

University of Utah Teaching Assistantship: Building an Inclusive Math Learning Environment to Support Student Retention in STEM

January 2019

A. Summary

Department:

Mathematics

TA Assignments:

Fall 2015: Lab Assistant, Differential Equations and Linear Algebra (MATH 2250)
Spring 2016: Lab Assistant, Differential Equations and Linear Algebra (MATH 2250)
Fall 2016: Instructor, Business Calculus (MATH 1100)
Spring 2017: Instructor, Business Calculus (MATH 1100)
Summer 2017: Teaching Assistant, Mathematics Program for High School Students
Fall 2017: Instructor, Calculus II (MATH 1220)
Spring 2018: Instructor, Business Algebra (MATH 1090)
Summer 2018: Teaching Assistant, Mathematics Program for High School Students
Summer 2018: Instructor, School of Business Bridge Program
Spring 2019: Lab Assistant, Engineering Calculus I (MATH 1310)

Teaching Mentor:

Amanda Cangelosi (cangelos@math.utah.edu)

Nominee:

Allechar Serrano López (serrano@math.utah.edu, u1012921)

B. Proposal Narrative

Title: Building an Inclusive Math Learning Environment to Support Student Retention in STEM

UTA Assignment:

It is well known that supportive educational environments are positively linked to retention and persistence of underrepresented minority (URM) students in STEM. Having instructors and peers who “look like you” is a critical component of success in STEM education (Palmer et al., 2011). The *Salt Lake Tribune* recently published an article highlighting how the University of Utah made history by appointing its first female president, Ruth Watkins. In this article, Watkins stated that the university’s goals for diversity go beyond gender. She said: “It is important that the University of Utah, as a public research university, is everyone’s university...that we are a place where talented people from all backgrounds feel welcome and have the opportunity to succeed... Access without people leaving with the degree they came for is a very hollow promise... We have to think about how we can get people here and get them through their degree.”

As STEM fields tend to be dominated by white males, combined with the fact that an overwhelming percentage of early-year undergraduate students are enrolled in lower-division math courses, the university’s diversity goals would be well-supported by instructor awareness and training in inclusivity practices. This proposal expands upon previous math department UTA awards to solicit university-wide undergraduate student voice to

- awaken graduate teaching assistants (GTAs) to the significant presence of microaggressions in math classrooms and subsequent attrition rates in STEM;
- provide GTAs with actionable steps and resources to create and maintain inclusive classrooms;
- provide support to undergraduates outside their math classrooms;
- promote undergraduate recruitment and retention while advertising that the math department is actively responding to the university’s diversity goals through extra-departmental outreach.

There is a need for GTA awakening because interactions in the classroom affect the relation that students have with mathematics, and students and instructors perceive interactions very differently. As a woman of color, I have had multiple interactions that have impacted my perception of the climate in the math department. For instance, I was asked by a U.S. graduate student why the phrase “your English is very good” is considered a microaggression rather than a compliment as intended. On numerous occasions, my accent has been addressed by individuals in the department, similar to a student commenting in my instructor feedback that it was impossible to understand me or a faculty member asking me why my accent is different from other Costa Ricans’. Other instances of microaggressions in the classroom include a faculty member referring to me as “the one with the Mexican name” and a graduate student asking me about the color of my skin. Such interactions—and more importantly, their impacts—often invisibly pass by well-intended members of dominant groups, creating a culture of denial. This UTA proposal will leverage such interactions as teachable moments for GTAs.

In order to awaken members of the math department regarding microaggressions in the classroom and how these directly impact a student’s decision of pursuing a degree in STEM, I plan to compile stories from different student groups on campus, like American Indian Science and Engineering Society, Black Student Union, Latinos in Action, Inter Tribal Student Association, Pacific Islanders Student Association, Queer U, Queer & Trans Students of Color, Society for the Advancement of Hispanics/Chicanos

and Native Americans in Science, Somos Dreamers, and Women in Physics and Astronomy. During these meetings wherein I will serve as an ambassador from the math department, I will create a document that includes experiences of URM students in the math classroom and how these interactions impacted their relation with mathematics and their career choice. This will provide evidence for GTAs that a microaggression is neither abstract nor something that occurs far away.

During my time at the University of Utah, several graduate students have come to me with questions regarding race and ethnicity, expressing a desire to help their students, but do not know what can be done to provide this help. As there is a demand to provide GTAs with actionable steps and resources, some of my responsibilities as UTA will be the following:

- create a document with teaching techniques that improve the classroom experience for URM students and a list of contributions of underrepresented minorities to mathematics; this document will be included as part of the annual Teaching Assistant Training for first-year graduate students;
- coordinate quarterly workshops for instructors on topics such as: diversity and inclusion; exploring power and privilege; prejudice, bias, and discrimination; navigating the conflict zone, becoming an ally, and taking action;
- organize quarterly discussions for members of the math department to have an opportunity to ask questions about race, ethnicity, and gender;
- organize quarterly discussions with perspectives outside the math department, such as: College of Education, College of Social Work, and the School for Cultural and Social Transformation.

To provide support for undergraduate students outside their math classroom, I plan to:

- facilitate a discussion with a focus group of undergraduate students once per semester. Here, students will discuss their current experiences in a safe space. Information gathered will be used to improve teaching;
- build a schedule for bilingual tutoring with the Math Center; the bilingual tutoring does not require additional resources, we will ask the tutors that are already providing their services if they are willing to provide their services in another language, as I have successfully sought previously;
- create a survey for undergraduate students in order to obtain information about inclusivity and diversity in math courses.

Interaction with Undergraduates:

The Department of Mathematics interacts with undergraduate students from all majors, and success in math courses can determine which career these students will pursue or if they stay in college. Improving the quality of their education by creating a supportive environment increases their opportunities of success and academic achievement. This UTA proposal impacts students enrolled in math courses at any level and it will impact students in STEM majors more profoundly.

By providing information to GTAs about microaggressions in the classroom and attrition rates in STEM, undergraduate students will have instructors that are more conscious about implicit bias, microaggressions, and how to approach these situations. The environment of the math classroom will be transformed by actionable steps that will impact directly how math classes are taught in order to provide an inclusive classroom for all students. Undergraduates will have access to support outside the classroom to anonymously report relevant experiences involving their status as URM students and their interactions in the classroom. They will also have access to resources that accommodate their needs as URM students such as bilingual tutoring. By advertising that the math department is actively responding to the university's diversity goals, undergraduate students will have reaffirmation of our commitment

to a high quality educational experience, consistent with the words of President Watkins.

Mentor:

Amanda Cangelosi is a career-line faculty member of the mathematics department. She has a B.S. in Math Education and a M.S. in Statistics from Utah State University, and a post-baccalaureate in mathematics from Smith College. She taught secondary mathematics for nine years. Amanda serves as a university supervisor to math teaching majors during their student teaching assignments in local secondary schools and as the liaison between the department of mathematics, College of Education, Utah State Board of Education, and the Center for Science and Mathematics Education.

The UTA:

Allechar Serrano López is a fourth year graduate student in the Department of Mathematics. She has teaching experience in a variety of classes and is engaged in multiple outreach projects. Most of her outreach projects are aimed at promoting the participation of minorities in STEM as well as increasing the retention rate of underrepresented groups. She has worked with high school students for the last two summers in the department's Summer Mathematics Program for High School Students. Allechar was the instructor for the Bridge Program implemented by the School of Business, a program which was aimed at underrepresented groups in the School of Business; its main purpose was to ease the transition from high school to college in order to increase retention.

During Spring 2018, Allechar reached out to the Math Center and proposed to have bilingual tutoring available during the semester. The tutoring center was able to provide tutoring in Mandarin, Japanese, Russian, Spanish, and Korean. The main goal of this initiative was to create a welcoming environment for students of different backgrounds and countries.

During Fall 2018, Allechar co-organized, with Amanda Cangelosi and Christian Klevdal, *What is Math? Day* and visited 18 different math classes—over 450 students—in three different local public middle and high schools. The main purpose of this project was to visit classrooms that are not Honors/AP, to prioritize reaching underrepresented populations in STEM and specifically individuals who do not already express a particular interest in the quantitative sciences. Each 50-minute visit included a hands-on origami folding activity and a presentation relating the activity and different areas of mathematics. She also volunteered as a tutor in the Gear Up Program at West High School and as a teaching assistant for the University of Utah Math Circle. She is part of the mentoring network organized by the University of Utah Chapter of Association of Women in Mathematics and is currently mentoring two undergraduate female students. She is also supervising another female undergraduate student for MATH 5960 Special Projects.

Allechar has participated in various panel discussions regarding life as a graduate student, experiences as a woman in STEM, and teaching as an international student. She also been academic co-chair of the University of Utah Chapter of Latinos in Action since Fall 2016. Her projects for Spring 2019 include organizing the Speaker Series of Association of Women in Mathematics and a workshop for undergraduates that provides information about how to apply to graduate school in mathematics.

Prior Support:

During the last two academic years, the Department of Mathematics has received UTA support for three previous proposals. During the academic year 2017-18, Anna Romanova received support to teach special topics course on Representation Theory course and Sean McAfee received support for the Graduate Teacher Mentor (GTM) program. Sean tracked student-instructor interactions and provided feedback to mentees. During the academic year 2018-19, Anna Nelson and Rebecca Terry were awarded UTA support to continue the GTM program. Anna and Rebecca collected information about grades and

instructor feedback to measure the impact of the program.

Assessment Plan:

The success of the proposed program will be evaluated through several methods. To assess the initiative to help URM students in the classroom, I will quantify the number of student-instructor interactions and how these impacted URM students during meetings with student affinity groups on campus, focus groups discussions, and quarterly discussions with instructors, and compare data from term to term. I will design a survey to measure the factors that promote retention and persistence of URM students in STEM. This survey will collect information from student affinity groups on campus and math department instructors. Information collected through this survey will be used to compare the climate perceived by URM student and instructors in the math learning environment.

To assess the impact of the program on undergraduate learning and performance, I will compare student surveys about inclusivity in the classroom and anonymous reports during each term and meet with Lisa Penfold, who is in charge of the Math Center, to discuss the success of the bilingual tutoring program. To assess the teaching development of beginning GTAs, I will design evaluations to be completed by first-year graduate students at the end of their required Teaching Assistant Training in the Summer of 2019. Finally, to assess the efficacy of the quarterly workshops and discussions I will design pre- and post-workshop surveys to determine what knowledge was gained by participation in the workshop. The information collected from these surveys will be used to design future workshops that address the needs of instructors.

References:

- Course Enrollment Profile. The Office of Budget and Institutional Analysis, The University of Utah. Retrieved from <https://www.obia.utah.edu/data/student-data/course-enrollment-profile/> on December 25, 2018.
- Palmer, R. T., Maramba, D. C., & Elon, D. T. (2011). Qualitative investigation of factors promoting the retention and persistence of students of color in STEM. *The Journal of Negro Education*, 80(4), 491504.
- Wood, B. (2018, January 28). For Ruth Watkins, new University of Utah president, the job centers on students while also making history. *The Salt Lake Tribune*. Retrieved from <https://www.sltrib.com>