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From the Achievement Gap to the Opportunity Gap: Increasing Accountability Among Faculty and Staff in STEM through an Inclusion and Social Mindfulness Intervention

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From the Achievement Gap to the Opportunity Gap: Increasing Accountability Among Faculty and Staff in STEM through an Inclusion and Social Mindfulness Intervention

By

Kayla Christiani

Accepted in Partial Completion
of the Requirements for the Degree
Master of Science

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Master's Thesis

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Kayla Christiani

August 6, 2021

From the Achievement Gap to the Opportunity Gap: Increasing Accountability Among Faculty and Staff in STEM through an Inclusion and Social Mindfulness Intervention

A Thesis
Presented to
The Faculty of
Western Washington University

In Partial Fulfillment
Of the Requirements for the Degree
Master of Science

by
Kayla Christiani
August 2021

Abstract

Racial disparities in graduation rates and academic performance measurements have long existed in higher education (Bowen et al., 2009) and are even more pronounced in STEM fields (Riegle-Crumb et al., 2019). Some researchers argue that students of color are experiencing a gap in opportunity due to racial hostility and exclusion both on campus and in the classroom, and interventions should focus on changing the negative environment students of color are exposed to at colleges and universities (Johnson-Ahorlu, 2012). Faculty members at Western Washington University (WWU) developed the Inclusion and Social Mindfulness in STEM (ISMs) workshop series in an effort to improve faculty and staff's understanding of equity and inclusion issues at WWU and adjust their behavior accordingly based on an acknowledgement of their own biases. Faculty and staff in the college of science and engineering were invited to participate in the ISMs workshop series that focused on cultural awareness of self, experiences of others, critical conversations in the workplace, and a call to action in the workplace. Sixty-six participants completed the pre-workshop series survey and 54 participants completed the post-workshop series survey over the three years that ISMs workshops were available. At post workshop, participants had better vocabulary around issues of equity and inclusion and higher levels of critical thinking about the way they behave and react to situations on campus. However, we found very little changes in participants' behavior and believe modifications to the ISMs workshops are necessary to improve outcomes for students of color at WWU.

Keywords: Opportunity Gap, Equity, Inclusion, Higher Education, Workshop, Faculty, Intervention, Racial Disparities

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Introduction

In the United States, White students at four-year colleges and universities are significantly more likely (63.2%) to graduate within six years than their Hispanic (53.5%), Native (41.0%), and Black (40.9%) peers (Nicholas & Evans-Bell, 2017). Even among those who do graduate, racial disparities persist in the form of academic performance measurements, such as class rank and grade point average (Bowen et al., 2009). These disparities, often called the racial achievement gap, are most prominent at predominantly White institutions (PWI's). PWI's, which have a 50% or greater enrollment of White students, often have environments that feel hostile and isolating for students of color (Apprey et al., 2014).

This gap is exacerbated in science, technology, engineering, and mathematics (STEM) disciplines, where Black and Latinx students are more likely than their White peers to switch majors or leave college without a degree (Riegle-Crumb et al., 2019). Unlike in other disciplines such as business, humanities, and social science, this trend occurs in STEM even when statistically controlling for family background and academic preparation. The underrepresentation of marginalized students within STEM is especially troubling when considering the economic implications post-graduation. Specifically, the lifetime earnings of graduates with STEM bachelor degrees are significantly higher than those with degrees in arts/humanities or social science, and are even slightly higher than those with degrees in business (Webber, 2014). Researchers have suggested that a variety of social, economic, and psychological factors are responsible for the racial inequities in higher education (Harackiewicz et al., 2016). Critical race theory suggests that these racial inequities are driven by racism and stereotypes (Johnson-Ahorlu, 2012). As such, a multitude of different interventions have been

developed in efforts to reduce the racial gaps that are fundamentally built into the current higher education system.

Why Racial Gaps Exist in Higher Education

Researchers have explored an abundance of possible reasons for the ever-persistent racial “achievement” gap (see Martin et al., 2017 for a review). Looking specifically at higher education, Bowen and Bok (1998) suggested that pre-college preparation, dis-identification in academics, negative stereotyping, and racial mistrust may all play a role in the college achievement gap. Others have highlighted poverty, quality of schools, economic resources, academic preparation, academic engagement, stigmatization, and belongingness as major factors (Harackiewicz et al., 2016). Although the list of possible influences is quite extensive, these factors tend to fall into three major categories: pre-college background/academic preparation, within-college capital, and social engagement/campus climate.

Pre-college Background/Academic Preparation

Pre-college background and academic preparation refer to family background and high school experiences (Lareau, 2011), which highlight the role of economic resources. Although low economic resources are likely to inhibit the academic performance of students of all racial-ethnic backgrounds, low resources have a particularly negative effect on Black and Latinx students, who are more likely to grow up in lower income neighborhoods and attend high schools that have less experienced teachers than their White and Asian peers (Massey et al., 2003). Moreover, Black and Latinx students are less likely to take advanced placement courses in math and science (Kelly, 2009), which would not only improve the chances of college admission, but also could allow them to complete some college graduation requirements ahead of time. Pre-

college factors may account for more than half of the gap in college GPA (Espenshade & Radford, 2009).

Within-college Capital

Within-college capital refers to various personal skills, dispositions, and other psychosocial dynamics that influence academic performance, such as self-esteem, academic self-confidence, salience of student identity, and academic effort (Martin et al., 2017). Many studies have found positive associations between these different forms of within-college capital and GPA, especially during the first two years of college (Charles et al., 2009). Further, one study found that Black and Latinx students were more likely to switch majors early on and were more likely to report they did so because of academic challenges (Martin et al., 2017), suggesting that within-college capital has implications beyond just performance.

Social Engagement/Campus Climate

A vast amount of research suggests that student engagement on campus is strongly associated with not only GPA, but also degree completion and satisfaction with college (Kuh et al., 2007). However, the climate students are exposed to on campus can largely influence levels of engagement. Institutions that are perceived as inclusive and supportive report enhanced levels of engagement for Black and Latinx students (Kuh, 2001). These campuses provide opportunities for collaborative learning and include access to culturally-relevant activities. Unfortunately, it is all too common for universities to have campus activities that cater primarily to White middle and upper-class students and to have classrooms that are perceived as exclusive (Martin et al., 2017). Students who experience discrimination or stereotyping from other students, faculty, and/or administration, or who perceive racial tension/conflict in the classroom report a lower sense of belonging, doubts about academic ability, limited interactions with peers and

participation in learning activities, and increased psychological distress (Hurtado et al., 1999). Some researchers have found these negative outcomes are linked to lower GPA (Hurtado et al., 1990), while others did not find evidence of this but instead found associations with lower levels of degree completion and college satisfaction (Charles et al., 2009). Nevertheless, racial disparities in both graduation rate and academic performance need to be addressed for students of color to have access to the same opportunities as their White peers, both during college and afterwards.

Student-Focused Interventions

Many different types of interventions targeting students of color have been developed in efforts to counteract the factors that are theorized to be responsible for the racial achievement gap. Brief psychological interventions tend to focus on single psychological factors, whereas comprehensive programs use a holistic approach in their plans to create racial equity in education and beyond.

Brief Psychological Interventions

Brief psychological interventions are effective and powerful because they are psychologically precise, focus on a specific problem, and occur at critical time points yet tend to improve outcomes over long periods of time (Walton, 2014). These interventions work to improve academic achievement through three specific processes (Yeager et al., 2013). First, some interventions attempt to change the subjective experience of school for students by changing how they view themselves in the classroom. For example, interventions that promote a growth mindset can address students' questions about their competence and/or belonging. Second, some interventions aim to leverage psychologically wise tactics that deliver messages effectively, such as self-generation of appeals, rather than attempting to persuade students to

think a certain way, which can create undesired effects such as stigmatization. For example, interventions focused on value affirmation ask students to write about how they are attaining their most important values, which is more effective than telling students that they are successfully meeting them. Third, some interventions tap into self-reinforcing processes so that students can sustain the positive effects of the intervention over long periods of time. For example, interventions that promote belonging can improve students' relationships, experiences, and performance in school, which in turn provide a supportive and healthy learning environment that can lead to sustained academic success.

There are two different major types of brief psychological interventions (Harackiewicz et al., 2016). Domain-general interventions target the overall feelings and/or self-beliefs of students and attempt to help them navigate their educational environments. Domain-specific interventions, alternatively, address factors such as value of and/or interest in a specific subject or course.

One example of a domain-general intervention is a social belonging intervention that targeted Black students during the second semester of their first year of college (Walton & Cohen, 2011). The researchers used a 2x2 design that included both Black and White participants, with half of each group receiving the intervention, and the other half of each serving as a control group. The hour-long intervention presented participants with a narrative that framed social adversity in college as a short-lived experience that all students endure, and encouraged students not to attribute this adversity to deficits unique to themselves or their ethnic group. Following the presentation of this narrative, participants were first asked to write a short essay connecting these vignettes about social belonging to their own experiences in college so far, and were then asked to read the essay as a speech to a video camera.

Walton and Cohen (2011) tracked participants' GPA for three years following the intervention, and found a significant increase in GPA during this time for Black participants who received the intervention but not for Black participants in the control group. However, no such difference was found among White participants, leading to a 52% reduction of the racial achievement gap among participants receiving the intervention. Further analyses found a moderate negative correlation between reported adversity and belongingness for Black participants in the control group but found no such correlation for Black participants who received the intervention, or among White participants regardless of group. This suggests that the intervention was able to improve reported belongingness in Black participants by disentangling it from adversity.

One example of a domain-specific intervention is a utility-value (UV) intervention that aimed to improve the performance of underrepresented minority (URM; refers to students of color) and first-generation (neither parent has a 4-year degree) college students in an introductory biology course (Harackiewicz et al., 2016). UV interventions address students' perceived value of and engagement in coursework, which are psychological processes highly correlated with student achievement. As part of a larger study, participants completed either three UV assignments or three control assignments throughout the semester. Participants taking part in the UV intervention wrote short essays about how the course material was personally relevant or useful, while participants in the control condition wrote essays summarizing the course material. The researchers analyzed the moderating effect of race (URM vs. majority status) and found that the intervention successfully reduced the achievement gap in course grade between URM participants and majority race participants by 40%. However, when evaluating the interacting effects of both race and first-generation status on course grade, the researchers found

that the intervention was only effective at reducing the achievement gap for URM participants who were also first-generation college students (but the reduction was a large 61%). Combined with the lack of a main effect of first-generation status (among all participants) on course grade, this suggests that UV interventions may be extremely effective at reducing racial achievement gaps, but they appear to be limited to a particular segment of URM students.

Considering that large proportions of students of color (e.g. 71% of American Indian, 69% Hispanic, & 65% Black; National Center for Education Statistics, 2019) are first-generation college students, UV interventions look to be a very effective mechanism for helping to close the racial achievement gap, at least in introductory STEM courses. Further, because faculty members can easily implement UV interventions into course curriculums, it is practical to make them widespread at low cost (Harackiewicz et al., 2016). Rosenzweig et al. (2019) suggested that it is important to determine how the different components of UV interventions work so that we can make them as effective as possible. Researchers have manipulated the level of choice participants have (Rosenzweig et al., 2019), the dosage and timing of assignments (Canning et al., 2018), and the focus of the assignment (Priniski et al., 2019) and found that these changes can impact which populations benefit the most from the intervention.

Although it is encouraging to see the success brief psychological interventions have had in reducing the racial achievement gap, they do come with some important limitations (see Casad et al., 2018 for a comprehensive review of interventions). Brief interventions are much less likely to be effective in openly hostile environments, as well as in situations where students lack opportunities (Walton & Cohen, 2011). Additionally, when learning opportunities do exist, students must be open to them in order to have academic success (Yeager et al., 2013). Researchers warn that brief psychological interventions are meant to complement traditional

educational reforms (e.g. structural changes), but they cannot solve educational problems such as the racial achievement gap alone (Yeager et al., 2013). Lastly, due to the singular focus of brief interventions on specific psychological factors, they only address part of the complex equation that is responsible for the racial achievement gap.

Comprehensive Programs

Black undergraduate students at the University of Virginia (UVA) have regularly held the highest graduation rate for Black students at any predominantly White public university in the United States (“Black Progress,” 2011). One reason for this continued success is due to the supportive environment provided by UVA’s Office of African American Affairs (OAAA) and their comprehensive cluster-mentoring model for Black undergraduates (Apprey et al., 2014). The cluster-mentoring model for Black undergraduates follows the vision of the OAAA: “to achieve and sustain successful student outcomes in a culturally sensitive environment” (Apprey et al., 2014, p. 326). The four core elements of the model include a peer advisor program, the GradSTAR program, cultural initiatives for skill building and leadership, and the parents advisory association.

The peer advisor program at UVA was created to assist incoming Black undergraduate students with their transition to college and in doing so improve first year retention (Apprey et al., 2014). All incoming students are assigned a peer advisor whose responsibility is to advise and mentor them through their first year at the university. Peer advisors help incoming students with coping skills (for issues such as homesickness), making connections on campus, adjusting to the campus culture and climate, choosing courses, and becoming acquainted with the resources the university and local community have to offer.

The GradSTAR program at UVA was created to assist with the academic success of all Black undergraduate students, with an emphasis on second- through fourth-year students (Apprey et al., 2014). The program helps students develop interpersonal and leadership skills by promoting personal growth and involvement in university life through its three major components. A weekly “Raising-the-bar” program provides students with course-specific one-on-one and small group peer tutoring as well as an information session (on topics such as time management and getting involved in research) led by student and faculty guest speakers. The faculty-student mentoring program pairs students with a faculty member, administrator, or senior staff member that provides students with intellectual stimulation, academic support, career guidance through at least three meetings per semester. Postgraduate preparation is provided for students through specialized outreach to students interested in professional and graduate school, focused support for undergraduate research to assist in graduate program admissions, and individualized counseling for students interested in business school or health professions.

Cultural initiatives that support skill building and leadership at UVA are organized by the Luther Porter Jackson (LPJ) Black Cultural Center and help create an atmosphere of acceptance that helps counter the hostility and isolation Black students often feel at predominantly White institutions (Apprey et al., 2014). Throughout the academic year, the LPJ Black Cultural Center coordinates and implements a variety of cultural, educational, and social programs and activities such as lectures/workshops, dance performances, and exhibitions that are related to the African diaspora. The Cultural center also supports a variety of leadership initiatives that provide opportunities such as leadership training and mentorship for undergraduate leaders by graduate students and professionals.

The Parents Advisory Association (PAA) at UVA promotes family involvement that contributes to the well-being of Black undergraduate students and provides stability throughout their student experience (Apprey et al., 2014). Members of the PAA meet with university administrators, engage with student leaders, and sponsor events in order to help ensure a welcoming environment for Black students. The PAA also offers financial assistance for students through emergency loans and scholarships.

The cluster-mentoring model for Black undergraduates at UVA demonstrates just how complex the racial achievement gap really is, and how extensive the solutions must be to create a more equitable environment for Black college students. The OAAA at UVA was formed in 1976 and has consistently added programming in efforts to reduce the racial achievement gap and address the needs of Black students (Apprey et al., 2014). The GradSTAR program was added in 2010 to as their focus began to shift from addressing disparities in graduation rates to address disparities in academic performance, another large component of the racial achievement gap. A model of this magnitude requires quite an investment by a university, as the OAAA employs five deans to run the programming. Considering the rarity of models with such extensive programming around the country, it remains to be seen whether universities are willing to make this type of an investment to address racial gaps. Last, it is important to note that this model only addresses the needs of Black students, not all students of color, so any university adapting a similar model would still need additional programming to adequately serve all students of color.

A Shift in Responsibility

The name “achievement gap” in itself is problematic, because achievement by definition is the result of effort or skill (Johnson-Ahorlu, 2012). Johnson-Ahorlu (2012) argues that this creates a deficit model, and consequentially suggests that students of color that underperform in

comparison to their white counterparts must lack effort and/or skill. Unsurprisingly then, most of the research on the achievement gap has focused on the deficits that students have and how to mitigate them. Instead, by using the term “opportunity gap,” the focus shifts to the environment students are exposed to and how it limits their opportunities. As such, interventions should focus on how we can change the environment that leads to the gap, instead of only trying to help students adapt to an unfair system. This gets at the real issue with brief psychological interventions because they work to change the psychological factors that lead to gaps in performance, rather than to change the environments that cause the psychological factors in the first place.

From Equity to Justice

Student-focused interventions focus on equity and aim to provide students of color with the tools and resources necessary to navigate the systemic barriers and racial discrimination they often face. Despite the superficial success of these student-focused interventions, there are several reasons why they alone are not enough to adequately address and eliminate racial inequity in higher education.

To put it simply, an equitable system is not a just system. If students of color must work their way around barriers while white students face a path of little resistance, what we really have is two separate and unequal education systems. Asking some students to do extra work to access the same opportunities others start off with is simply unfair. Further, student-focused interventions fall short because they lack accountability for those who contribute to the problem. Campus climate is one of the major factors that researchers believe contributes to the opportunity gap as it relates to feelings of belonging and levels of engagement. However, interventions designed to address campus climates often focus on changing how students perceive their

environments (e.g. Walton & Cohen, 2011), rather than changing the environmental factors that lead to a negative campus climate. It is important to look beyond student-focused interventions because addressing psychological consequences without addressing the conditions that cause them is a temporary solution to a permanent problem. Kendi (2019) explained why it is necessary to address policy and policymakers to create a permanent solution to racial inequity:

The history of racist ideas is the history of powerful policymakers erecting racist policies out of self-interest, then producing racist ideas to defend and rationalize the inequitable effects of their policies, while everyday people consume those racist ideas, which in turn sparks ignorance and hate. Treating ignorance and hate and expecting racism to shrink suddenly seemed like treating a cancer patient's symptoms and expecting the tumors to shrink (p. 230).

To promote true justice in higher education, interventions must also focus on pushing those with power and privilege to remove the barriers they contribute to, instead of putting the burden of adaptation on to the victims of a racist system.

The Role of Faculty

Although many different factors can influence campus climate, faculty can play a particularly important role in the experiences of students of color on and around college campuses. One way to critically evaluate the role of faculty is to explore the experiences of students of color at minority serving institutions, which have a majority enrollment of racial minority students. Johnson-Ahorlu (2012) looked specifically at the experiences of Black students at a minority-serving institution and found that they experienced racial hostility regularly on campus, particularly from faculty members. This racial hostility came from both white faculty and faculty of color, including Black faculty. The campus racial climate was driven

by negative racial stereotypes about Black students, which participants believed strongly influenced how faculty members treated them. Participants reported encountering low expectations from faculty, which included discouraging Black students from pursuing certain careers and majors. Further, stereotypical perceptions from faculty members caused Black students to experience stereotype threat, as they consistently felt extreme pressure to not confirm negative stereotypes, which can take a psychological and emotional toll. Lastly, Black students also reported encountering a lack of support from faculty in terms of clarification of content inside the classroom and basic academic support outside of it. Instead, students often felt dismissed and in turn became less engaged in the classroom and less enthusiastic about school, which can both inhibit academic performance (Harackiewicz et al., 2016).

Faculty/Staff-Based Interventions

Considering the variety of ways in which faculty members can influence the experience and education of students of color, it is important to explore the impact and influence of equity and inclusion interventions for faculty. However, such interventions are rare in published research. A 2020 study by Harrison-Bernard et al. evaluated a diversity, equity, inclusion, and implicit bias workshop for faculty and staff and found improvements in knowledge of equity-related terminology and self-perceptions of knowledge and behavior related to diversity and unconscious bias. Although it is not yet clear how these changes might influence faculty's treatment of students of color, Harrison-Bernard et al.'s study indicates that faculty-based interventions do have the ability to change perceptions. It seems plausible then, that faculty-based interventions could promote strong enough changes in perception that could in turn drive changes in their behavior in meaningful enough ways to impact the experiences of students of color.

The Current Study

Students of color at Western Washington University (WWU) have frequently reported being dissatisfied with the lack of inclusion and support for students and faculty of marginalized identities (Dahlberg et al., 2018; Berkman et al., 2019). In March of 2016, this dissatisfaction escalated as students organized and shared a set of demands for WWU's administration to put forth measures that they believed would promote equity and inclusion on WWU's campus (Logue, 2016). These student demands along with the pattern of exclusion of students of color at WWU led faculty members Regina Barber DeGraaff, Lina Dahlberg, and Robin Kodner to design and implement the Inclusion and Social Mindfulness in STEM (ISMs) introductory workshops, with an intension of increasing social mindfulness, which "refers to being thoughtful of others and considering their needs before making decisions" (Lu et al., 2020). The ISMs workshops were originally derived from the WWU Equity and Inclusion forums and were modified to focus specifically on STEM. The ISMs workshops ran for three academic years from the fall of 2016 and through spring of 2019. Funding for the development and evaluation of ISMs workshops was provided by a grant from the Howard Hughes Medical Institute.

The voluntary workshop series was open to all faculty and staff in STEM disciplines and aligns with call for increased accountability among those who contribute to the opportunity gap. The ISMs workshop series was organized by four major concepts, each accompanied by its own set of goals (Barber DeGraaff et al., 2016). Participants were required to complete the concepts in order, as they were designed to build upon each other.

Workshop Concepts

Concept 1: Cultural awareness of self [in STEM]. The first workshop concept focused on developing an awareness of self as the foundation for understanding others and aimed to

provide a forum for participants to recognize their own role(s) in society, particularly in STEM communities. The goals associated with this concept were to initiate and/or increase awareness of the ways that language, microaggressions, and incomplete empathy inhibit student success and to open a discussion to encourage reflection of self in STEM communities and society, at large. See Appendix for a full outline of concept 1 workshop activities.

Concept 2: Experiences of others [in STEM]. The second workshop concept focused on understanding the experiences of others to promote support among peers and empathy for students. Facilitators used case studies (solicited from the STEM community at WWU and other sources) to identify effective problem-solving strategies and word-choices in response to hostile situations and microaggressive cultures in efforts to help participants learn how to confront difficult situations that may arise during teaching and/or mentoring. The goal associated with this concept was for participants to use concepts and vocabulary from concept 1 to discuss and engage with difficult STEM-specific situations in a respectful, empathetic, and productive manner. See Appendix for a full outline of concept 2 workshop activities.

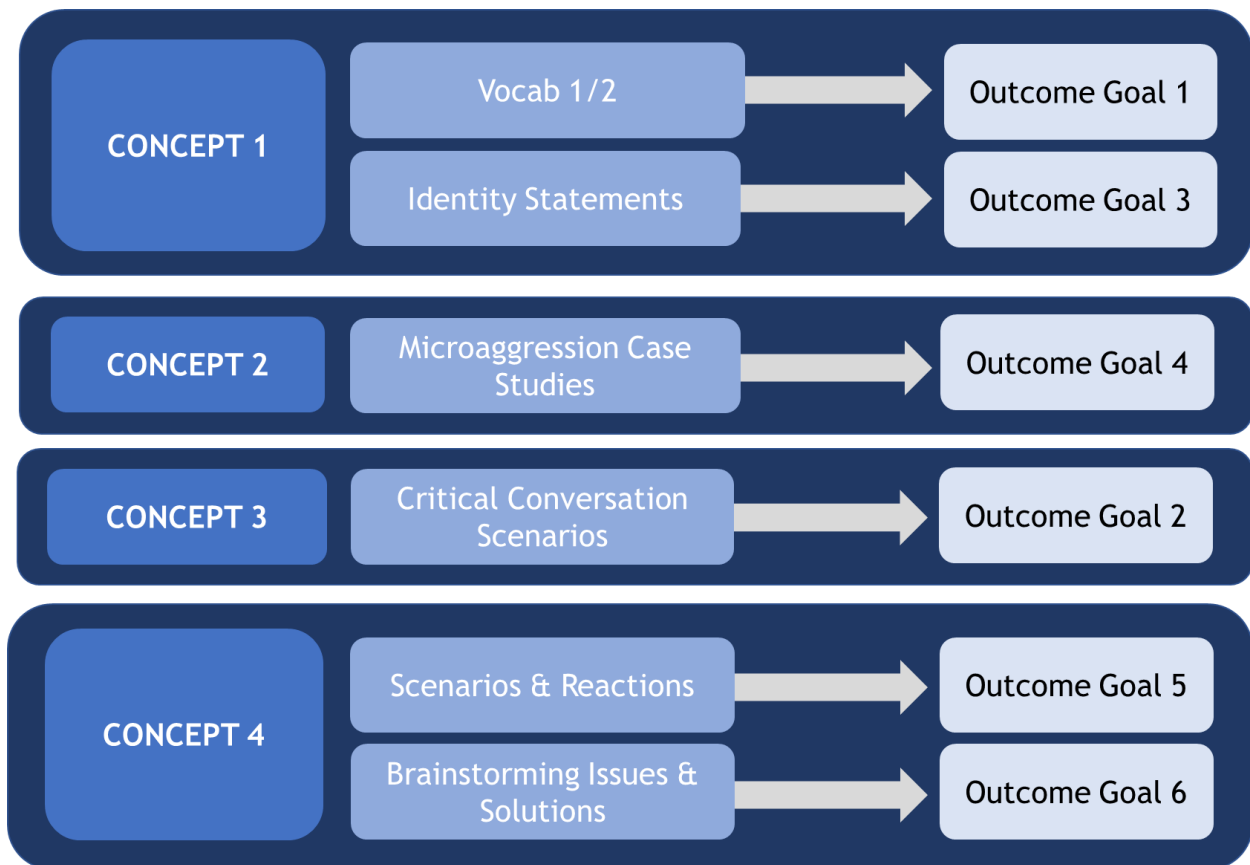
Concept 3: Critical conversations in the [STEM] workplace. The third concept focused on practicing having safe and productive conversations about difference in the workplace. Facilitators used scenarios similar to those used in concept 2 that focused on faculty-faculty interactions and faculty-student interactions. The goals associated with this concept were to use interactive exercises and role-playing to explore how actions and reactions define the atmosphere for students, educators, and others in the STEM community and to specifically address some of the microaggressions discussed in concept 2. See Appendix for a full outline of concept 3 workshop activities.

Concept 4: A call to action in the [STEM] workplace. The fourth concept focused on brainstorming ideas for campus climate change on three levels: university, department, and classroom. The goals associated with this concept were to have an open discussion about where the WWU community currently stands on issues of equity and inclusion and explore what the goals for the future should be. Then, the results of these conversations will be shared with the WWU administration and committees tasked with cultural change. See Appendix for a full outline of concept 4 workshop activities.

Outcome Goals (See Figure 1 for an outline of how workshop activities for each concept connect to each of the outcome goals).

Overall, this workshop series had six major outcome goals for participants:

1. Develop vocabulary around equity and inclusion issues, specifically on the topic of race and ethnicity.
2. Learn to be open minded in challenging conversations.
3. Learn tools for self-reflection related to identity and societal hierarchy.
4. Thinking critically about the way that one behaves and reacts to situations encountered on and around campus.
5. Change patterns of mindset and behavior based on acknowledgement of biases.
6. Define expectations for personal growth and community cultural change.

Figure 1*ISMs Workshop Concepts, Activities, and Outcome Goals*

The purpose of the current study is to evaluate the effectiveness and impact of the ISMs introductory workshops at WWU and explore potential modifications that may improve the workshops in the future. Specifically, we aim to assess whether outcome goals 1, 3, 4, and 5 were met through the ISMs workshops using quantitative survey data. We conducted follow-up focus groups and will use that qualitative data to evaluate the success of outcome goals 2 and 6 in a future study.

Method

Participants

Sixty-six participants completed the pre-workshop series survey and 54 participants completed the post-workshop series survey. Approximately 75% of the participants who completed the pre-survey also completed the post-survey. However, pre- and post-workshop series surveys were not linked together.

All participants were faculty or staff members at Western Washington University. Participants worked in engineering (40.0%), biology (17.1%), chemistry (11.4%), mathematics (8.6%), and geology (8.6%). The remaining 14.3% of participants worked in physics, AMSEC (advanced materials science and engineering), pre-healthcare advising, or university advancement. Most participants (63.6%) were faculty members who reported teaching a variety of different course levels, including undergraduate upper-division (57.6%), major courses (36.4%), undergraduate lower-division (33.3%), graduate courses (24.2%), and non-major courses (18.2%)¹. Participants who do not teach (36.4%) reported working as a research/lab associate (38.5%), classroom/lab technician (30.8%), advising (15.4%), providing financial support (7.7%), and working as an academic department manager (7.7%).

Procedure

Each of the workshop concepts were offered as individual workshop sessions during the first two years, and were available multiple times throughout each academic year. Participants had to complete the workshop series in order but could attend any of the sessions that were convenient for them. Participants typically completed the entire series within one academic year. For the final year ISMs were offered, the workshop concepts were combined into two large

¹ Percentages add up to more than 100% because participants could select more than one answer.

sessions delivered on consecutive days. The first session consisted of concepts 1 and 2, and the second session consisted of concepts 3 and 4. These workshops were offered once per quarter.

Pre-workshop Series Survey

As participants arrived for the first workshop in the series, they were asked to fill out a survey that would assist in evaluating the workshop series. After providing verbal consent, participants received paper surveys to complete. Participants had approximately 15 minutes to complete the anonymous surveys. Researchers collected all of the surveys before beginning the workshop.

Post-workshop Series Survey

At the end of the fourth workshop in the series, participants were asked to fill out another survey to reflect on their experience in the workshops. After providing verbal consent, participants received paper surveys to complete. Participants had approximately 15 minutes to complete the anonymous survey. Researchers collected all of the surveys as participants left the workshop.

Materials

Survey Scales

There was variation in the number of response options provided for scales across the many iterations of the survey (ranging from 3-point to 7-point scales). In order to combine data that were collected with different response scales, we used a proportional transformation to transform each scale into 7-point scales. We then assessed whether there were significant differences between responses based on the response scale provided. Because no significant differences were discovered, we transformed the data so that all responses could be assessed on a 7-point scale.

Pre-workshop Perceptions

Measures included in the pre-workshop perceptions were purely descriptive and only used to summarize the characteristics and values of participants that chose to participate in the workshop series. These measures were not used to evaluate any of the outcome goals or the overall effectiveness of the workshop series.

Participant Goals for Workshop. Upon entering the workshop series, participants were asked the extent to which they agreed on a scale of 1 (strongly disagree) to 7 (strongly agree) that attending programs on diversity contributes to four different goals: 1) increasing cultural awareness of self, 2) gaining knowledge about and understanding the experiences of others, 3) encouraging critical conversations about diversity and inclusivity in the workplace, and 4) creating a call to action for our community to work towards diversity and inclusivity on campus. Participants also ranked these goals in terms of importance, with 1 indicating the most important and 4 indicating the least important.

Frequency of Social Identities. Participants were asked the frequency with which they thought about an array of their own social identities on a scale of 1 (never) to 7 (often). Social identities included: gender, age, class, race, ethnicity, religion, ability/disability, and sexual orientation.

Knowledge of Issues in STEM. Participants were asked how knowledgeable they believed themselves to be on problems and challenges with student success in STEM at the national level and on WWU's campus on a scale of 1 (not at all knowledgeable) to 7 (very knowledgeable).

Classroom Impacts and Teaching Practices. Participants were asked how interested they were in learning more about the impact of ethnicity, race, and gender on interpersonal

interactions and behavior patterns in the science classroom on a scale of 1 (not interested) to 7 (very interested). The survey also asked how interested they were in modifying their teaching practices in order to benefit all students, but particularly underrepresented students.

Discussions about Diversity, Inclusion, or Related Social Issues. Participants were asked how frequently they have discussions about diversity, inclusion, or related social issues with individuals from social groups other than their own and with individuals from their own social groups on a scale of 1 (never) to 7 (often). They were also asked about the affective nature of the experiences on a scale of 1 (nearly all negative) to 7 (nearly all positive).

Workshop Outcome Goals for Participants

Goal 1: Develop Vocabulary around Equity and Inclusion Issues, Specifically Race and Ethnicity.

Knowledge on Equity and Inclusion Topics. Participants were asked to rate their level of knowledge on 18 topics related to equity and inclusion both before and after completing the workshop series. Responses were recorded on a 7-point scale, ranging from 1 (not at all knowledgeable) to 7 (very knowledgeable). Example items include “equity vs. equality,” “microaggressions,” and “inclusive classrooms” (see Table 1 for the full list of topics).

Participants were also asked on the post-workshop survey which topic they would like additional training on or more information about.

Knowledge of Issues in STEM. Participants were asked how their knowledge of problems and challenges with student success in STEM at the national level and their knowledge of these issues on WWU’s campus changed as a result of the workshop series. Responses were recorded on a scale of 1 (decreased significantly) to 7 (increased significantly), with 4 indicating that knowledge stayed the same. Responses were transformed to a -3 (decreased significantly) to

3 (increased significantly) scale for practical interpretation, with 0 indicating that knowledge stayed the same.

Goal 2: Learn to Be Open Minded in Challenging Conversations. This outcome goal was not evaluated in the present study; however, follow-up focus groups were conducted and will be used evaluate this goal in a future study.

Goal 3: Learn Tools for Self-Reflection Related to Identity and Societal Hierarchy.

Awareness of Self. Participants were asked how well the following three statements describe them both before and after the workshop series: “I consistently seek out, initiate, develop, and value experiences and interactions that broaden my understanding of my culture and the cultures of others,” “I am aware of and can articulate the influence of my own assumptions, judgments, and biases when interacting with others who are from a culture other than my own,” and “I sometimes find it difficult to see things from someone else’s point of view.” Responses were recorded on a 7-point scale, ranging from 1 (not at all like me) to 7 (very much like me).

Post-workshop Outcome Statements. Participants were asked the extent to which they agreed with nine statements related to equity and inclusion. Responses were recorded on a scale from 1 (strongly disagree) to 7 (strongly agree). Example statements include “I have a clear sense of what I can do to foster an inclusive learning environment, regardless of students’ social identity groups” and “I have a clear sense of my own social identities.”

Goal 4: Think Critically About the Way that One Behaves and Reacts to Situations Encountered on and Around Campus.

Likelihood to Take Action. Participants were asked how likely they are to take four actions related to equity and inclusion: “discuss diversity and social issues surrounding it with

someone of a different social group (race/ethnicity, gender, sexual orientation, etc.) than your own,” “make efforts to educate yourself about other groups (e.g. ethnic groups, genders, sexual orientations/identities),” “avoid using language that reinforces negative stereotypes,” and “challenge others who make comments/jokes that are derogatory to any group.” Responses were recorded on a 7-point scale, ranging from 1 (very unlikely) to 7 (very likely).

Factors Affecting Classroom Climate. Participants were asked how their awareness of eight factors affecting classroom climate changed as a result of the workshop series. Responses were recorded on a scale of 1 (decreased significantly) to 7 (increased significantly), with 4 indicating that knowledge stayed the same. Responses were then transformed to a -3 (decreased significantly) to 3 (increased significantly) scale for practical interpretation, with 0 indicating that knowledge stayed the same. Example factors include “how students are impacted by a highly competitive academic environment” and “the negative impacts that implicit bias has on the learning environment.”

Confidence in Own Language. Participants were asked to rate how confident they were that the verbal and non-verbal language they use in classroom or the ways they communicate with students inside and outside of the classroom conveys a message of sensitivity about student diversity both before and after the workshop. Responses were recorded on a 7-point scale, ranging from 1 (not at all confident) to 7 (very confident).

Goal 5: Change patterns of Mindset and Behavior Based on Acknowledgement of Biases.

Equity and Inclusion in the Classroom. Participants were asked the extent to which they agreed with the following four statements both before and after the workshop series: “I recognize that not all students come into my classroom with the same level of preparedness; it is my job to

help level the playing field,” “some students might perform better in my class if I used a different teaching style,” “all students are capable; it is my job as their instructor to ensure that all students have equal opportunity to succeed in my class,” and “some undergraduates are not cut out to be science majors and should be encouraged to leave the major as early as possible.” Responses were recorded on a 7-point scale, ranging from 1 (strongly disagree) to 7 (strongly agree).

Classroom Impacts and Teaching Practices. Participants were asked how their interest in learning more about the impact of ethnicity, race, and gender on interpersonal interactions and behavior patterns in the science classroom, and their interest in modifying their teaching practices in order to benefit all students, but particularly underrepresented students, changed as a result of the workshop series. Responses were recorded on a scale of 1 (decreased significantly) to 7 (increased significantly), with 4 indicating that knowledge stayed the same. Responses were then transformed to a -3 (decreased significantly) to 3 (increased significantly) scale for practical interpretation, with 0 indicating that knowledge stayed the same.

Goal 6: Define Expectations for Personal Growth and Community Cultural Change.

This outcome goal was not evaluated in the present study; however, follow-up focus groups were conducted and will be used evaluate this goal in a future study.

Participant Evaluation of Workshop Series

Workshop Series Satisfaction. After completing the workshop series, participants were asked to indicate their level of satisfaction with the workshop series on a scale from 1 (very dissatisfied) to 7 (very satisfied).

Open-ended Questions. Participants responded to open-ended questions about their experiences with the workshop series by writing in a text box (by hand). The two open-ended questions included were “what did you find most valuable about the workshops” and “what

could have been improved about the workshops?” These questions were analyzed using a basic quantitative content analysis where overlapping and similar responses were viewed as synonymous and were categorized as the same code. The primary investigator tallied the frequency of each code and did not attempt to combine codes or create higher order themes. The purpose of this analysis is purely descriptive.

Results

Measures included only on the pre-workshop series survey were used to assess the perceptions among participants before beginning the workshop series, to determine the characteristics of faculty and staff members who chose to take part in the workshop series. Six outcome goals were evaluated using measures that were included on both the pre-workshop and post-workshop series surveys, as well as measures that were included only on the post-workshop series. Although survey data were collected pre- and post-workshop series, and some participants completed both, individuals’ responses were not linked due to participant error, and therefore within-subject analyses could not be used. Instead, we used between-subject analyses for changes from pre- to post-workshop series.

Pre-workshop Perceptions

Participant Goals for Workshop

Upon entering the workshop series, participants ($n = 55$) notably agreed (on a 1 to 7 scale where higher scores indicate greater agreement) that attending programs on diversity contributes to four different goals: 1) increasing cultural awareness of self ($M = 5.55$, $SD = 1.12$), 2) gaining knowledge about and understanding the experiences of others ($M = 5.64$, $SD = 1.01$), 3) encouraging critical conversations about diversity and inclusivity in the workplace ($M = 5.58$, $SD = 1.02$), and 4) creating a call to action for our community to work towards diversity and

inclusivity on campus ($M = 5.36, SD = 1.05$). Participants also ranked these goals in terms of importance (1 = most important, 4 = least important), and indicated that gaining knowledge about and understanding the experiences of others ($M = 1.82, SD = 1.08$) and encouraging critical conversations about diversity and inclusivity in the workplace ($M = 2.09, SD = 1.30$) were more personally important than creating a call to action for our community to work towards diversity and inclusivity on campus ($M = 3.00, SD = 0.89$) and increasing cultural awareness of self ($M = 3.09, SD = 0.70$).

Frequency of Social Identities

Participants ($n = 53$) reported that they most frequently thought about their own gender ($M = 5.08, SD = 1.62$), age ($M = 5.06, SD = 1.58$), class ($M = 4.89, SD = 1.48$), race ($M = 4.79, SD = 1.80$), and ethnicity ($M = 4.48, SD = 1.95$). Conversely, they reported that they thought about religion ($M = 3.58, SD = 2.00$), ability/disability ($M = 3.94, SD = 2.08$), and sexual orientation ($M = 4.10, SD = 1.73$) less frequently.

Knowledge of Issues in STEM

Participants reported that they believed themselves to be somewhat knowledgeable about problems and challenges with student success in STEM at the national level ($M = 3.38, SD = 1.28$) and on WWU's campus ($M = 3.53, SD = 1.36$).

Classroom Impacts and Teaching Practices

Participants reported that they were very interested in learning more about the impact of ethnicity, race, and gender on interpersonal interactions and behavior patterns in the science classroom ($M = 6.20, SD = 1.11$). Participants also reported that they were very interested in modifying their teaching practices in order to benefit all students, but particularly underrepresented students ($M = 6.15, SD = 1.33$).

Discussions about Diversity, Inclusion, or Related Social Issues

Upon entering the workshop series, participants reported that they sometimes ($M = 4.89$, $SD = 1.28$) have discussions about diversity, inclusion, or related social issues with individuals from social groups other than their own, and noted that their experiences were more positive than negative ($M = 5.51$, $SD = 1.18$), with only three of 64 participants reporting more negative than positive experiences. Respondents also reported that they frequently ($M = 5.74$, $SD = 1.22$) have discussions about diversity, inclusion, or related social issues with individuals from their own social group, and noted that their experiences were more positive than negative ($M = 5.24$, $SD = 1.12$), with only one of 33 participants reporting more negative than positive experiences.

Workshop Outcome Goals for Participants

Goal 1: Develop Vocabulary around Equity and Inclusion Issues, Specifically Race and Ethnicity

Knowledge on Equity and Inclusion Topics. Independent samples t-tests were used to test the difference between participants' reported knowledge on equity and inclusion topics at pre- and post-workshop series. See Table 1 for all topics. Participants' reported significantly more knowledge at post-workshop than at pre-workshop for a majority of the topics measured. The largest differences in knowledge on the pre- and post-workshop surveys were in intersectionality ($d = 1.63$, $p < .001$), microaggressions ($d = 1.31$, $p < .001$) and marginalized groups ($d = 1.15$, $p < .001$). Participants' reported knowledge on first-generation students ($d = 0.44$, $p = .063$), gender pronouns ($d = 0.44$, $p = .065$), and transfer students ($d = 0.33$, $p = .163$) was not significantly different on the pre- and post-workshop surveys. Among participants who reported wanting additional training/information on a specific topic following the workshop

series ($n = 28$), the most common topics listed were inclusive classrooms (28.6%), inclusive teaching practices (14.3%), socioeconomic status (14.3%), and intersectionality (10.7%).

Table 1

Perceived Knowledge about Topics Related to Equity and Inclusion

Topic	Pre-workshop <i>M</i> (<i>SD</i>)	Post-workshop <i>M</i> (<i>SD</i>)	<i>t</i> (73)	<i>d</i>
Intersectionality	2.60 (1.61)	5.00 (1.32)	6.99***	1.63
Microaggressions	3.71 (1.45)	5.40 (1.11)	5.61***	1.31
Marginalized Groups	3.74 (1.10)	5.13 (1.31)	4.93***	1.15
Intent vs. Impact	3.60 (1.38)	5.03 (1.27)	4.66***	1.08
Privilege	4.57 (1.07)	5.78 (1.23)	4.50***	1.05
Social Identity	3.37 (1.44)	4.78 (1.31)	4.42***	1.03
Implicit Bias vs. Explicit Bias	3.88 (1.37)	5.15 (1.25)	4.16***	0.97
Equity vs. Equality	3.65 (1.23)	4.75 (1.26)	3.80***	0.89
Stereotype Threat	3.00 (1.59)	4.45 (1.72)	3.77***	0.87
Inclusive Teaching Practices	3.69 (1.41)	4.72 (1.38)	3.23**	0.75
Inclusive Classroom	3.80 (1.39)	4.88 (1.57)	3.12**	0.73
Diversity	4.63 (1.03)	5.43 (1.17)	3.10**	0.72
Underrepresented Minority	4.37 (1.26)	5.25 (1.28)	2.99**	0.69
Social Justice	4.21 (1.41)	5.05 (1.18)	2.77**	0.65
Social Economic Status	4.34 (1.26)	5.13 (1.34)	2.59*	0.61
First Generation Students	4.77 (1.33)	5.33 (1.21)	1.89	0.44
Gender Pronouns	4.49 (1.29)	5.09 (1.46)	1.88	0.44
Transfer Students	4.51 (1.25)	4.97 (1.54)	1.41	0.33

Note. Perceived knowledge scores range from 1-7 (1 = not at all knowledgeable, 7 = very knowledgeable).

* $p < .05$. ** $p < .01$. *** $p < .001$

Knowledge of Issues in STEM. One sample t-tests were used to test whether participants' reported change in knowledge was significantly different than 0 (no change in knowledge). Participants reported that their knowledge about STEM-related problems and challenges on WWU's campus increased moderately ($M = 1.95, SD = 0.50$), $t(40) = 25.11, p < .001$. Participants' reported that their knowledge of these issues at the national level increased slightly ($M = 1.32, SD = 0.88$), $t(40) = 9.60, p < .001$.

Goal 2: Learn to Be Open Minded in Challenging Conversations

This outcome goal was not evaluated in the present study; however, follow-up focus groups were conducted and will be used evaluate this goal in a future study.

Goal 3: Learn Tools for Self-Reflection Related to Identity and Societal Hierarchy

Awareness of Self. Independent samples t-tests were used to test the difference between participants' identification with three statements related to awareness of self at pre- and post-workshop series. See Table 2 for t-values and descriptive statistics. Participants reported significantly more identification with the statement "I am aware of and can articulate the influence of my own assumptions, judgments, and biases when interacting with others who are from a culture other than my own" at post-workshop than at pre-workshop ($d = 0.47, p = .011$). There was no significant difference in participants' identification with the following statements at pre- and post-workshop: "I consistently seek out, initiate, develop, and value experiences and interactions that broaden my understanding of my culture and the cultures of others" ($d = 0.11, p = .545$) and "I sometimes find it difficult to see things from someone else's point of view" ($d = 0.004, p = .982$).

Table 2

Identification with Statements Related to Awareness of Self

Statement	Pre-workshop <i>M (SD)</i>	Post-workshop <i>M (SD)</i>	<i>t</i> (118)	<i>p</i>	<i>d</i>
I am aware and can articulate the influence of my own assumptions, judgments, and biases when interacting with others who are from a culture other than my own.	4.52 (1.36)	5.10 (1.13)	2.58	.011	0.47
I consistently seek out, initiate, develop, and value experiences and interactions that broaden my understanding of my culture and the cultures of others.	5.10 (1.43)	5.26 (1.46)	0.61	.545	0.11
I sometimes find it difficult to see things from someone else's point of view.	3.03 (1.33)	3.04 (1.28)	0.02	.982	0.004

Note. Identification scores range from 1-7 (1 = not at all like me, 7 = very much like me).

Post-workshop Outcome Statements. A repeated measures ANOVA found a significant difference in participants' agreement with nine post-workshop outcome statements, $F(8, 39) = 4.39, p < .001, \eta_p^2 = .101$. Pairwise comparisons found that participants' level of agreement with the statement "I am able to initiate and facilitate conversations to promote student learning about different social identities" was significantly lower than all but two other statements ("I have a clear sense of what I can do to foster an inclusive learning environment, regardless of students' social identity groups" and "I am able to recognize my own biases and stereotypical beliefs about social identity groups"). See Table 3 for descriptive statistics and all significant post-hoc comparisons.

Table 3

ANOVA comparisons of Agreement with Post-Workshop Series Outcome Statements

Statement	<i>n</i>	<i>M</i>	<i>SD</i>	Post-hoc
I understand how privilege and oppression can impact intergroup relations between students and between students and instructors in the classroom (a).	40	5.70	1.16	a > g, h, i
I recognize my own social identity group's position in society relative to other social identity groups (b).	40	5.63	1.19	b > g, h, i
I now have a better understanding of the perspective of students who are not in majority group at WWU (c).	40	5.55	1.11	c > h, i
I now have a better understanding of the perspective of faculty who are not in majority group at WWU (d).	40	5.43	1.17	d > i
I have a clear sense of my own social identities (e),	40	5.40	0.98	e > i
I recognize how others may/might see me based on my social identities (f).	40	5.38	0.95	f > i
I am able to recognize my own biases and stereotypical beliefs about social identity groups (g)	40	5.23	0.97	g < a, b
I have a clear sense of what I can do to foster an inclusive learning environment, regardless of students' social identity groups (h).	40	5.10	0.93	h < a, b c
I am able to initiate and facilitate conversations to promote student learning about different social identities (i).	40	4.83	1.20	i < a, b, c, d, e, f

Note. The letters in parentheses in statements refer to the letters used in illustrating statistically significant differences. Agreement scores range from 1-7 (1 = strongly disagree, 7 = strongly agree).

***Goal 4: Think Critically About the Way that One Behaves and Reacts to Situations
Encountered on and Around Campus***

Likelihood to Take Action. Independent samples t-tests were used to test the difference between participants' reported likelihood to take four different actions at pre- and post-workshop. Participants reported a higher likelihood to "avoid using language that reinforces negative stereotypes" ($d = 0.50, p = .014$), and "make efforts to educate yourself about other groups" ($d = 0.47, p = .027$) at post-workshop than at pre-workshop. There was no significant difference in participants' likelihood to take the following actions at pre- and post-workshop: "discuss diversity and social issues surrounding it with someone of a different social group (race/ethnicity, gender, sexual orientation, etc.) than your own" ($d = 0.40, p = .086$), or "challenge others who make comments/jokes that are derogatory to any group" ($d = 0.17, p = .459$). See Table 4 for t-values and descriptive statistics.

Table 4

Likelihood to Take Action

Action	Pre-workshop <i>M (SD)</i>	Post-workshop <i>M (SD)</i>	<i>t</i> (118)	<i>p</i>	<i>d</i>
Avoid using language that reinforces negative stereotypes	6.33 (1.56)	6.79 (0.62)	2.52	.014	0.50
Make efforts to educate yourself about other groups (e.g. ethnic groups, genders, sexual orientations/identities).	6.02 (1.23)	6.52 (0.87)	2.26	.027	0.47
Discuss diversity and social issues surrounding it with someone of a different social group (race/ethnicity, gender, sexual orientation, etc.) than your own.	5.12 (1.53)	5.71 (1.46)	1.74	.086	0.40
Challenge others who make comments/jokes that are derogatory to any group.	5.38 (1.48)	5.62 (1.42)	0.74	.459	0.17

Note. Likelihood scores range from 1-7 (1 = not at all likely, 7 = very likely).

Factors Affecting Classroom Climate. One sample t-tests were used to test whether participants' reported changes in awareness in each of eight factors affecting classroom climate were significantly different than 0 (no change in awareness), and found significant differences in awareness for all eight factors. See Table 5 for t statistics. A repeated measures ANOVA found a significant difference in participants' reported change in awareness among the eight factors affecting classroom climate, $F(7, 34) = 27.03, p < .001, \eta_p^2 = .443$. Pairwise comparisons found that participants' reported change in awareness of "how [they] respond to offensive comments or critical questions from students impacts the classroom environment" was significantly greater than their reported change in awareness of all other factors. Pairwise comparisons also found that

participants' reported change in awareness of "how [they] can set the tone on the first day of class to enhance student success," "the negative impacts that implicit bias has on the learning environment," "the negative effect of stereotype threat on student academic performance," and "how [they] respond to offensive comments or critical questions from students impacts the classroom environment" were significantly greater than their reported change in awareness of "how students are impacted by a highly competitive academic environment," "how grading methods may exacerbate the sense of competition between students," "how I structure my office hours can contribute to the frustrations and challenges students experience in succeeding in my classes," and "how [they] answer student questions with technical terms can contribute to the frustrations and challenges students experience in succeeding in my classes." See Table 6 for descriptive statistics and post-hoc comparisons.

Table 5

Awareness of Eight Factors Affecting Classroom Climate

Factor	<i>df</i>	<i>t</i>	<i>p</i>	<i>d</i>
How I structure my office hours can contribute to the frustrations and challenges students experience in succeeding in my classes. (a)	38	3.32	.002	0.53
How grading methods may exacerbate the sense of competition between students (b).	38	3.46	.001	0.55
How students are impacted by a highly competitive academic environment (c).	39	3.92	< .001	0.62
How I answer student questions with technical terms can contribute to the frustrations and challenges students experience in succeeding in my classes (d).	36	5.04	< .001	0.83
The negative effect of stereotype threat on student academic performance (e).	38	9.39	< .001	1.50
How I can set the tone on the first day of class to enhance student success (f).	38	11.48	< .001	1.84
The negative impacts that implicit bias has on the learning environment (g).	39	13.29	< .001	2.10
How I respond to offensive comments or critical questions from students impacts the classroom environment (h).	39	22.49	< .001	3.56

Note. A test value of 0 (no change in awareness) was used in all one sample t-tests. Descriptive

statistics for change in awareness scores can be found in Table 6.

Table 6

ANOVA Comparisons of Change in Awareness of Factors Affecting Classroom Climate

Factor	<i>n</i>	<i>M</i>	<i>SD</i>	Post-hoc
How I structure my office hours can contribute to the frustrations and challenges students experience in succeeding in my classes (a).	39	0.44	0.82	a < d, e, f, g, h
How grading methods may exacerbate the sense of competition between students (b).	39	0.44	0.79	b < e, f, g, h
How students are impacted by a highly competitive academic environment (c).	40	0.54	0.85	c < e, f, g, h
How I answer student questions with technical terms can contribute to the frustrations and challenges students experience in succeeding in my classes (d).	37	0.78	0.95	a < d < e, f, g, h
The negative effect of stereotype threat on student academic performance (e).	39	1.41	0.94	h > e > a, b, c, d
How I can set the tone on the first day of class to enhance student success (f).	39	1.51	0.82	h > f > a, b, c, d
The negative impacts that implicit bias has on the learning environment (g).	40	1.68	0.80	h > g > a, b, c, d
How I respond to offensive comments or critical questions from students impacts the classroom environment (h).	40	2.10	0.59	h > a, b, c, d, e, f, g

Note. The letters in parentheses in factors refer to the letters used in illustrating statistically significant differences. Change in awareness scores range from -3 to 3 (-3 = decreased a lot, 0 = no change, 3 = increased a lot).

Confidence in Own Language. There was no significant difference between participants' reported confidence at pre- ($M = 3.61$, $SD = 1.19$) and post-workshop ($M = 4.22$, $SD = 1.58$) series, $t(72) = 1.843$, $p = .069$, $d = 0.43$.

Goal 5: Change patterns of Mindset and Behavior Based on Acknowledgement of Biases

Equity and Inclusion in the Classroom. Independent samples t-tests were to test the difference between participants' agreement with statements related to equity and inclusion in the classroom at pre- and post-workshop. There were no significant differences in participants' agreement with any of the following statements at pre- and post-workshop: "some undergraduates are not cut out to be science majors and should be encouraged to leave the major as early as possible" ($d = 0.41$, $p = .085$), "I recognize that not all students come into my classroom with the same level of preparedness; it is my job to help level the playing field" ($d = 0.41$, $p = .087$), "all students are capable; it is my job as their instructor to ensure that all students have equal opportunity to succeed in my class", ($d = 0.37$, $p = .122$), and "some students might perform better in my class if I used a different teaching style" ($d = 0.03$, $p = .903$). See Table 7 for t-values and descriptive statistics.

Table 7

Differences in Agreement with Statements Related to Equity and Inclusion in the Classroom

Statement	Pre-workshop <i>M (SD)</i>	Post-workshop <i>M (SD)</i>	<i>t</i>	<i>p</i>	<i>d</i>
Some undergraduates are not cut out to be science majors and should be encouraged to leave the major as early as possible.	2.64 (1.32)	2.13 (1.15)	-1.75	.085	0.41
I recognize that not all students come into my classroom with the same level of preparedness; it is my job to help level the playing field.	5.45 (1.23)	5.92 (1.04)	1.74	.087	0.41
All students are capable; it is my job as their instructor to ensure that all students have equal opportunity to succeed in my class.	5.42 (1.25)	5.87 (1.17)	1.56	.122	0.37
Some students might perform better in my class if I used a different teaching style.	5.75 (1.11)	5.72 (1.10)	0.12	.903	0.03

Note. Agreement scores range from 1-7 (1 = strongly disagree, 7 = strongly agree). Degrees of freedom varied from 68 to 70.

Classroom Impacts and Teaching Practices. One sample t-tests were used to test whether participants' reported change in knowledge was significantly different than 0 (no change in knowledge). Participants reported that their interest in learning more about the impact of ethnicity, race, and gender in the science classroom increased moderately ($M = 1.73$, $SD = 0.88$), $t(40) = 12.44$, $p < .001$. Participants also reported that their interest in modifying their teaching practices to benefit underrepresented students increased moderately ($M = 1.71$, $SD = 0.91$), $t(38) = 11.97$, $p < .001$.

Goal 6: Define Expectations for Personal Growth and Community Cultural Change

This outcome goal was not evaluated in the present study; however, follow-up focus groups were conducted and will be used evaluate this goal in a future study.

Participant Evaluation of Workshop Series

Post-workshop Series Satisfaction

Following the workshop series participants indicated that they were notably satisfied ($M = 5.95$, $SD = 1.32$) with the workshop series, with only two of 41 respondents reporting that they were dissatisfied to any extent.

Open-ended Questions

The most common responses to the open-ended question about what participants found most valuable in the workshop series were the WWU case studies, example scenarios/practice, and group discussions/pair and share activities. The most common responses to the question about what could be improved about the workshops were expanding them (ongoing workshops/discussion), more practice/complex scenarios, and better logistics for the workshops (timing, location, etc.). See a summary of all responses in Table 8 and Table 9.

Table 8

Aspects of the Workshop Series that Participants Found Most Valuable (N = 39)

Most valuable aspect	Example quote	Frequency (%)
Example scenarios	“Formulating/working out answers to different scenarios of racism/microaggressions.”	13 (33.3)
Group discussions/pair and share	“The balance of small and large group discussions.”	13 (33.3)
Case Studies	“Being exposed to the variety of ways underrepresented students can be marginalized at WWU and how we as faculty/staff can directly improve that situation.”	9 (23.1)
Safe/engaging learning environment	“It was a relaxed/comfortable environment that made it easy for me to learn.”	4 (10.3)
New understanding/shared language	“I feel much more aware of all the issues and how to identify them.”	4 (10.3)
Deep listening/feeling heard	“Connecting with other individuals that share my concerns. Being heard.”	3 (7.7)

Note. Percentages add up to more than 100 because some responses included multiple most valuable aspects.

Table 9

Suggestions for Improvement for the Workshop Series (N = 32)

Suggested improvement	Example quote	Frequency (%)
Expand the workshops	“Expand. Realize that time is limited but more of an ongoing discussion would be valuable.”	8 (25.0)
More practice/complex scenarios	“More situational practice in slightly larger groups (with feedback). Role playing.”	7 (21.9)
Improve logistics of workshops	“Timing so that it is easier to fit with class schedules.”	7 (21.9)
Additional focus on staff and/or teaching assistants	“While an effort was made for staff involvement, these workshops are for faculty.”	3 (9.4)
Additional resources/tools	“I wanted more tools to use on a daily basis.”	3 (9.4)
Improve clarity of vocabulary	“Do a better job of defining terms.”	3 (9.4)
Additional focus on gender and intersectionality	“More discussion aimed at faculty of color/marginalized groups and their experiences of other faculty and students.”	3 (9.4)

Note. Percentages add up to more than 100 because some responses included multiple suggestions for improvement.

Discussion

Our results indicate that the workshop series was generally a success, but future workshops could be improved upon through necessary modifications. Faculty and staff who participated in the workshop series indicated that their attendance was driven by wanting to gain knowledge and understanding of the experiences of others and wanting to engage in critical conversations about diversity and inclusivity in the workplace. Participants reported that they

entered the workshop series somewhat knowledgeable about the problems and challenges with student success in STEM both at the national level and on WWU's campus, but that they were very interested in learning more about the impact of ethnicity, race, and gender on interpersonal interactions and behavior patterns in the science classroom, and also in modifying their teaching practices in order to benefit all students, particularly underrepresented students. Participants were incredibly successful in improving their vocabulary around equity and inclusion issues (outcome goal 1), as their reported knowledge at post-workshop was significantly higher than at pre-workshop for 15 out of 18 equity and inclusion topics, with the largest differences occurring in intersectionality, microaggressions, and marginalized groups. Participants also appeared to improve their critical thinking about the way they behave and react to situations encountered on and around campus (outcome goal 4), as at post-workshop they reported more likelihood of avoiding using language that reinforces negative stereotypes and more likelihood of making efforts to educate themselves about other social groups. Further, they reported increases in awareness to eight different factors that impact classroom climate, with the largest reported increase in awareness of how their responses to offensive comments or critical questions from students can impact the classroom environment. Overall, participants were notably satisfied with the workshop series and found the example practice scenarios, group discussions/pair and share, and WWU case studies to be the most valuable workshop activities.

Participants appeared to make some gains in self-reflection related to their identity and social hierarchy (outcome goal 3), as their agreement with the statement "I am aware of and can articulate the influence of my own assumptions, judgments, and biases when interacting with others who are from a culture other than my own" was greater after completing the workshop series. However, participants' tools for self-reflection may still be somewhat limited. There were

higher levels of agreement with general outcome statements about understanding the role of privilege and oppression in the classroom and understanding the relative position of their own social identity group than with more specific statements about the ability to initiate and facilitate conversations about different social identities and the ability to recognize their own biases and stereotypical beliefs about social identity groups.

The workshop series did not successfully change participants' patterns of mindset and behavior based on an acknowledgement of biases (outcome goal 5), as the way participants viewed students' abilities within the science classroom and their understanding of their own role in creating equity and inclusion in the classroom did not change. However, participants appear open to change as they reported an increase in interest in learning more about the impact of ethnicity, race, and gender in the science classroom and in modifying their teaching practices to benefit underrepresented students after completing the workshop series. This sentiment was echoed in responses to what could be improved about the workshops, where participants suggested expanding the workshops and increasing the number of practice scenarios.

Connection to Previous Research

There are very few published studies on equity and inclusion workshops designed for faculty and staff in higher education because most interventions target students and are remedial in nature. Nonetheless, a 2020 study by Harrison-Bernard et al. evaluated the effectiveness of a workshop on diversity, equity, inclusion, and implicit bias for faculty and staff at a Louisiana medical school and provides a good comparison for the current study. The outcome goals for their three-hour workshop were educating participants on terminology commonly used when discussing inclusion and teaching participants the role of implicit bias in preventing an inclusive and diverse academic workforce. Similar to the current study, participants' knowledge of

inclusion terminology improved following the workshop. However, while we asked participants to self-report on their knowledge of equity-related terminology, Harrison-Bernard et al. used multiple choice questions to test participants' knowledge before and after their workshop. Although their method was more objective than ours, it was also limited to definitions and did not attempt to capture participants' scope of understanding for topics related to inclusion. Harrison-Bernard et al. also found increases in participants' self-perceptions of knowledge and behavior related to diversity and unconscious bias from pre- to post-workshop, which somewhat resemble the post-workshop outcome statements we used to evaluate participants' tools for self-reflection related to identity and social hierarchy. Whereas we only measured tools for self-reflection post-workshop series, following their workshop Harrison-Bernard et al. had their participants retrospectively evaluate their self-perceptions pre-workshop and report their self-perceptions post-workshop, then measured the change.

Interpretation of Findings

Overall, participants' who attended the workshop series showed vast changes in their awareness and understanding of issues related to equity and inclusion but reported very little change in their behavior. Participants reported more knowledge on equity and inclusion topics as well as on issues in STEM (outcome goal 1). Among the post-workshop series outcome statements (outcome goal 3), participants reported higher agreement with awareness and understanding statements than behavior statements. Participants did increase their critical thinking related to their own behavior on campus (outcome goal 4), as they reported an increased likelihood of avoiding language that reinforces negative stereotypes. Among factors affecting classroom climate, participants reported a larger increase in their awareness of how their responses to offensive comments or critical questions from students can impact the classroom

environment than their awareness of all other factors. However, despite this finding being related to behavior, it still represents a change in awareness of behavior rather than a change in behavior itself. We found no evidence that suggests participants ultimately changed their patterns of mindset and behavior based on acknowledgement of biases (outcome goal 5), as there were no increases in agreement with statements related to equity and inclusion in the classroom. Whereas very few behavioral changes appear to have occurred in participants following the workshop series, they do seem to be open to future behavioral changes as they reported an increase in interest in modifying their teaching practices to benefit underrepresented students after completing the workshop series.

It is important to note that for participants who took the workshop in a consecutive 2-day span, they likely did not have enough time to implement very many behavioral changes. However, this was the case for only about one-fifth of all participants. It may also be the case for the participants who completed the workshop series over the course of a few months that they also needed more time to implement behavioral changes. Two of the most common responses about improvements we could make to the workshop series were about expanding the workshops and adding more practice scenarios for participants. Participants may just need more time and practice before feeling confident enough to implement behavioral changes. Follow-up focus groups were conducted several months after participants completed the workshop series and will be analyzed in the future to determine if participants made additional behavioral changes after some time had passed.

Another important trend within our findings is that participants appeared to be much more willing to learn about systemic issues than they were to evaluate their own behavior and reflect on the specific ways they may be contributing to inequity in STEM. When evaluating the

tools for self-reflection related to identity and societal hierarchy (outcome goal 3), there was a difference in participants' agreement among nine post-workshop outcome statements.

Participants reported higher levels of agreement with statements about systemic issues than statements about individual accountability. Although participants' reported awareness and ability to articulate the influence of their own biases was higher at post-workshop than at pre-workshop, their identification with this statement following the workshop series was still relatively low.

Participants reported changes in their critical thinking about how they behave and react to situations encountered around campus (outcome goal 4). On an individual level, participants did report a higher likelihood to avoid using language that reinforces negative stereotypes and to make efforts to educate themselves about other groups at post-workshop. Participants also reported increases in their awareness of eight different factors that affect classroom climate.

However, among those factors, participants reported larger increases in their awareness of systemic and general factors, including the effect of stereotype threat, the impact of implicit bias, the importance of how they set the tone, and how they respond to offensive comments, and smaller increases in their awareness of specific individualized factors, including how they structure their office hours, their grading methods, how they answer student questions with technical terms, and how students can be impacted by a highly competitive environment. This distinction may be due to participants exhibiting self-serving bias, which occurs when people attribute their own failures to external factors (Larson Jr., 1977). It appears as though participants haven't yet changed their patterns of mindset and behavior based on an acknowledgement of biases (outcome goal 5), as they reported no changes in statements regarding equity and inclusion in the classroom. Specifically, participants reported no changes in their agreement with accountability statements saying their job is to level the playing field in their classroom, their job

is to ensure students in their classes have equal opportunity to succeed, and some students may perform better if they modified their teaching practices. However, participants did report an increase in interest in modifying their teaching practices when it was not directly linked to student performance.

Both of these trends suggest that our workshop series was effective at laying a foundation for faculty and staff in STEM to begin to work to create a more equitable and inclusive academic environment at WWU, but a great deal of work remains. Participants seem to be aware of the need for more work as they requested expanded workshops and additional opportunities for practice. It is also clear that participants need additional content in the workshop series to help them recognize and understand the ways they may individually be contributing to systemic inequities.

Limitations of the Study

Although the results of this study are promising and suggest the ISMs workshop series is a worthwhile resource for faculty and staff at WWU, it is important to recognize some of its limitations.

Survey Design

The survey for this study was originally adapted from another WWU workshop by the same workshop facilitators and the procedures underwent many changes throughout the administration of the workshop series. Unfortunately, no demographic information was collected on participants, which severely inhibits our ability to generalize any of our findings to anyone beyond those who participated in our workshop series. However, our ability to infer causal changes was already inhibited by the lack of random assignment. We also did not have any sort

of control group to compare our participants to, which limits our ability to confidently attribute changes in participants to our workshop series.

Several measures were modified and others were added between cohorts of workshops, resulting in many participants completing different versions of the survey. Despite administering both pre- and post-workshop series surveys, we were unable to pair each participant's surveys together for analysis because no efforts were made to connect them during early iterations and later efforts were unsuccessful (e.g. participants could not remember their 4-digit PIN number or multiple participants used the same PIN number). Further, whereas traditional pre- and post-surveys might include the same measure so to evaluate change over time, several measures on our survey asked participants to identify their base level on the pre-survey, and then identify their own levels of change on the post-survey, making the findings of those measures much more subjective. There were also a wide variety of scale response options used among measures, which may have confused respondents.

Workshop Series Participation

The workshop series was delivered in two different formats. Early workshops provided a lot of flexibility to the participants as each of the four topics was offered as its own session on many different occasions. Although participants had to complete the workshops in order, they were free to move quickly through the series or spread it out over several months as it fit their schedule. Later workshops were offered as a cohort model, with the first and second topics combined into one session, the third and fourth topics combined into another, and the series delivered in a consecutive two-day span. It may be the case that the difference in delivery resulted in a much different experience among participants, and differences could exist between the two waves. We initially planned to evaluate these waves of participants separately and

analyze the similarities and differences among them, but we did not end up with a large enough sample size in each to feel comfortable doing so.

A similar difference among participants might also exist between participants who completed the workshop series soon after it became available and participants who waited and completed it towards the end. The workshop series was offered on a volunteer basis over the span of three years. It is possible that early participants had higher levels of enthusiasm, engagement, and knowledge of issues related to equity and inclusion than later participants. It is also possible that later participants were less interested but felt pressure from their colleagues or department leadership to complete the workshop series because a majority of faculty staff in the college had already completed it. Some participants in the last set of workshops offered shared with workshop facilitators that their department chair forced their participation.

Concerns with Internal Validity

A total of 66 participants completed the pre-workshop survey while only 54 participants completed the post-workshop survey. Because participants complete the pre-workshop survey before the first workshop and the post-workshop survey after the fourth workshop, this suggests that there was attrition and 12 participants that began the workshop series did not complete it. There may be a variety of different reasons why participants did not complete the workshop series, such as logistical or personal challenges to attending. However, it may also be the case that participants that disliked or did not agree with the content facilitators presented during the workshop series. If participants did not complete the workshop series because they disliked it, the difference between pre- and post-workshop scores may be exaggerated. Further, because our pre- and post-workshop surveys were not connected, it was not possible to remove the pre-workshop survey data from participants that did not complete the workshop series.

Implications

The results suggest that the workshop series may have been successful in educating participants on topics related to equity and inclusion in STEM, but needs additional content to guide participants in their practical application of the knowledge they have gained. The lack of reported changes in participants' behavior may be a byproduct of a heavy emphasis on systemic issues in our workshop series without enough emphasis on individual accountability. While participants gained awareness of how inequity in STEM is driven by systemic causes, they don't appear to have a clear understanding of how their own behaviors can contribute to those systemic causes. Participants reported a strong desire for additional practice scenarios, indicating that it was important for them to learn how to respond to encounters of racism or microaggressions. However, very few participants sought additional practice evaluating and learning how to adjust their own behavior. As such, participants would benefit greatly from additional workshop content focused on tools for self-reflection and accountability. It may also be advantageous to organize ongoing workshop activities led by dedicated participants following the workshop series to provide a space for continued growth and accountability. We believe that the ISMs workshop series delivered with the aforementioned modifications can be a valuable tool for other colleges and universities to begin addressing inequities in STEM at their institutions.

Future Research

Throughout the entirety of the ISMs workshop series, facilitators used a variety of different formats that may have influenced participants' experience. It is important that future research explore and evaluate the impact of these logistical differences. The ISMs workshop series was delivered as four separate sessions spread out over several months or as two large sessions occurring on consecutive days. Determining the pros and cons of each delivery method

can give future workshop facilitators a better idea on how to maximize the influence of the workshop series and best serve the participants at their institution. We also suggest evaluating possible cohort effects between participants that complete the workshop series soon after it becomes available and participants that wait until the later offerings. It may be possible that the workshop series is more impactful for early participants than our findings indicate and less effective for later participants.

Future research should also explore ongoing workshop activities and their potential impact on behavioral changes. Participants requested ongoing opportunities for learning and practice and the results lend support to their assertion that the additional time would be beneficial. These ongoing activities could be formatted in a variety of ways, providing many different avenues for future researchers to explore.

We received feedback from some participants that our workshop series did not have enough content aimed at staff, and appeared to be primarily for faculty. Researchers should explore whether additional content needs to be added to the workshop series to make it better suited for staff, or if it would be better to simply separate the two and develop a separate workshop for staff. Future research could also explore whether it would be worthwhile to develop a workshop series targeting department and college leadership, as several department chairs attended our workshop series and reported during the follow-up focus groups that a lot of the content was not applicable to them because they rarely teach. Further, our workshop series was only available to faculty and staff within WWU's college of science and engineering, so additional workshops could be developed targeting university administrators that hold even more power and influence.

Conclusion

All things considered, the ISMs workshops were worthwhile for WWU STEM faculty and staff and resulted in improved awareness and attention to equity and inclusion issues. ISMs should continue to be administered at WWU with important modifications focused on promoting more behavioral changes. Other institutions could also benefit from adopting the ISMs model of workshops to work towards creating a more equitable and inclusive environment for STEM students.

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Appendix

ISMs Workshop Outlines

Concept 1: Cultural awareness of self [in STEM]:

1. Introductions: Name, unit, position
2. Discuss goals and workshop norms.
3. Warm Up: Step in – Step out activity (adapted from activity used by Nick Sanchez, WWU Equity and Inclusion Forum)
4. Group debrief “Step in – Step out”
5. Vocabulary 1 (developed for this workshop) -Discuss the dictionary definitions of the words.
6. Identity Statements: Example identity statements. Participants read and deconstruct who they think the statement may be written by.
 - a. What is included in each and why?
 - b. When are race, power, and privilege included?
 - c. What is assumed? Who has the power to define?
7. Facilitators share their identity statements.
8. Participants write their own identity statements. Their own identity statements are not shared with the group but the process is discussed.
9. Vocabulary 2 (developed for this workshop) – Introduce the definitions of the words that will be discussed in Workshop 2.
10. Homework: Think about how the words in vocabulary list 2 relate to your own identity.

Concept 2: Experiences of others [in STEM].

1. Begin with slide show of “I too am WWU”--(<http://itooamwwu.tumblr.com/>)

2. Silent Activity: Read terms and phrases that are often heard by people of color (developed by Regina Barber DeGraaff for this workshop).
3. Introductions and Warm Up: Name, unit, position, and last time you heard a statement from Silent Activity.
4. Discuss goals and workshop norms.
5. Participants move into small groups and read microaggression case studies (developed for this workshop from surveys results of student, staff, and faculty that requested stories describing microaggressions at WWU in CSE – College of Science and Engineering).
 - a. Each group gets two scenarios in their folders. There are three versions of the scenarios for a total of six. Small group discuss their assigned scenarios, then share their versions with the larger group. The first scenario has an “easy” identifiable microaggression and the second scenario is more subtle.
 - b. Participants are encouraged to discuss all scenarios in context of the words on Vocabulary list 2 introduced in Workshop 1.
 - c. Participants are encouraged to deconstruct identities, motivations, and perspectives of all people involved in the scenarios and discouraged to “solve the problem.”
6. Homework: Think about how you would handle these scenarios if they happened in your classroom. What would you say or do?

Concept 3: Critical conversations in the [STEM] workplace

1. Introductions: Name, unit, position, and something others in the room don't know about you.
2. Discuss goals and workshop norms.

3. Warm up: Personal reflection:
 - a. What brought you here today?
 - b. What are you hoping to learn?
 - c. What challenges do you have engaging in conversations about race?
4. Listening exercise: 3 people, 3 questions, 3 minutes (adapted by Claire Horner-Devine, Counterspace Consulting) for this workshop).
 - a. When were you first in a classroom with someone who looks like you?
 - b. What has surprised you about the ISMs workshops and conversation so far?
 - c. When have you observed or colluded with racism?
5. Use a new set of scenarios, Critical Conversation Scenarios (developed by Claire Horner-Devine and workshop facilitation team for this workshop), to facilitate discussion of what to DO and what to SAY in these scenarios. This activity contains Faculty-Faculty interaction and Faculty-Student interactions scenarios. Small group discussions are followed by large group discussions. Participants are specifically prompted to think about:
 - a. Using Silence Breakers for Whites in Cross Cultural Discussions (from Robin DiAngelo's book *What does it mean to be White?*)
 - b. What to do when a mistake is made? What about outside the workshop?
 - c. How can you lay the groundwork to have courageous or difficult conversations?
6. Homework: Continue to think about, and discuss with colleagues, what you would say in some of the scenarios we didn't discuss and go back to scenarios from Workshop 2 for more practice.

Concept 4: A call to Action in the [STEM] Workplace.

1. Introductions: Name, unit, position
2. Discuss goals and workshop norms.
3. Warm up: Scenarios and Reactions Facilitators role play. Participants first write down their response and then discuss in small groups their responses to the two scenarios.
 - a. Scenario 1: Faculty – Faculty Interactions
 - i. What would you say in that moment? (3 mins to come up with a response)
 - b. Scenario 2: Student-Student Interaction
 - i. What would you say in that moment? (1 min to come up with a response)
4. Brainstorming Session on Issues and Solutions across Units at WWU Participants visit a table and have open discussion. Facilitators takes notes, summarize ideas, and provide support to discussions. Resulting ideas will be shared with CSE administration and the Equity, Inclusion & Diversity Standing Committee.
 - a. Institutional Change
 - i. Committees and hierarchy
 - ii. Recruitment and retention
 - iii. Interdisciplinary teaching and research
 - iv. University level programming
 - b. Departmental Change
 - i. Meeting norms
 - ii. Hiring
 - iii. Advising
 - iv. College level programming

- c. Classroom Change
 - i. Group Work
 - ii. Prerequisites
 - iii. Classroom culture
5. Homework: Use resources provided on campus, including the ISMs Canvas site, to continue discussing as a group and reading for self-enrichment.