your peers, or faculty
3. Explore ways to engage with and build a community that is supportive and inclusive of minorities historically underrepresented in the sciences
4. Establish your role as a scientist in **continuing this dialogue about community, identity and inclusion in STEM**

Resources for this Workshop:
- Scratch paper
- Pencils or pens
- *Cross the Room* Handouts
- Definitions sheet and scenarios
- White board and at least 3 or 4 whiteboard markers
- [Optional] Powerpoint presentation and Projector

Segment Title and Time	Lesson Plan and Instructions	Content and Activities	Facilitation Notes and Rationale
Welcome and Introduction (5 mins)	Introduce facilitators and acknowledge the land we are on. Provide context and rationale for this workshop and introduce statistics from the Diversity and Inclusion Report.	**Introduction** This workshop was developed as an opportunity for STEM students to engage with issues of race, diversity, and inclusion, because we do not often have the opportunity to do so in classrooms. **Land Acknowledgement** We want to start by acknowledging that we are on the stolen land of Lummi and Coast Salish peoples. Please take a few seconds to appreciate what this land gives us and to think about what we can do to give back to the land and the communities that were here before us. **Why do we care about inclusion in STEM? Why does this matter to students?** A Diversity and Inclusion report conducted in 2016 by the College of Science and Engineering highlights that STEM majors at Western continue to be predominantly accessible to white men. Although the number of women and underrepresented minorities has gone up in most majors over the past few years, we must actively work to promote inclusion in our classrooms, labs, and campus community so that all people feel welcome and like they belong in STEM.	Giving rationale for why we designed this workshop helps frame the conversation, placing this workshop into a school-wide or societal context. Statistics are also a good way to demonstrate the importance of talking about race, gender, identity, and privilege in science.
Bonding Activity (5 min)	Have participants find someone they don't know. Rotate 3+ times, giving around one	**Meet-and-Greet Activity** Stand up (if able) and find someone you don't know. Ask about the following: - Name - Major/minor/intended field of study - Club or science community you belong to	Icebreakers are a great way to prime people for discussion with strangers.

| | minute with each partner.

Come back together as a group and go through the debrief statements. | • Your role model in STEM

Role Models and Representation
Thinking about who your role model in STEM is, raise your hand if:
• Your role model is a woman
• Your role model is a person of color
• You considered the **identity** of your role model before these questions or when choosing them | The debrief activity is meant to show that regardless of if we consciously think about identity in science, we tend to choose role models who reflect the identities we hold. |
|---|---|---|---|
| Transition: My hope is that you all will be better equipped to critically examine how the science community contributes to and perpetuates biases against minorities historically excluded from or underrepresented in the sciences, and that you will leave this workshop with an action and a new friend. | | | |
| Learning Outcomes and Ground Rules (5 min) | Read through learning outcomes.

Read ground rules out loud, then ask group for additional rules (up to 3 more). Ask participants for a thumbs-up if they can agree. | **Learning Outcomes**
There won't be time to fully explore all these outcomes, and we don't expect everyone to meet all these outcomes. Our hope is that you challenge your understanding of the status quo and think critically about inequality in STEM, and we ask that you all be okay with leaving the workshop with questions **with the intention of continuing this conversation later.**
1. Understand your identity and how it influences your biases, perceptions of, and interactions with the scientific community
2. Practice identifying and confronting microaggressions and implicit bias demonstrated in the actions of yourself, your peers, or faculty
3. Explore ways to engage with and build a community that is supportive and inclusive of minorities historically underrepresented in the sciences
4. Establish your role as a scientist in <u>continuing this dialogue about community, identity and inclusion in STEM</u>

Ground Rules
• Respect the boundaries of yourself and others: *lean into discomfort but know your limits and don't push yourself or others into the danger zone.*
• Trust intentions while acknowledging impacts
• Ouch/Oops: *if you say something wrong, apologize. If something hurts, say so! We all make mistakes, and we can acknowledge them and help each other grow*
• Step up, step back: *speak from your own experience, be aware of how much space you take up in the room* | We are starting with identity because we need an awareness of ourselves before we can think about others in our communities.

We will do a little bit of responding to oppression, knowing that this is an action that requires continual practice.

Establishing ground rules sets a precedent for how we expect participants to engage with conversation while in this workshop. |
| Transition: We cannot begin to engage with others' identities unless we can understand and articulate our own identity. The STEM community has traditionally had a difficult time having conversations about identity and diversity because as scientists we are acculturated to believe that we hold an objective perspective. The idea of having a "purely objective perspective" whitewashes the role of race in our STEM culture and overlooks the fact that identity for many is a barrier in science. So we want to start by thinking a little bit about how your identity has impacted your participation in science. | | | |
| Identity (25 mins) | Hand out scratch paper/pens. Have participants independently | **Self-Reflection on Identity in STEM**
On a piece of scratch paper, take a few minutes to write down a response to the following question. | Self-reflections are a safe and non-committing way to begin exploring |

	write for a few minutes, then discuss with someone next to them. Invite 2-3 people to share to whole room. Distribute *Cross the Room* Handouts. Recollect and shuffle them before redistributing. Have participants stand in a circle and read each statement aloud one-by-one. Go through debrief questions in small groups. Invite small groups to share out from their discussions.	*How has your identity shaped your experience in STEM or your perception of the sciences?* You can consider identities such as gender, race, class, sexuality, religion, ability, etc. in your response. **Activity: *Cross the Room*** Take a few minutes to fill out the *Cross the Room* Handouts. Do not write your name on them, they will be shuffled and anonymously redistributed. Each statement will be read aloud. If there is a check-mark next to the statement on the sheet you have, step in to the circle for a few seconds. This is a silent activity, but I encourage you to think about what you notice about this particular group's identity and privilege. **Follow-up Questions for Debrief:** What did you notice? What was surprising or not surprising? Did any of the statements make you aware of a privilege that you have or don't have in the sciences?	identity. This is an opportunity to assess where everyone in the room is at, and to challenge them to think about how their identities impact the way they participate in STEM communities. The *Cross the Room* or *Step-in, Step-out* activity is intended to get participants thinking about the kinds of privilege/oppression that occurs on a systemic level, and to start noticing patterns of oppression that people in the sciences experience.

Transition: Science is undeniably more accessible to some than others. However, by acknowledging our privilege we can work to dismantle systems that prevent minorities from succeeding and feeling comfortable studying/working in STEM fields. We are going to turn now to looking at some scenarios which highlight ways that privilege and identity can lead to oppression in the STEM community.

Confronting Bias (35 mins)	Divide room into groups of 4-6 people. Give each group a definitions sheet and a scenario (recommend using only 2-3 scenarios per workshop—duplicates are okay).
	
	Spend 10-15 minutes discussing in small groups, then remind people to come up with a sentence or two.
	
	Come together and discuss each
		Activity: Confronting Bias
		These scenarios are based on real experiences of students. Some people might relate to them more than others, so consider the identity you hold as you approach discussing these situations. We will also provide you a definitions sheet with terms for some of the components at work in these scenarios. This resource is meant equip you with a vocabulary to approach challenging situations that you might encounter or experience. Confronting bias takes practice, and the goal of this activity is to build our skills at starting difficult conversations.
		
		Instructions:
		In your groups, assign one person to report back to the room (they might want to take notes). Read your scenario and then use the following questions to guide your discussion about the scenario:
		1. What is problematic about this situation?
		  • What biases do you notice?
		  • What identities are involved? Who has power?
		2. What are your intentions for responding?
			Confronting bias is not an easy thing, but it is a skill that we can practice. Taking the time to go through scenarios and dissect them helps us build an awareness of our own biases and the biases of others and build a vocabulary to express and discuss oppressive behaviors.
			
			Writing down specific sentences makes the situations more real and gives us a place to start/something to refer to if we do actual encounter situations like this.

	scenario, making sure each group shares their conversation starters.	• What are some risks of speaking up? What are some risks of *not* speaking up?
		• What is an ideal outcome for the parties involved?
		3. Come up with a potential response
		  • How would you respond as the person directly impacted? As a bystander?
		  • Would you respond immediately, or discuss it later?
		  • What tone or attitude could you employ? Humor? Professionalism?
		<u>Write down at least one sentence that you could say to start a conversation.</u>
		
		Examples:
		"Could you explain what you mean by…?"
		"I noticed you made a generalization about…"	

Transition: Take a minute now to think about yourself and your own level of comfort in responding in scenarios like these. One of the most important parts of confronting bias is to reflect on our actions and to give ourselves the time to continue the dialogue later. Another important part is to find others to talk about it with. It is easy to feel alone in these situations, but we can establish a support system in our communities and continue learning together.		
BREAK (5-10 min)		
Community (15 min)	[optional: give instructions before break] Divide the whiteboard into two sides: "Inclusive" and "Exclusive." Have participants use whiteboard pens to silently write responses to the *chalk-talk* prompt. Give 5-8 minutes to record their ideas. Lead a short debrief highlighting major trends or things you notice. Can invite participants to share their thoughts as well.	**What does community look like?** Community is all around us, in our clubs, networks, friend groups, study groups, classrooms, labs, group projects—cells are also like communities: a group of unique individuals working towards a common goal. Community means different things to different people; some people might seek out spaces where they feel challenged academically, whereas others might find communities that value humor. **Activity: Community Values *Chalk-Talk*** Our communities have and express different values, and when we aren't intentional about how we engage with community they tend to default to what is around us. Thinking specifically about the values intentionally or unintentionally expressed in the science community, write words or phrases on the whiteboards answering the prompt below. You can also comment on other people's responses or show support with smiley faces/check marks. *What aspects of the science community **promote inclusion and support** between peers, and what aspects are **detrimental or exclusive**?* **Examples:** Inclusive – encouraging group work in classrooms Exclusive – classes graded entirely from tests	We don't often talk about what our communities prioritize. In some situations, it is obvious—Women in Physics values gender equity and promoting women in STEM. But what do our study groups value? Is inclusion something we care about? The goal of this activity is to challenge participants to think critically about their own communities and recognize the impact a community can have on shaping our experiences.
What Next? (20 min)	Independently write at least one	**What next?**	Action statements keep us accountable

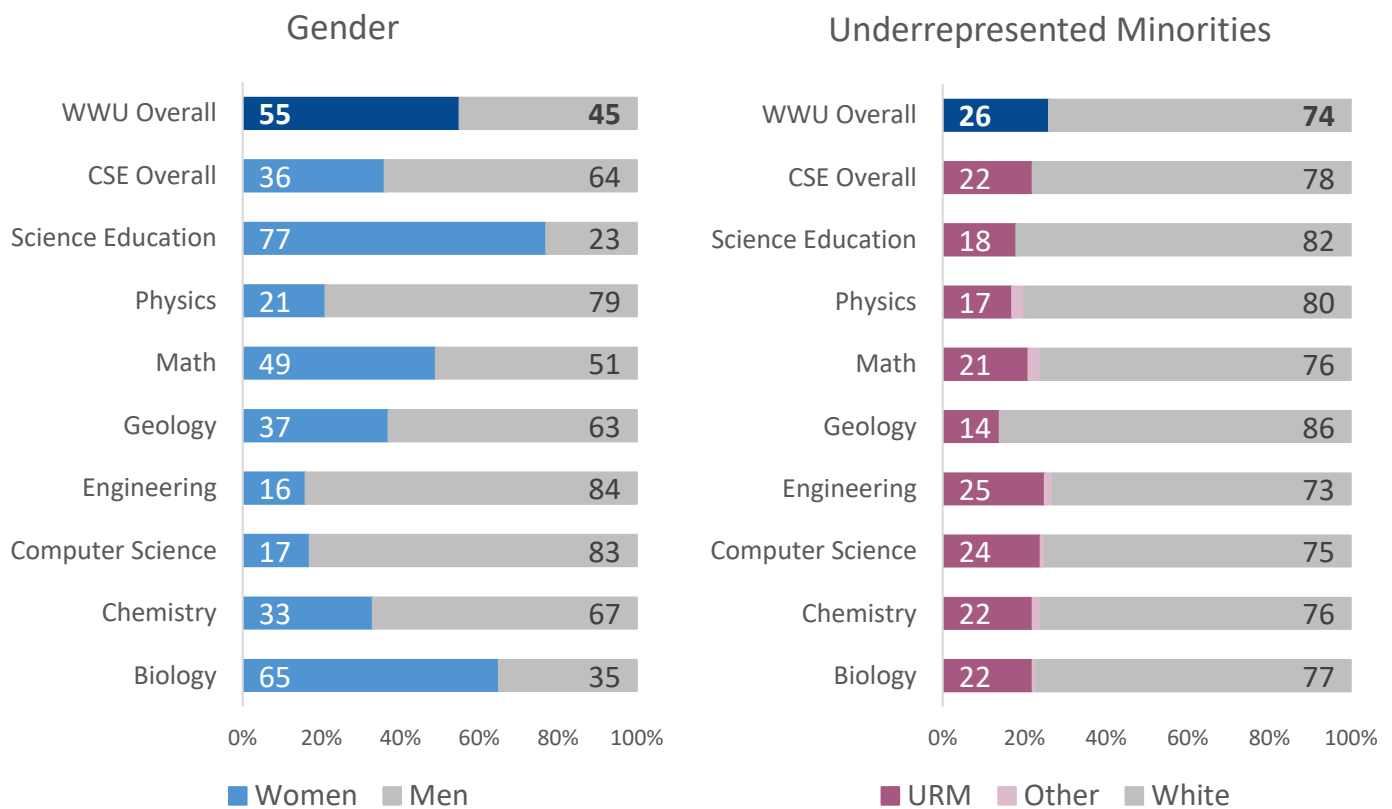| | action you will take to make the science community more inclusive. Then talk in small groups about your action(s). Each group can write one or two responses on the posters. | Now take a minute to think about one action you can do to make the science community more inclusive. Think about a value from the previous activity that you want to continue to express or that you want to challenge. These responses will be written on posters that are going to be hung up in STEM departments around campus. If you are struggling to think of something specific, think about your communities, study groups, etc. and what you can do on a small scale. There are no right answers.

WHAT DO YOU THINK IS THE NEXT STEP TOWARDS MAKING STEM COMMUNITIES MORE INCLUSIVE? | for doing something, not just talking. Writing responses on a poster visible to the greater campus allows others to see the conversation from this workshop and provides an opportunity for others to participate in the dialogue. |

B.2 Diversity and Inclusion Report

Figure B2. Visual representations of the ratios of gender and underrepresented minorities in CSE departments, compared to Western Washington University overall.

Any information you provide will be completely anonymous. Participate only as much as you feel comfortable.

Please put a check mark in each box that pertains to you

☐ Did your elementary or middle school have a science fair?

☐ Did you have teachers or parents growing up who encouraged you to pursue STEM?

☐ Did your high school offer AP classes or Running Start?

☐ Did you grow up in a single parent home?

☐ Do you worry about affording lab materials and textbooks?

☐ Do you have a role model in STEM that you look up to or identify with?

☐ Do you feel supported by faculty or by your department at Western?

☐ Do you feel comfortable attending the office hours of STEM faculty at Western?

☐ Have you felt excluded or uncomfortable in science classrooms at Western because of an identity you possess?

☐ Have you ever been the only person in your class or lab of your race, gender or sexual identity/orientation?

☐ Have you ever been talked over or cut off in class while explaining something?

☐ Do you feel like your voice and opinions are *not* valued in classes, group projects or study groups?

☐ Are you ever concerned that your performance in class or lab will be perceived as representative of an entire group of people?

☐ Are you ever concerned people will associate your everyday behaviors and/or small missteps (e.g., arrive late to a meeting, misspell a few words in a written document) with negative attitudes about your race?

☐ Are you ever asked to speak for or on behalf of other members of your racial group?

☐ Are you often mistaken for another person on campus of your same race?

☐ Do you find it difficult to arrange being in the company of people of your race most of the time?

☐ Have you been called slurs related to your race, ethnicity, sexual orientation, gender identity, or disability?

☐ Do you often receive comments on your appearance when you are at a conference or during a presentation?

☐ Have you ever had your authority on a subject questioned because of your age, gender, race or sexual orientation?

☐ Have people often expressed surprise or doubt you when you say that you are studying or have a career in STEM?

☐ Do you feel like you can fully be yourself when you are in the role of scientist?

☐ Can you imagine yourself in a science career?

☐ Do you believe the science community is inclusive?

Racism

A *system* that encompasses economic, political, social, and cultural structures, actions, and beliefs that *institutionalize* and *perpetuate* an unequal distribution of privileges, resources, and power between White people and people of color. This system is historic, normalized, taken for granted, deeply embedded, and works to the benefit of whites and to the disadvantage of people of color.

Discrimination

Treating an individual or group unfairly based on a characteristic or identity they possess.

Oppression

A *system* of policies, practices, norms, and traditions that exploit one social group for the benefit of the group in power; can operates intentionally and unintentionally on an individual, institutional, and cultural level.

Implicit Bias

The attitudes or stereotypes that affect our decisions and behavior in an unconscious manner; they encompass both favorable and unfavorable assessments of individuals and are activated involuntarily.

Microaggression

Everyday verbal, nonverbal, and environmental slights, snubs or insults (whether intentional or unintentional) which communicate hostile, derogatory or negative messages to target persons based solely upon their marginalized group membership.

Equity

Fairness or justice in the way people are treated; balancing power by giving people what they need rather than treating everyone the same (equality).

Intersectionality

The complex, cumulative way that multiple forms of discrimination (such as racism, sexism, and classism) can combine, overlap, or intersect especially in the experiences of marginalized individuals or groups.

Scenario 1:
X is attending a lunch with a prospective faculty for the department. In the event description, the department encouraged the students attending to question candidates about how they will support student needs and promote diversity, inclusion, mentoring and advocacy. X quickly realizes that the students asking most of the questions are predominantly white, and that they are not asking any questions about diversity. When X attempts to steer the conversation towards topics related to inclusion, the conversation is quickly side-tracked by the other students in the room.

Scenario 2:
Y has been studying Organic Chemistry with the same group for the past two quarters. His study group typically does very well, and some of the members frequently get top scores in the class. This quarter, a group of Asian students consistently score better than Y's study group. During one of their study sessions, someone in the group comments that the Asians in their class "must be cheating on their tests." Y is also Asian, and when he looks uncomfortable, his friend adds, "not you though, Y. You wouldn't cheat!"

Scenario 3:
A is a minority in their department. They are planning an event specifically for minorities in their field. B and his friends are not part of underrepresented identities in the field and are upset that this event is happening. They feel that everyone should be invited. When A points out that many spaces in the field don't feel welcome for them, B says "well at least we don't explicitly exclude you!"

Scenario 4:
M is applying for STEM internships for next year. She is talking with her friend about applying and they say, "You'll definitely get that program, since you're a brown girl."

Scenario 5:
For their capstone course, CS students are working in a team to create an app for a client of their choice. They decide to split up the work and the group suggests that the one woman in the group take the role of communicating with the client and promoting the app.

Appendix E – Identity Self-Reflection Responses

Individual responses to the question **"How has your identity shaped your experience in STEM?"** were collected from the workshops. I categorized responses based on the types of identities mentioned (gender, race, sexuality, etc.) and the depth of awareness participants demonstrated when engaging with their own identity and the identities of others. Many responses mentioned multiple types of identities. However, I split the responses into four levels of awareness, although some fit between or in multiple categories. This appendix contains some phrases and sentences from each response that were used as indicators for identity-consciousness, as well as a more detailed breakdown of the responses and types.

Levels of Identity Consciousness:
1. Did not consider their identity prior to the workshop (or until recently) and/or is able to **ignore** or not think about their identity on a regular basis
2. **Recognizes** and **acknowledges** their own identity, privilege or biases; notices discrimination or oppression but does not address how it affects their experience, thoughts or actions
3. **Understands the impact** identity has on their own experience, thoughts and actions or the experiences of those in their communities; can describe ways their identity has **changed their behaviors**
4. Can identify historical **systems of oppression** at work and demonstrates motivation to consciously challenge the social status quo; able to **connect** their identity to how they can shape the community

Types of Identities:
A. Gender
B. Race
C. Religion, spirituality
D. Sexuality
E. Class, family, socioeconomic status

Table E1. The types of identities referenced by responses in each level of identity consciousness.

Levels of Awareness	Types of Identities					Total
	Gender	Race	Religion	Sexuality	Class/Family	
1	2	2	-	-	1	4
2	5	4	-	1	3	7
3	8	2	2	-	4	9
4	4	2	-	2	1	4
Total	19	10	2	3	9	24

Phrases and Sentences from Responses:

Level 1: Ignore

"don't have to worry much [going into a STEM field]"

"the privilege of having never had to think about [identity]"

"have had about as few barriers as possible"

Level 2: Acknowledge

"my identity generally benefits me"

"my identity as a Russian white male has made people *expect* that I am good at math and physics"

"being a white male, I notice when other people ask me questions about CS they automatically trust my advice more than someone else's"

"experienced a lot of sexism"

"many opportunities"

"lucky to come from middle class family"

Level 3: Understand

"I have often felt out of place, but that just makes me want to do better."

"female in STEM – made me feel like I need to try especially hard to be noticed"

"difficult to find support while in school"

"by making me more **self-aware**"

"constantly proving self/conscious of my voice and having to interact differently to achieve same results"

"my identity as a religious person has also shaped my experience because I'm afraid if my peers in STEM know, they will think I am hypocritical"

"imposter syndrome as a female"

"pressure to be more male"

Level 4: Connect

"moving into a field of study where there are few women feels at first like a disadvantage, but can be a huge advantage for the young women I encounter in the future"

"[identity as a woman] makes me more prepared to defend others and help foster an inclusive environment"

"want to change social norms not just for myself, but for those to come."

"mythologizing Asian Americans, 'model minority'"

Appendix F – *Cross the Room* Responses

Table F1. The percentage of participants that answered yes to each *Cross the Room* activity question during the workshop sessions.

	Total Responses: 58	Session 1: 38	Session 2: 20
Did your elementary or middle school have a science fair?	66 %	66 %	65 %
Did you have teachers or parents growing up who encouraged you to pursue STEM?	86 %	89 %	80 %
Did your high school offer AP classes or Running Start?	95 %	92 %	100 %
Did you grow up in a single parent home?	26 %	29 %	20 %
Do you worry about affording lab materials and textbooks?	33 %	32 %	35 %
Do you have a role model in STEM that you look up to or identify with?	60 %	45 %	90 %
Do you feel supported by faculty or by your department at Western?	83 %	84 %	80 %
Do you feel comfortable attending the office hours of STEM faculty at Western?	74 %	74 %	75 %
Have you felt excluded or uncomfortable in science classrooms at Western because of an identity you possess?	40 %	39 %	40 %
Have you ever been the only person in your class or lab of your race, gender or sexual identity/orientation?	35 %	32 %	40 %
Have you ever been talked over or cut off in class while explaining something?	59 %	61 %	55 %
Do you feel like your voice and opinions are not valued in classes, group projects or study groups?	26 %	26 %	25 %
Are you ever concerned that your performance in class or lab will be perceived as representative of an entire group of people?	48 %	47 %	50 %
Are you ever concerned people will associate your everyday behaviors and/or small missteps (e.g., arrive late to a meeting, misspell a few words in a written document) with negative attitudes about your race?	21 %	18 %	25 %
Are you ever asked to speak for or on behalf of other members of your racial group?	19 %	16 %	25 %
Are you often mistaken for another person on campus of your same race?	28 %	29 %	25 %
Do you find it difficult to arrange being in the company of people of your race most of the time?	16 %	11 %	25 %
Have you been called slurs related to your race, ethnicity, sexual orientation, gender identity, or disability?	38 %	39 %	35 %
Do you often receive comments on your appearance when you are at a conference or during a presentation?	31 %	26 %	40 %
Have you ever had your authority on a subject questioned because of your age, gender, race or sexual orientation?	62 %	58 %	70 %
Have people often expressed surprise or doubt you when you say that you are studying or have a career in STEM?	50 %	58 %	35 %
Do you feel like you can fully be yourself when you are in the role of scientist?	40 %	47 %	25 %
Can you imagine yourself in a science career?	86 %	89 %	80 %
Do you believe the science community is inclusive?	17 %	24 %	5 %

Appendix G – Community Values *Chalk-Talk* Responses

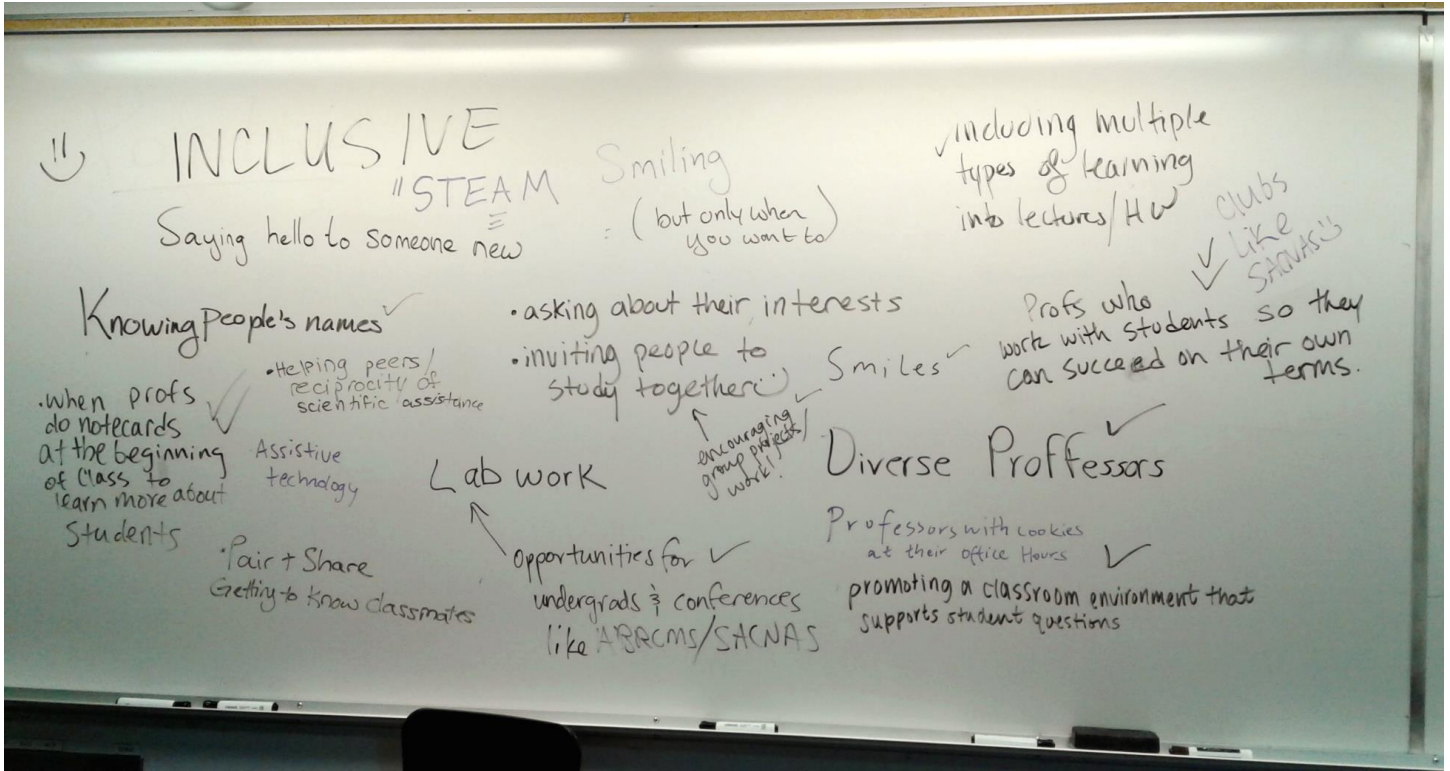Exclusive Values
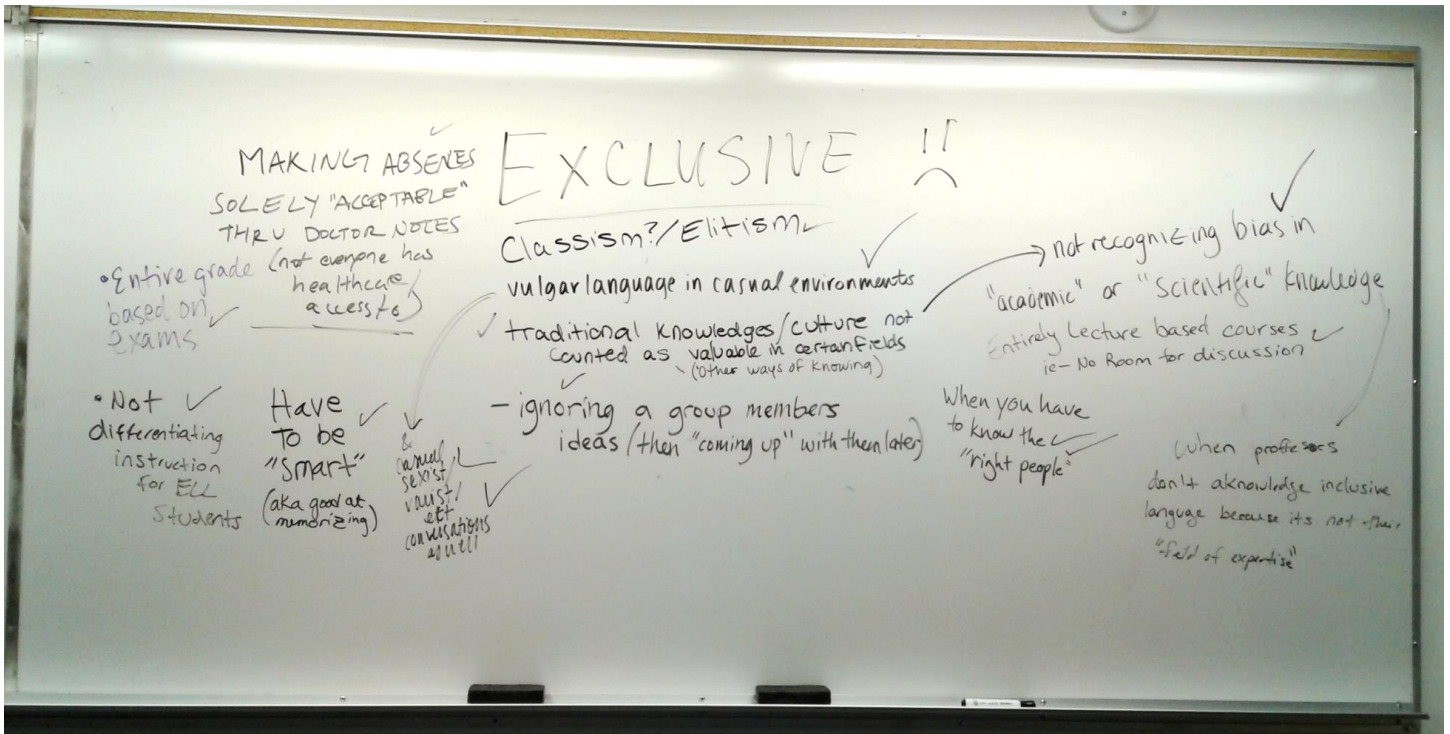
Inclusive Values

Figure G1. Images of the *Chalk-Talk* responses from workshop session 2 answering question: *What aspects of the science community **promote inclusion and support** between peers, and what aspects are **detrimental or exclusive**?*
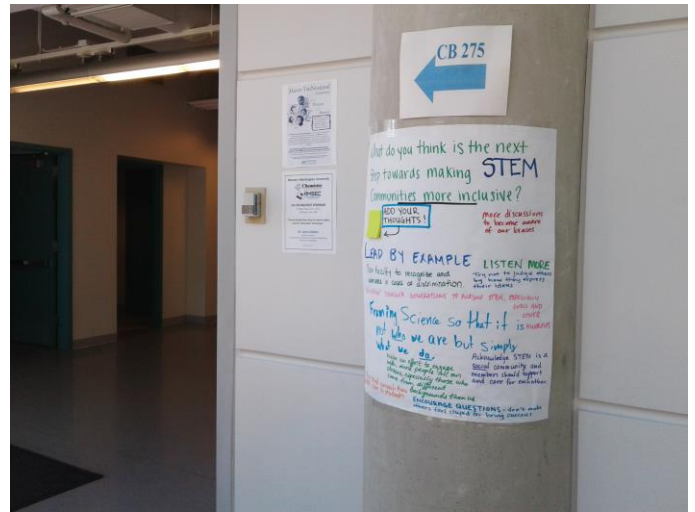
Appendix H – Workshop Posters and Responses
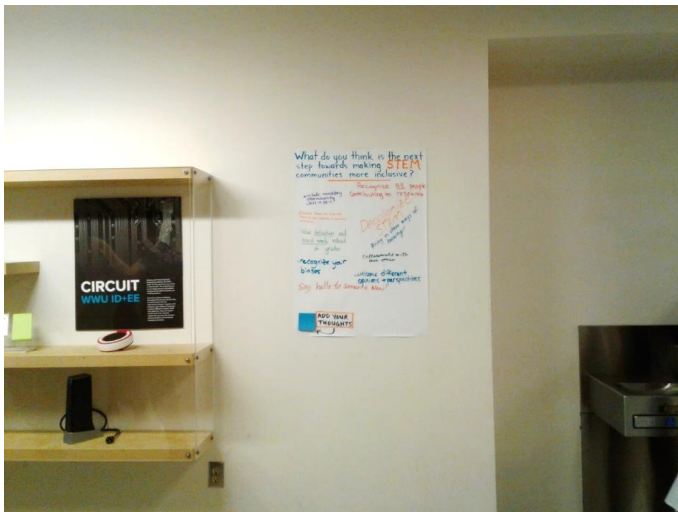
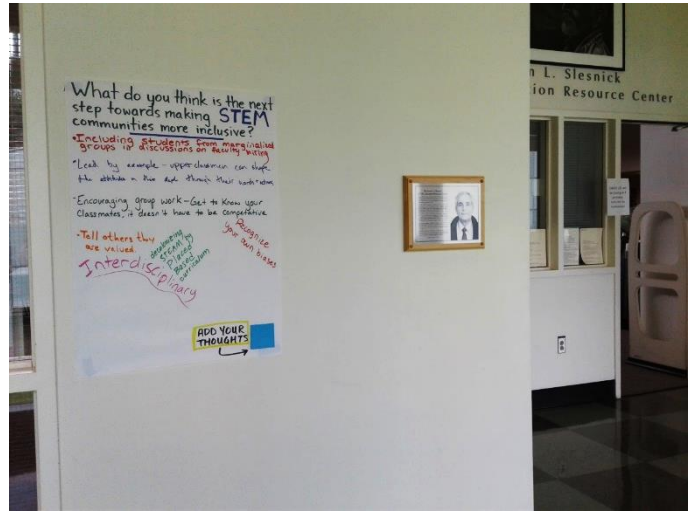## H.1 Poster Locations

Biology Building (1st Floor)

Chemistry Building (South Entrance)

Engineering Building (3rd Floor)

SMATE Library

Math Department

Physics Department

Figure H1. Images of workshop posters located around campus. Posters in Biology, Chemistry, and Math were put up on May 11th. Posters in Engineering, SMATE and Physics were put up May 18th. All posters were left up until June 8th.

Chemistry: 3 responses

- "Denounce and punish organizations and people who exclude women and people of color"
- "Diversify your interests and encourage STEM ideas in other communities"
- "Hold faculty accountable"

Engineering: 3 responses

- "Be friendly"
- "Never make assumptions in regards to people"
- "Do service work. Service work creates unity."

Math: 1 response

- "Redefine what it looks like to be a scientist"

SMATE: 1 response

- "Don't be a know it all or share test scores"

Biology: 6 responses

- "Address harassment women face in STEM and DO something about it."
- "Make it more accessible to POC and others"
- "In STEM classes TALK about inclusion for 1 day! At least! I'm in my 2nd year and have never heard any proof talk about the importance of inclusion."
- "Recognize that science is part of western culture/recognize alternative, particularly indigenous ontologies"
- "Stop assuming the system is inherently flawed."
- "And make the STEM community safe for them [girls/minorities]!! #WesternsBrandingDoesntDeliver #SafetyandDiversityarenotyourstrongpoint"

Figure H2.1. Image of the poster in the Biology Department with comments. Photo was taken at the end of the quarter.

Physics: 18 responses

- "anyone can already do science"
- "people need to get over their anxiety with dealing with members of minorities and especially women. Many women experience sexualized experiences with their collegues (or fellow students) that creates a sexist and sexualized environment"
- [in response to "value hard work instead of grades"] "Why? STEM trades are usually quite results-oriented. Aren't the grades you get the closest proxy to skill?"
  - "Skill develops over time: a grade is a fixed assessment that does not reflect potential for future growth"
  - "The demands of STEM education ≠ demands of working in STEM. You can be a bad student but a fantastic programmer, for example."
  - "Grades often do not reflect ability, rather they reward memorization of content"
- [written on poster, over other comments] "Remove grievance seeking shit like this"
  - "Actually, that would make it less inclusive. Read the question and at least find somewhere relevant to flame people."
  - "Ignore people who are inflammatory like this"
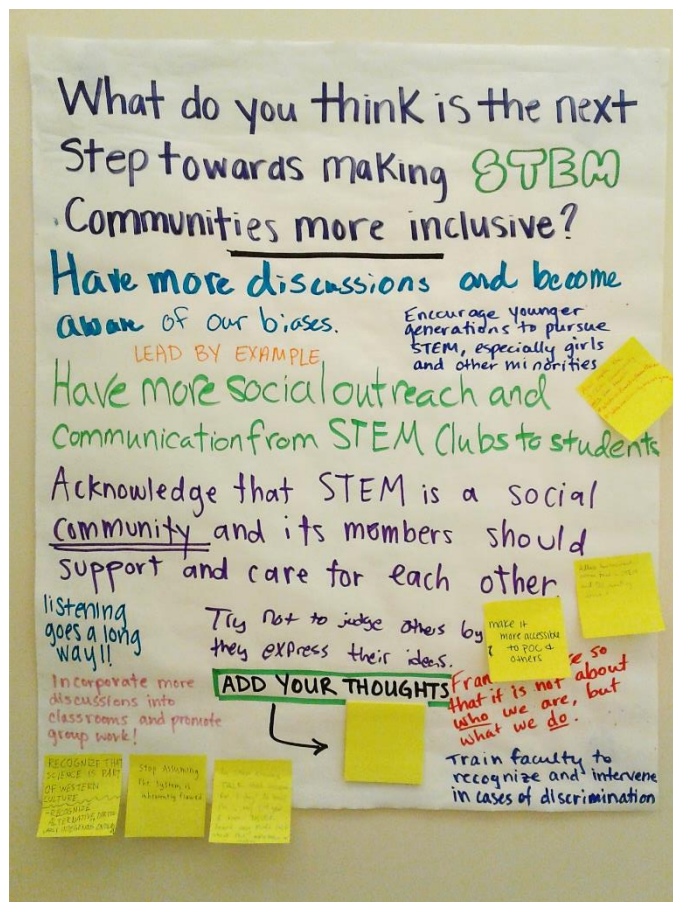- "Focus on growth and have teachers who accept their curriculum is why people aren't succeeding"

- "Focus more on projects rather than memory based, timed exams. It unfairly targets those of us with learning disabilities who do just fine in the real world"
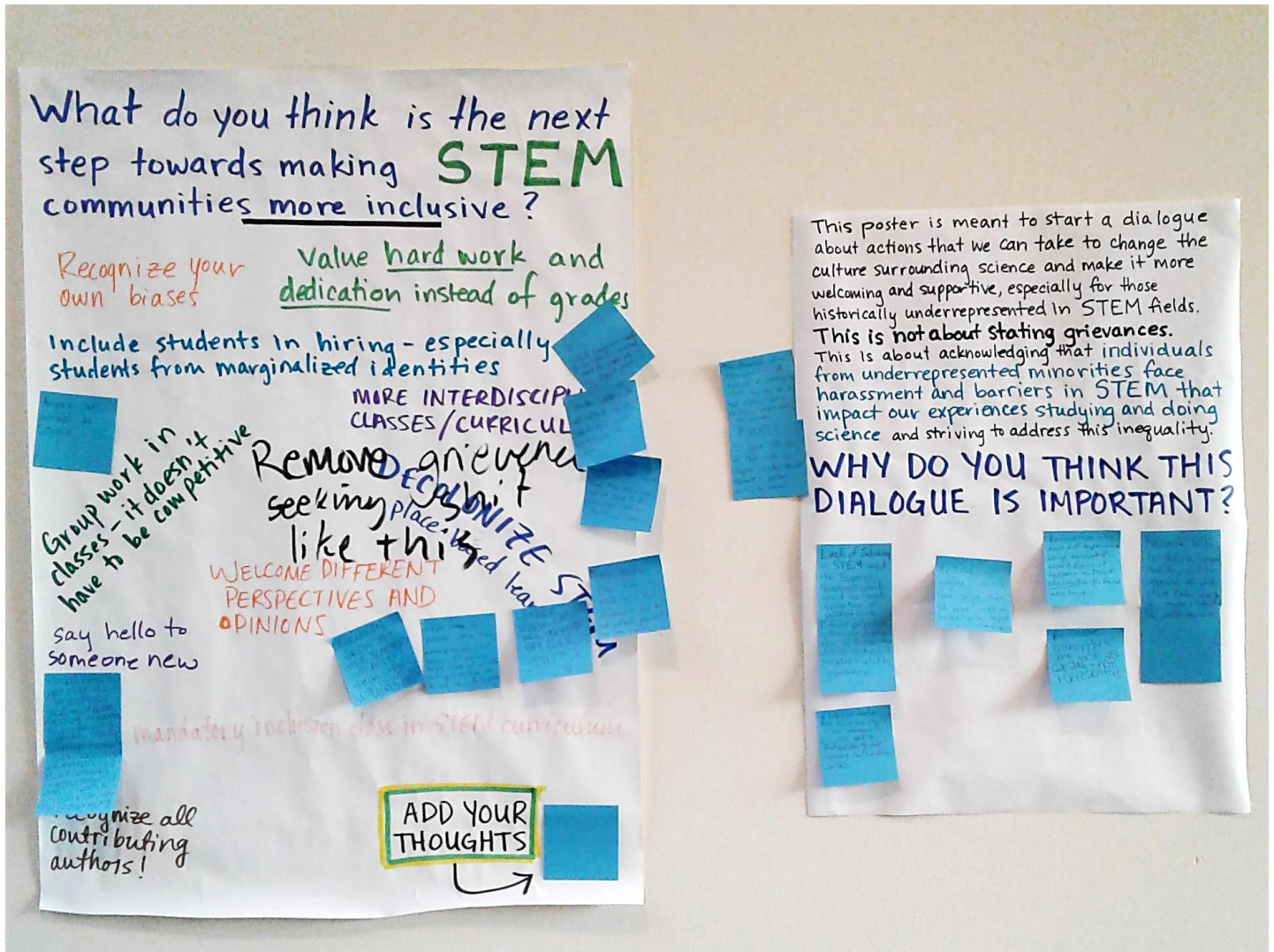

Figure H2.2. Image of the posters outside the Physics department. The poster on the left was added a week after the first, in response to the comment written in black ink across the middle. Photo was taken at the end of the quarter.

[in response to new poster, "Why do you think this dialogue is important?"]

- "Lack of inclusion in STEM created the Eugenics Movement. Which caused the forced sterilization of 60,000+ people. Different perspectives within conversations allow us to overcome obstacles and avoid tragedies fueled by ignorance."
- "Because not everyone is on the same page that all people should be treated with respect and integrity."
- "It helps us realize that there are people in our community who care and to find solidarity and support for hardships we face."
- "Because failing to discuss ignores reality, which is opposite of what STEM fields aim to do – observe and understand the world around us."
- "Because minorities are just as capable and not represented"
- "Because those who have not experienced being excluded won't know it happens without dialogue with those who have"