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IDENTIFYING AND MITIGATING PRACTICES THAT INDUCE STEREOTYPE THREAT AT VALPARAISO UNIVERSITY

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ABSTRACT. This paper describes the implementation, assessment, and impact of a professional development project to address stereotype threat at Valparaiso University (VU). Stereotype threat is a psychological phenomenon that has been shown to cause disadvantaged groups to underperform on a wide range of tasks. Additionally, it is recognized as a key contributor to the underrepresentation of women and minorities in science, technology, engineering, and mathematics (STEM) fields. This project sought to assess the extent of stereotype threat and execute an intervention to reduce stereotype threat on VU's campus. Supported by a grant from the American Association of University Women (AAUW), VU hosted lectures and workshops by Dr. Catherine Good, a stereotype threat expert. Several follow-up discussion events were held over the following months to increase the impact of Dr. Good's visit. Through these activities faculty, staff, and students learned about stereotype threat and its influence on learning. Assessments of each event and the subsequent implications for the mitigation of practices that induce stereotype threat are discussed in this paper. The results provide significant hope for future reduction of stereotype threat at VU. However, the results also highlight a gap between faculty/staff self-perceptions and student experiences with this issue.

Keywords: Stereotype threat, implicit bias, faculty, professional development, STEM education

INTRODUCTION AND PROJECT SUMMARY

Women and ethnic minorities are unequally represented in many science, technology, engineering, and mathematics (STEM) disciplines (National Science Board 2016, Chapter 2). One known barrier to the participation of underrepresented groups in STEM is the psychological phenomena known as stereotype threat (ST). As defined by Steele & Aronson (1995), "stereotype threat is a fear of confirming a negative stereotype about your group." ST is a well-established phenomenon in psychology research literature, with studied groups ranging from women to African Americans and even Caucasian males (Nguyen & Ryan 2008). Inspired by the research report *Solving the Equation* from the American Association of University Women (AAUW), Valparaiso University (VU) undertook efforts to raise awareness of ST among faculty, staff, and students (Corbett & Hill 2015). Our work presents a case-study on a campus-wide professional development project about ST. In this paper we detail the project's effect on ST awareness in faculty, staff, and students as well as faculty/staff's intent to change current mentoring and teaching practices.

The goal of our project was to raise awareness about ST and provide strategies to reduce or eliminate it in classrooms, informal mentoring, and the workplace both on and off VU's campus. To achieve this goal, two different audiences were targeted: (1) faculty and staff (hereafter referred to as 'employees'), and (2) students. For employees a professional lecture, pedagogical development workshops, and follow-up discussions were sponsored. For students a general lecture, including an invitation to the general public, with follow-up discussions were held.

In planning these activities, the need for an expert on both the phenomenon of ST and techniques for reducing it was identified. To this

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end, Dr. Catherine Good, Associate Professor of Psychology at the City University of New York, was invited as the primary lecturer and to lead the workshop sessions. A nationally recognized expert in this field, Dr. Good's work focuses on how negative stereotypes contribute to women's underachievement and underrepresentation in math and science disciplines (Aronson et al. 1999; Good et al. 2007, 2008, 2012). She has presented at many national conferences as a keynote or workshop leader including the Joint Mathematics Meetings, the American Physical Society's March Meeting, and the National Center for Women & Information Technology's Summit. Dr. Good also studies methods of helping women overcome vulnerability to ST and alternative techniques for faculty to avoid causing ST (Aronson et al. 2002; Good et al. 2003; Dweck et al. 2004; Inzlicht et al. 2006).

The remainder of this paper is laid out as follows. The *Background and Motivation* section explains in more depth the effects of ST as well as the institutional context which sparked this project. The *Methods and Approach* section details our actual implementation and marketing for the intervention activities. The *Assessment Plan* outlines how we measured the impact of our interventions on knowledge and intent. The *Results* contain two subsections, one on employees, one on students, which report the survey responses and basic interpretations of them. Finally, the *Discussion* summarizes the overall intervention outcome and shares lessons learned.

BACKGROUND AND MOTIVATION

Stereotype threat background.—Stereotype threat (ST) has been explicitly studied since the publication of Steele & Aronson's seminal article in 1995 where the term first appeared (Steele & Aronson 1995). Since then over 850 articles have been published examining ST (based on a Google-Scholar search for "Stereotype Threat" in titles). Here we will highlight three of the several meta-analyses that exist on these works. First, Walton & Cohen (2003) perform a meta-analysis that highlights how the "in-group" can actually achieve a performance boost. Second, Nguyen & Ryan (2008) introduce three levels of ST: blatant, moderately explicit, and indirect/subtle. They also review several articles that attempted to remove ST through either explicit or subtle interventions. Most importantly, their meta-analysis found that the experiments statistically supported an effect on women, with a greater impact on minorities. Nguyen and Ryan also provided a ranking of which type of interventions were most effective for each group experiencing ST. Third, and more recently, Pennington et al. (2016) performed a meta-analysis of the various psychological mediators that can create or influence the actual performance in individuals exposed to ST. Three broad categories of mediators were examined: affective/subjective, cognitive, and motivational mechanisms. Each category had detailed examples of the mediators and highlighted experiments discussed in the literature. These meta-analyses clearly indicate that ST is a valid psychological phenomenon applicable to a broad range of groups, with a variety of causes and negative outcomes.

This project was specifically concerned with increasing awareness of the impact that ST can have on women and underrepresented minorities (URMs) as well as introducing ways to mitigate ST. As a concrete summary of the impacts above, Corbett & Hill (2015) state that when someone experiences ST it reduces working memory capacity, increases stress and anxiety, and may lead to disengagement from domains in which a person feels stereotyped (Pennington et al. 2016). Many researchers are investigating how to alleviate the psychological impact of ST. Proven strategies include addressing women and URM's sense of belonging by creating a community of equality and welcome. For example, regardless of the task or degree program difficulty, establishing that everyone (men and women) must work hard has been shown to increase women's sense of belonging (Smith et al. 2013). Similarly, Carol Dweck's work on "growth mindsets" has also been employed by researchers to increase a sense of belonging by making students aware that difficulties, challenges, and failures are a normal part of earning a degree (Dweck et al. 2004; Walton & Cohen 2007; Dweck 2008). Finally, simply reducing the disparities between men and women (or other groups) can help prevent feelings of non-belonging (London et al. 2014).

Institutional motivation.—Within the gender imbalanced (with male prevalence) environments of STEM, we acknowledge that the College of Engineering (CoE) faculty, science professors, and other technical professors often unknowingly commit stereotype threats on a regular basis. Even though VU's CoE has an percentage of women above many undergrad-

uate engineering schools (National Science Board 2016), its gender mix is still heavily skewed with only about 20% female students. Of greater concern, Computer and Information Sciences (CIS) has had a very low average enrollment of women (12.5%), well below the national average. The CIS department also had a 14% lower retention rate for women than men in 2009–2013. Women, as a clear minority in these disciplines may easily experience a more limited sense of community. This makes imperative the creation of a welcoming and inclusive environment free from ST and other negative psychological influences.

METHODS AND ASSESSMENT PLAN

Methods.—To create a community of acceptance, the employees must be able to talk and teach in ways that do not generate ST. Moreover, they must be convinced that they need to change. Together these are the primary goals for this project, the education and impact on practices surrounding ST for employees and especially within the STEM faculty. These goals suggested the two-stage intervention created: an educational lecture and a skills workshop.

By initially offering the lecture, employees were presented with research data demonstrating the existence of ST and making evident the need for change. Research focusing on a variety of at risk groups was shown. Even more compelling was the research that ST could be induced in white males, a traditionally privileged group. Appealing to a campus culture that highly values effective teaching and mentoring, the lecture focused on the negative effect that ST has on learning. It concluded with a description of three effective interventions – encouraging a growth mindset, encouraging belonging based on effort or engagement, and re-attribution for difficulty. All of these serve as effective practices for improving student learning, regardless of the state of ST.

The workshop, presented as a professional development activity, provided employees a venue for learning important skills as well as possible interventions to reduce ST within their classrooms. To increase long-term effectiveness, follow-up discussions were scheduled two months after the lecture and workshops. This allowed all participants to reflect on what they had learned and to plan future activities for themselves or the general university.

An additional component in creating a ST free environment is helping students themselves be alert to experiencing or creating ST. Research has shown that students who are aware of ST are less likely to suffer from the negative effects (Guajardo 2005; Johns et al. 2005; Dar-Nimrod & Heine 2006). Moreover, by making students aware of ST, they will be able to share that knowledge with other students and avoid creating it themselves. These reasons led to the inclusion of a general lecture for the student body. Similar to the interventions for employees, follow-up discussions with students were scheduled over the next two months to increase the long-term efficacy of this intervention.

Faculty and staff were invited to attend the lecture and workshops through a wide range of messaging. The Assistant Provost for Inclusion, the Deans of their respective colleges, and advertising by VU's Institute for Teaching and Learning provided official invitations. More informally, student groups on campus, such as Athena Society (a gender equality group) and the Society of Women Engineers (SWE), used real-life examples and personal invitations to inspire faculty attendance.

Students were invited to the general lecture through student organizational leaders, posters, and targeted emails. Specifically, the event was shared with the university student leadership network and the Engineering Leadership Student Association Committee. This led to at least two professional societies including the event as part of their membership education requirements.

Assessment plan.—As stated above, the primary goal of our project was to educate and modify practices of employees, especially STEM faculty. The secondary goals of our project were to educate the general student body about ST and promote general awareness. To evaluate the results of our project, we established four measures of success: (1) lecture and workshop attendance, (2) understanding of ST, (3) short- and long-term behavior change, and, for employees only, (4) inspiring intent to change current mentoring or pedagogical practices.

Faculty and staff assessment: We assessed (1) by recording attendance numbers, especially of STEM faculty, at the lectures and workshop. For (2) and (4) we administered a post-lecture and post-workshop survey to participants to evaluate their learning and future plans. For (3), short-term impact was assessed by informal

Table 1.—Faculty and staff understanding of stereotype threat.

I believe...	Strongly disagree (1)	Disagree	Neutral	Agree	Strongly agree (5)	Average	Std. dev.
From this event [lecture] I learned a lot of new things about stereotype threat	0	1	0	4	8	4.46	0.88
I learned a lot from this workshop.	0	0	1	5	7	4.31	0.87
that stereotype threat can negatively impact performance of underrepresented groups (e.g. gender, ethnicity, etc.)	0	0	0	1	12	4.92	0.28
that stereotype threat can negatively impact performance of any group or person.	0	1	2	3	7	4.23	1.01
my teaching practices or pedagogy should change to reduce stereotype threats	0	1	2	3	6	4.17	1.03
that my teaching practices currently introduce stereotype threat to at least one group	0	4	1	7	0	3.25	0.97

interviews with SWE members and other female STEM students and follow-up conversations with faculty. Additionally, part of a second round of post-event surveys asked employees to reflect on any changes they instituted at the end of spring semester. Finally, the long-term impact of (3) will be evaluated through institutional retention data and graduation/exit interviews, which are already being analyzed for similar outcomes in another project for the National Center for Women in Information & Technology.

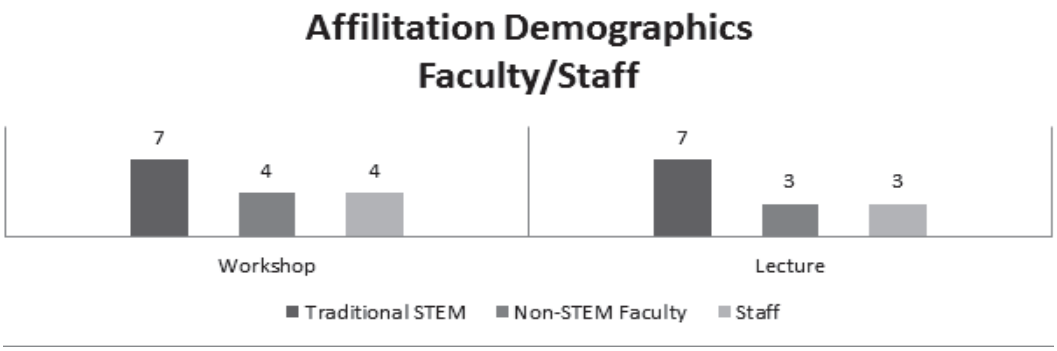
Students and community assessment: For goal (1) we used an identical assessment to the employee's. We assessed (2) by creating and administering a short survey at the end of the public lecture, accessible via smartphone. Included were a few questions to gauge understanding followed by brief demographic questions. Goal (3) or short/long term impact was assessed by attendance at the follow-up events and subsequent engagement of students in various activities to reduce ST on campus.

RESULTS

Results from faculty and staff.—With regards to the primary goals of our project, to educate and influence practices of employees, we achieved notable success. For measure (1), there was a total attendance of 22 employees between both of Dr. Good's lectures. Additionally, there were over 30 attendees at the workshops held specifically for employees. Overall, between 35 and 40 individual employees interacted directly with Dr. Good during the lectures and workshops. While the initial goal for attendance of more than 50 at the lecture(s) was not achieved, the workshop attendance goal of more than 30 was achieved and through several follow-up activities managed to reach at least 50 employees.

To understand the effectiveness of various activities (Goals 2–4), several follow-up surveys were administered. Thirteen responses to the lecture and 16 responses to the workshops were collected, giving an average response rate of 58%. The demographic data from the surveys shown in Fig. 1 indicate that the target audience was reached, including a focus on STEM faculty.

To assess goal (2), employee understanding of ST, we asked four questions on a Likert scale (Table 1). We acknowledge that these questions were both subjective and affective; however, these results were strongly positive. They show that the employees absorbed the information from Dr. Good's lecture about the pervasive effect ST can have on learning.



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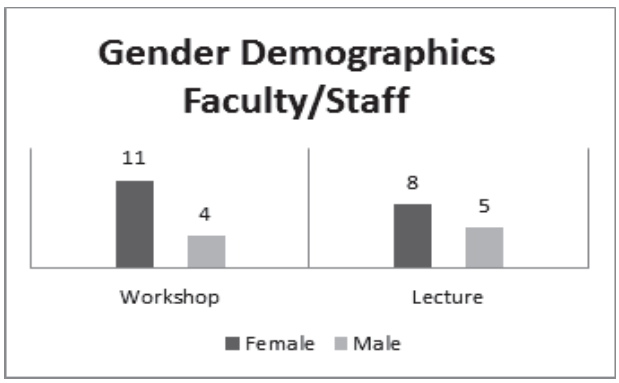

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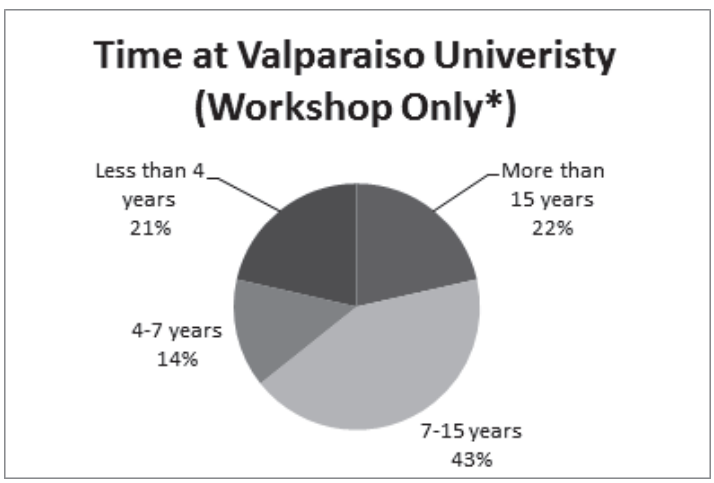

(c)

Figure 1.—Demographic data for attendees of the workshops and lecture. Similar data were not collected in the post-lecture survey.

For measure (3), employee intent or inspiration to change, two questions were asked during the initial post-workshop survey (Table 2, with response counts). Additionally, some inference can be made based on the attendance at follow-up meetings. While the project did not originally include any follow-up discussions, the opportunity arose to schedule more events specifically for

Table 2.—Faculty and staff intent to change.

	Very unlikely (1)	Unlikely	Neutral	Likely	Very likely (5)	Average	Std. dev.
Based on this workshop, how likely are you to change your teaching practices?	0	0	1	8	4	4.25	0.58
Based on this workshop, how prepared do you feel to create classroom activities which reduce or avoid stereotype threat?	0	1	2	8	2	3.94	0.77

employees. These follow-up discussions were held during finals week, nearly two months after Dr. Good's visit. These events attracted more than 40 participants, including several new attendees. While no formal assessment was made of these events, notes were taken about possible future activities and actions for campus (summarized in the Appendix 1). Based on these informal discussions several faculty members and staff members intend to implement alternative practices on campus to reduce ST.

While planning changes was a desirable outcome, it was important to know if the workshops had actually equipped employees to implement change. Thus, in the post-workshop survey two paired questions (Table 3) were asked about employee skills in avoiding ST during classroom and mentoring activities. Although survey scores indicate that VU employees feel fairly skilled at avoiding ST in both classroom (3.81/5) and informal settings (4.19/5), they thought that the workshops still improved their abilities. It should be noted that the standard deviation on improving their avoidance of informal ST was higher when compared to the standard deviation for improving classroom skills. This is because the distribution of responses was skewed towards '5', with more employees feeling as though they improved greatly in this area.

Based on the formal and informal assessment collected so far, our intervention has been successful in making employees both aware of and desiring to reduce ST on the VU campus. Because the events occurring during the middle of the spring semester, it is still too early to ascertain whether Dr. Good's workshops and lectures will have a lasting influence on campus culture or faculty instruction. However, based on the special follow-up discussions, an optimistic view is certainly justified. This was strongly supported

Table 3.—Faculty and staff skills.

	Very low (1)	Low	Neutral	High	Very high (5)	Average	Std. dev.
Please rate your ability to engage with students in a classroom setting without introducing stereotype threat	0	0	5	7	1	3.81	0.66
How did the workshop impact [your ability in the classroom]?	0	0	0	7	6	4.38	0.62
Please rate your ability to engage with students in an informal setting (mentoring, office hours, etc.) without introducing stereotype threat	0	0	1	9	3	4.19	0.54
How did the workshop impact [your ability to informally mentor]?	0	0	2	3	8	4.38	0.81

Table 4.—Faculty and staff perceptions of administration.

I believe...	Strongly disagree (1)	Disagree	Neutral	Agree	Strongly agree (5)	Average	Std. dev.
VU's administration is working to address issues of stereotype threat	1	5	3	2	2	2.92	1.26
VU's administration is working to address issues of equality (gender, ethnicity, etc.)	0	3	2	5	3	3.62	1.12
I believe...	**Significantly decrease (1)**	**Decrease**	**Not Chnage**	**Increase**	**Significantly increase (5)**	**Average**	**Std. dev.**
that the effort Valparaiso University expends towards reducing stereotype threat should ...	0	1	2	7	3	3.92	0.86
that the effort Valparaiso University expends toward reducing inequality (of any sort) should ...	0	0	4	4	5	4.08	0.86

by the four survey questions (Table 4) about current and future efforts of VU's administration.

Results from students and community.—The secondary goal of educating the student body was carried out explicitly through the open lecture by Dr. Good. Similar questions to those for the employees about general understanding of the effects of ST were asked (Table 5). As with VU employees, these showed strong and positive results. In addition to helping students understand ST, it was important to discover what students currently felt they were experiencing. Table 6 displays the two questions asked – one about their experiences and one about their perceptions of the administration. These results were disappointing since most respondents felt they in fact had experienced ST and were not persuaded that the adminis-

Table 5.—Student and community understanding of stereotype threat.

	Strongly disagree (1)	Disagree	Neutral	Agree	Strongly agree (5)	Average	Std. dev.
From this event I learned a lot of new things about stereotype threat	0	0	4	5	15	4.46	0.78
Based on this event, I feel more able to identify when I am experiencing stereotype threat	0	0	2	10	12	4.42	0.65
I believe that stereotype threat can negatively impact performance of underrepresented groups (e.g. gender, ethnicity, etc.)	0	0	0	8	16	4.67	0.48
I believe that stereotype threat can negatively impact performance of any group or person.	0	0	2	8	14	4.50	0.66
I believe that stereotype threat represents a real, measurable phenomenon	0	0	1	6	16	4.65	0.57

Table 6.—Student and community experiences.

	Strongly disagree (1)	Disagree	Neutral	Agree	Strongly agree (5)	Average	Std. dev.
I feel that I've experienced stereotype threat in a course or activity related to Valparaiso University	4	3	3	2	9	3.43	1.63
I believe VU's administration is working to address issues of equality (gender, ethnicity, etc.)	0	3	9	6	4	3.50	0.96

tration was addressing equality issues. Finally, while only a tertiary goal, it was hoped the students would be better equipped to deal with ST personally. Here we succeeded admirably (Table 7).

DISCUSSION

Impact of results.—The overall responses to the survey questions show that faculty, staff, and students have benefited from this project. Furthermore, in the surveys immediately following the events, the faculty and staff respondents overwhelmingly (92%) indicated a plan to change their personal practices. A slightly smaller portion actually felt prepared to implement changes (77%). Only one participant indicated s/he did not actually feel prepared to implement changes. However, these survey responses and attendance numbers serve only as indirect measures of change.

During the two months following the lectures and workshops, we held several follow-up discussions for faculty, staff, and students. These discussions focused on changes for Valparaiso's campus and generated many ideas for reducing ST. We have generalized some of these ideas and included them in the Appendix 1 to spark further conversations. The discussions were well attended (over 40 employees and 30 students) and even attracted new participants because of the initial attendees' enthusiasm. This enthusiasm has had important, tangible outcomes such as the welcome packet for new women engineers developed by current female students. Perhaps the most promising and important outcome was the participants' interest in continuing the process of addressing ST into the next academic year.

More directly, our longitudinal data collected almost a year after Dr. Good's visit show that participants generally followed through on their intent to change. Specifically, Fig. 2 shows that 71% of respondents made a change within a year. In addition, 93% were interested in seeing the same or a similar workshop offered again. Overall, the survey had a 28% response rate out of the employees who participated in the lectures, workshops, and follow-up discussions. In addition to these results, 15 faculty members have been participating this year in a learning community focused on growth mindset, one of the acknowledged ways to address ST.

Generally, these results indicated a positive change in campus culture. Yet, comparing the employees' responses to the students' experiences raises an important concern. Faculty indicated they were able to avoid ST in the classroom and informal mentoring (Question 1 & 3, Table 3), while some students clearly indicated that they had experienced ST (Question 1, Table 6). We are concerned about this discrepancy but acknowl-

Table 7.—Student and community preparation.

	Strongly disagree (1)	Disagree	Neutral	Agree	Strongly agree (5)	Average	Std. dev.
Based on this event, I feel more able to withstand or otherwise combat stereotype threat (against myself or others)	0	2	2	8	12	4.25	0.94

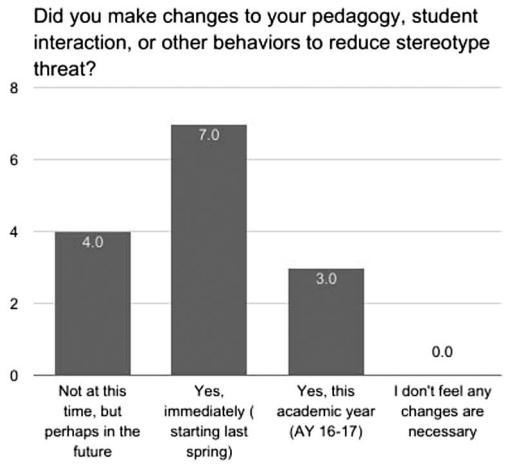

Figure 2.—Survey results from 1 year after events.

edge that the students perspectives may not refer to the specific faculty surveyed. However, it would not be entirely surprising for faculty to report not performing ST while students actually did report experiencing ST. Previous work has shown a measurable failure of faculty to correctly assess student's thoughts and views (Schmitt et al. 2015).

Transferable lessons.—There are two lessons from the project that are transferable to other institutions and professional development activities. First, even though the primary target of our program was faculty and staff, the student leadership proved immensely valuable in persuading the faculty and staff to participate. If the subject of the event is relevant to students, consider including student leaders or advocates, even if they are not the intended audience.

Second, the greater lesson comes from the value of originally unplanned follow-up activities related to the speaker. By having a series of lectures, workshops, and then subsequent discussions with students, faculty, and staff, we were able to deepen engagement with the topic. The lecture, with workshops on the following day, while akin to a traditional conference event, did not sufficiently deepen our discussions. Instead, by having structured conversations nearly two months later, participants were able to return to the idea and better process what they had learned about ST. This strategy fits well with the pedagogical idea of mastery-based learning and, more generally, the power of repetition (Kulik et al. 1990). This extended engagement model is replicable for any high-profile speaker visit or event on a campus.

Future work.—When someone experiencing or creating stereotype threat is able to identify and explain the psychological problem, s/he has made the first step towards overcoming it. The education conveyed through our project has made that identification possible for many students, faculty, and staff. More broadly, the administration is reviewing the recommendations generated in the discussions (see Appendix 1) for feasibility and implementation. Overall, this project has served as an initial call to action for students, faculty, and administrators to address situations of stereotype threat. With a broader population aware of the challenge, Valparaiso University has made the first steps towards identifying and mitigating stereotype threat on our campus.

ACKNOWLEDGMENTS

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APPENDIX 1

Specific Classroom/Pedagogical Thoughts on Reducing ST:

- When doing assessments (especially pre/posttests, or scholarship of teaching work) be sure to avoid saying or implying that the tests reflect student abilities, that is, "intrinsic" traits, rather than "current state"
- When returning grades, be careful of attributions. A student's *work* receives a grade, not the student. Example: "Your paper has received a grade of XX"
- Hide or remove names from online classes to help avoid gender bias
- Include a "quality of failure" grade (See articles by Edward Burger, 2012)
- Include discussions of "growth mindsets" throughout the semester, not just at the beginning or before exams.
- Find ways to encourage "communities of belonging" within academic disciplines
  - Departmental social events
  - Discipline-based study tables
  - RA led/dorm-based study tables

Ways to Promote/Spread knowledge about stereotype threat (ST)/growth mindsets (GM)

- Hold a faculty learning community on Stereotype Threat or Growth Mindsets
- Include programming in required freshman courses
- Organize Residential or Greek Life programming
- Relate to faculty the importance of these issues to Freshman/Sophomore retention
- Provide more knowledge to faculty about student backgrounds and experiences, possibly through presentations by recruitment/admissions staff
- Blog Posts or emails from the university's Teaching and Learning Center/Staff
- Provide fliers, printable websites, or other resources to faculty and advisors about ST/GM
  - A "Top 10 Things Faculty Say" about inducing ST, and how to avoid them
  - General information about the effects and how to avoid ST

Groups of People who may need training in Stereotype Threat/Growth Mindsets

- Professional Advisors
- Faculty, especially those teaching:
  - Freshman courses
  - General Education/Study Skills courses
- Peer Tutors (and tutoring center directors)

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