David White — Statement on Diversity and Inclusion

1. Introduction and Philosophy

Diversity and inclusivity are core values for me, and have infused my approach to teaching, research, and service. My passion for these issues dates back to my upbringing in a Chicago neighborhood that was racially mixed and economically diverse. There I had a first-hand view of the many ways society marginalizes and oppresses people from underrepresented groups, in terms of physical safety, housing, job availability, and educational opportunities. My high school education, at the hands of the Jesuit order, instilled in me a moral imperative to try to improve the situation for marginalized groups. My interactions with students and colleagues at Bowdoin, Wesleyan, and Denison, as well as time spent living abroad, have instilled in me a deep-seated respect for the value of diversity in university settings, in STEM fields, and in my area of research. As a professor, much of my most meaningful work has involved mentoring students from underrepresented groups, helping them persist in the major, and exposing all students to the value of diversity, empathy, and justice.

Mathematics and computer science are notoriously non-diverse. This means that many in our field did not benefit, as I did in Chicago, from a sustained exposure to individuals from different backgrounds. It also represents a serious disparity in fairness of access to the life benefits that training in mathematics and computer science confers, and an immense loss of talent for our field. The metaphor of a 'leaky pipeline' is often used to describe the many places where we lose persons from underrepresented groups, including women, people of color, first generation students, and others. We lose them at the professor level, at the graduate student level, at the undergraduate level, in high school, and in primary school. Improving the situation is an urgent challenge that will require sustained effort from all of us over the courses of our careers. In this document, I will describe several concrete steps I have taken to improve the situation, and I will describe plans for continued work on this important problem.

2. Experiences

I strive to build an environment of **inclusive excellence**, in my courses, in my department, for the university at large, and in my research field. I combat the leaky pipeline at several points, and nurture students from underrepresented groups. My approach is based on published literature about the problems faced by persons from underrepresented groups, and approaches that have been proven to work. I emphasize to students that developing respect for diversity is a core part of the university's mission. I also stress to students that not all kinds of diversity are visible. Consequently, attentiveness to diversity must be a mindset that infuses one's life, rather than a perspective one picks up in a classroom setting or during certain interactions, and lays aside when class ends.

In the classroom. I believe student success is intimately tied to the degree to which they feel a sense of belonging in my courses [1]. Inspired by Uri Treisman's approach [9], I project high standards, and a belief that students can meet them. I hold mandatory office hours for students in the first week of the semester, to build rapport and trust with them, to demonstrate that I value their unique perspectives, and to explain (especially for first generation students) that my office is a safe space, where students can talk to me about anything, and that I expect them to use my office hours when they are confused about course material. Students are often surprised to learn that I am fluent in Spanish and have traveled to more than 70 countries. I get students to teach me about their lives, their home towns, and their hobbies, to show that I value them and want to learn from their experiences. If a student misses back-to-back classes, I reach out by email and get the student to come in to meet with me. I use surveys to figure out whether students are missing prerequisite knowledge, and when they are, I introduce just-in-time teaching modules to meet them where they are, and leave no one behind. Cognizant of the experience of low income students, I select open access textbooks and free software (like R, Sage, and Python).

I structure my classes around active learning and group work, a proven strategy [3] to get students invested in course content, constructing their own knowledge, and benefiting from the perspective of their peers. I carefully manage my messaging and advising to guide students into a growth mindset [2]. When circumstances warrant it, I provide students with "exam wrappers" to get them to think metacognitively about their study habits and how they can grow. Early in the semester, I have students read "How Diversity Makes Us Smarter" [5], and I lead a class discussion about the importance of

diversity in mathematics (or computer science, or statistics, depending on the course). I return to this theme throughout the semester, and I remind students to help members of their group for whom English is not the first language. I also rewrote all my course materials to avoid references to uniquely American phenomena (such as Pig Latin), and to feature gender inclusive language.

After reading *Whistling Vivaldi* [8], I restructured my courses to emphasize project-based learning as a higher priority than exam performance, to reduce the impact of stereotype threat on students. In their lab reports, students investigate how course content can help people in the real world (e.g., a statistics lab on the opioid epidemic in Ohio). Research suggests that this method of teaching is effective for all students, and is especially effective for students from underrepresented groups [4]. Success on the projects helps students build confidence, which in turn helps them persist in the major. Since I implemented project-based learning, the percentage of female students going on to the second course in computer science (as a fraction of all students) rose from 10% in my first year, to 40% last year. Even for daily in-class examples and activities, I choose problems that highlight diversity (e.g., related to income inequality, segregation in housing, and statistics on mental health), and I use these examples to drive conversations with students. In the future, I would like to create a course where students investigate issues of power and justice through a quantitative lens, and to introduce more reflective journaling, so students can connect course content with such issues.

I further combat stereotype threat by redecorating classrooms to include visual cues showing diversity in math and computer science, by giving students direct instruction about managing anxiety leading up to exams (including mindfulness activities), and by having students write a brief self affirmation before the first exam (an activity that has been shown to have positive benefits lasting up to two years [8]). I now call exams "quizzes", I have twice as many (so that they are lower stakes, and to give students more opportunities for recall learning), and I emphasize to students that the purpose of quizzes is to give me feedback on which topics to revisit, rather than to test student prior knowledge or overall intelligence.

Another strategy with proven positive benefits is to expose students from underrepresented groups to individuals who "look like them" and have succeeded in the field. I facilitate this in two ways. First, I periodically bring in external speakers to present interesting topics to my classes and to our majors (as well as to talk candidly about their personal journeys in life). Second, I led our department to a TA model, and piloted training modules to teach TAs how to lead effective study sessions. I carefully select a diverse set of course TAs, and I mentor the TAs. As part of this, I encourage the TAs to mentor the students, since research has often supported the value of near peer mentorship [8]. I have all TAs take an implicit bias test [6] and talk to them about the importance of tone, their choice of language, and microaggressions. I have received positive feedback from students about the TA sessions, and I believe they help students feel a sense of belonging. I am pleased that the percentage of students of color, in my courses and in my department, is steadily rising, and I hope it will soon reach a critical mass.

In my department. As mentioned above, I have worked to redecorate our learning spaces to feature visual cues favorable to diversity, to bring in a diverse array of external speakers, and to introduce a TA model for our courses. I also reshaped our cs major to allow students to study abroad, and I brought in speakers to highlight the importance of an international perspective. As a result, we now have several double-majors, who probably would not have been cs majors if it meant they could not study abroad. Research shows that focused group experiences increase student persistence in math and cs [4, 7, 9]. With this in mind, I've helped a number of female cs majors secure funding to attend the Grace Hopper Celebration for Women in Computing, and I've supervised seven undergraduate research projects (and even more directed/independent studies). In a related vein, I was part of a group of faculty that successfully lobbied the administration to convert an office into a Community Learning space and a Maker Space.

Additionally, I worked with the university's career counseling center to build connections with a number of companies in the area, who now offer internships and externships (one-day shadow experiences) for our students. I also created email listservs to alert our majors to opportunities (related to jobs, summer research, graduate school, fellowships, etc.), and I created a list of programs that accept international

students on student visas. When I advise students, I give them concrete help related to their applications and interviews, and I share my own struggles with impostor syndrome and anxiety, to help destigmatize such discussions and to guide them to an improved state of mental health. I keep in touch with former students via LinkedIn, and have helped alumni transition to new jobs. I have also served on a number of hiring committees, and worked with my senior colleagues to think carefully about what traits we are seeking, to craft a job ad, and to stick to our previously agreed upon criteria (to combat implicit bias). This has resulted in a number of diverse hires, whom I now mentor.

In the university at large. At Denison, I organize several outreach events designed to increase interest in computer science, and to invite a diverse array of students to take our courses. I ran a faculty/student learning group on Ethics in Cyberspace, and I co-organized an Hour of Code outreach event, which helped hundreds of students, community members, and professors write code for the first time in their lives. I developed project-based courses in statistics, computer science, and mathematics, that entice students to connect course content to their other passions. I was part of the group that created Denison's new data analytics major (and I wrote papers about this experience [10, 11]), following a project-driven approach. This major is extremely diverse, with demographics matching the university at large, and with many students who most likely would not have taken mathematics or computer science otherwise. In preparation for the launch of this major, I led a faculty reading group about Teaching Statistical Concepts, which included extensive discussions about how faculty can best serve a diverse array of learners. I currently lead a faculty reading group on Resilience and Pedagogy, focused especially on students with gaps in their preparation level for college, on first generation students, and on students with mental illnesses.

In my research field. Diversity is represented in the nature of my research. I have published in mathematics, computer science, statistics, economics, and (soon) epidemiology. My research with students on the opioid epidemic in Ohio focuses explicitly on marginalized groups, including the black community, and drug users with mental illnesses. My volunteer consulting work for Harm Reduction Ohio is aimed at changing perceptions of drug addicts, and implementing strategies that save lives. My papers [10, 11] explicitly discuss how students from underrepresented groups benefit from a project-based approach to data analytics. As a result of these papers, I was asked to serve on an NSF grant panel where I helped direct NSF funds to programs that serve huge numbers of students from underrepresented groups.

Even within pure mathematics, my research is inherently interdisciplinary (I prove that many different mathematical fields can be approached using the tools from topology). Consequently, I have developed a network of collaborators spanning seven countries. As many of my collaborators do not have funds to support their research, I often win external funding to support research visits. I have spoken at conferences and seminars all over the world, and I disproportionately choose speaking engagements that allow me to help researchers from underrepresented groups. For example, I once taught a summer short course on model categories to a group of Moroccan graduate students. Over the years, many ESL mathematicians, whom I met during my travels, have sent me papers, that I edit to help with the exposition and language. I have also published several expository papers aimed at making my field more accessible to a diverse array of graduate students. I have also published papers in the Journal of Humanistic Mathematics (JHM), about the value of expository writing, and writing that shares personal narratives. My most recent paper in JHM includes a discussion of how we can best support diverse students and faculty.

Combating the leaky pipeline. In addition to the activities discussed above, which improve persistence for undergraduates, I also work to improve persistence for professors, graduate students, and high school students/teachers. I mentor a large number of junior faculty, from departments spread across campus. At a recent workshop at Kenyon College, on "Connections and Conversations: Furthering the Success and Thriving of Underrepresented Junior Faculty," I added several mentees from underrepresented groups. We have a regular Friday lunch meeting where we talk about our pedagogy, about finding time for research, about navigating life as a professor, and about strategies to make our courses and departments more inclusive. A carpool I co-organize, that helps some 40 faculty commute to work every day from Columbus, provides another space for mentorship. I also co-organize the Columbus Faculty

Meetup, which provides a space for faculty from area universities to mingle and mentor each other. And, I bring interested mentees to an OSU speaker series called the STEAM exchange, where faculty from across campus give short talks connecting their research to a central theme. Cognizant of "minority tax," I actively find ways to spread around service work, so that it does not fall disproportionately on faculty from underrepresented groups. I am part of an ongoing conversation with the Associate Provost for Diversity about reshaping university policies to account for bias in teaching evaluations, for implicit bias in publishing, and for inequitable distributions of service work.

As a member of Ohio State's algebraic topology group, I mentor several graduate students and postdocs. I help co-organize the seminar, bringing in diverse speakers. I drive the graduate students to conferences around the Midwest and teach them how to network. I also teach them topics related to my research, where possible. Many of our graduate students are from underrepresented groups, and I think my encouragement and advice helps them persist in the field. I also serve as an editor for the Graduate Journal of Mathematics, and in this role I help graduate students get an early publication, which helps them persist in their field. Lastly, I connected with a number of high school teachers at the Park City Mathematics Institute in 2016, and I keep in touch with them about teaching strategies that will help their students persist in mathematics.

3. Future Plans

In the future, I would like to build on my success with course TAs, and begin to make discussions of implicit bias and microaggressions part of my courses. This spring, I hope to work with University Communications to film upperclass students discussing the challenges they overcame, as showing such videos to first-year students is associated with improved retention [4]. Building on my success getting students to the Grace Hopper conference, I would like to start sending students to the Tapia conference, which celebrates diversity in computing. I hope to take on more "early experience" summer students, as success on a tractable problem the summer after their first year is associated with improved retention [4]. I want to find ways to smooth the transition of transfer students, and at some point I would love to get involved with the Posse program. I also hope to one day shift my research field in the direction of a referee process that combats implicit bias. I plan to continue my efforts on behalf of diversity and inclusivity throughout my career.

References

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