

Social justice, equity, and inclusion in opportunities to pursue STEM education and careers from pre-kindergarten through college and beyond

Participating Units:

Cato College of Education, Department of Educational Leadership
Division of Academic Affairs, ADVANCE Faculty Affairs and Diversity Office
College of Health and Human Services, Department of Kinesiology
College of Liberal Arts and Sciences, Department of Sociology
College of Liberal Arts and Sciences, Department of Physics and Optical Science
William States Lee College of Engineering, Department of Civil and Environmental Engineering

Responsible Individual:

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The target category for the submission is Existing and Emerging Excellence

However, we believe that this proposal also falls under Future Opportunity and Investment

Key Words:

Diversity, Equity, and Inclusion
Institutional Racism
Education
Social Justice

Executive Summary

The global community faces numerous challenges, including, but not limited to, current and future health and humanitarian crises, racial equity, and climate change. Addressing problems requires multidisciplinary approaches to inspire innovation by the best and brightest minds. However, this is not possible if we consider that historically individuals from under-represented groups and first-generation individuals have been excluded from opportunities to succeed in education, particularly in the Science, Technology, Engineering, and Math (STEM) domains. Providing opportunities for all individuals to be successful will require implementing strategic interventions at every stage of this life-long journey, starting with K-12 through higher education and beyond. Interventions will need to be multifaceted and include input from scholars in a variety of different fields. It will require continued research to determine the factors that impact students at different educational levels and lead them to exit or persist in STEM-related educational opportunities. Further, resources and tools must be developed to keep minoritized students interested, engaged, and ultimately, successful once they enter the workforce. These are just a few of the critical factors that need to be explored to ensure that all individuals who are interested in and want to participate in STEM-related career pathways can do so.

Evidence of Strength and Excellence

Our scholar collaborators have demonstrated excellence and a national reputation not only in their academic fields, but also in the realm of promoting educational opportunities for URM students. This is underscored by their ability to secure NSF Funding, their publication records in journals that impact the field, presentations at national meetings and invited talks. Elizabeth Stearns, Brett Tempest and Lisa Merriweather collaborate with Yvette Huet and Andrea Dulin as members of the IChange Team, which is charged with developing strategies to meet the goals of Aspire: The National Alliance for Inclusive and Diverse STEM Faculty. ASPIRE's vision, to increase the learning, persistence, and completion of students from underrepresented groups (URG) in colleges and universities in STEM to increase their contributions to the U.S. STEM enterprise, aligns perfectly with the goals of this R1 proposal. Identifying social justice, equity, and inclusion in opportunities to pursue STEM education and careers as an area of excellence for UNC Charlotte will support efforts in building collaborations both within UNC Charlotte in multiple disciplines and also outside of the institution.

Yvette Huet has worked in the area of student and faculty success for over 20 years. Dr. Huet has a national reputation as a scholar in biomedical research and she has been awarded 11 externally funded grants as PI (including NIH and NSF). Her awards demonstrate her recognition in the areas of mentoring, including a McNair Outstanding Mentor Award in 1996. Her work has included supporting the skills of underrepresented students through the Ford Foundation Fellowship program, where she has been actively involved in numerous domains for over 20 years. She is the current PI for UNC Charlotte on an NSF AGEP-NC Alliance award and she is the UNC Charlotte Director for the National ASPIRE Alliance. Her work with the NSF ADVANCE, NSF INCLUDES, and AGEP programs has resulted in her presenting at national and international venues.

Andrea Dulin has worked with Yvette Huet in the area of student and faculty support for the past 9 years as Project Director of the ADVANCE Faculty Affairs and Diversity Office. Prior to working with Dr. Huet, Dr. Dulin was a scholar in neuroscience research. Since joining the ADVANCE Office, Dr. Dulin has played an integral role in applying for and obtaining funding for the Office, and developing and implementing professional development programming for both faculty and post-doctoral fellows on campus. She serves as the Project Director for UNC Charlotte's ASPIRE Alliance, and she supports Dr. Huet in her role as PI for UNC Charlotte on the NSF AGEP-NC Alliance. She is certified to facilitate mentoring workshops designed to make faculty better mentors, particularly for URM graduate students.

Brett Tempest, is an associate professor of civil and environmental engineering, whose research areas include the durability of infrastructure and building materials as well as engineering education. As such, Dr. Tempest has focused on creating opportunities for students from a variety of backgrounds to be successful as graduate engineers. Dr. Tempest is the PI of the Engineering Academic Pathways program at UNC Charlotte, an S-STEM NSF funded project to support the success of engineering students from low-income family backgrounds. He was previously co-PI of the research initiation grant in engineering education, "Investigating the Role of Interaction, Attitudes, and Intentions for Enrollment and Persistence in Engineering Among Underrepresented Minority Students." These projects have established a theme around creating pathways and opportunities for underrepresented and underserved students to pursue STEM careers. A primary feature of Dr. Tempest's scholarship is a strong component of outreach and community engagement which includes strong collaboration with the public school systems surrounding UNC Charlotte. Dr. Tempest has also deployed engagement programs such as,

“Service-Learning: A Bridge to Engineering for Underrepresented Minorities - An Action Research Project,” which utilized the pedagogy of service-learning to inform high school students about preparation for engineering majors in college.

Elizabeth Stearns, Professor of Sociology and Public Policy whose research centers on inequality, particularly gender and racial/ethnic inequalities as they are manifested, produced, and reproduced in various levels of the American educational systems. She has led and participated on multi-disciplinary and multi-institutional research teams that have investigated how the roots of college-level STEM disparities are established, maintained, and transferred from middle and high schools into community colleges and four-year institutions. This research was supported by two large grants from the NSF. The project team published and presented extensively, to education policy and STEM education-oriented audiences, as well as to policymakers. Most recently, Dr. Stearns has built on the findings from this basic research to implement a multi-institutional S-STEM grant for low-income students studying biological sciences. This grant awards scholarships to students at partner community colleges, with continuing funding when they transfer to UNC Charlotte and major in biological sciences.

Rosario Porrás-Aguilar is an Assistant Professor in the Department of Physics and Optical Sciences and Head of the Active and Reconfigurable Optics. She is committed to fostering inclusive environments where all underrepresented groups feel welcome in STEM areas. She has organized numerous events to encourage and promote women's involvement in STEM areas in Mexico and, recently, in the participation of first-generation Latinx students in the Charlotte area. Dr. Porrás organized and conducted workshops on optics and photonics for three months during a tour through rural and indigenous areas in southern Mexico that reached thousands of students. She served as the advisor to the Women in Optics SPIE Student Chapter at the Institute for Research in Astrophysics, Optics, and Electronics in Puebla, Mexico from 2016 – 2018. Together with this student chapter, Dr. Porrás organized the "Science in Heels" workshop for girls in high school (about 100 students from all over Mexico) in 2017 and 2018. Dr. Porrás was instrumental in the project "For More Women in Science and Technology" in Mexico to foster high school girls' interest in STEM areas throughout the country in 2018. This event included workshops for K-12, Undergraduate students, and College teachers (more than a thousand participants and tens of speakers). In 2019, Dr. Porrás enabled collaboration between the Center for STEM Education at UNCC and the Camino Community center in Charlotte to participate in the "Back to School" event for the Latinx Community in Charlotte. Dr. Porrás has been a speaker at numerous workshops on increasing the participation of women in science in national and international forums. She was involved in the creation of the "Math & Science First" Learning Community focused on freshman and first-generation students in STEM-related areas at UNC Charlotte in 2019. This year, Dr. Porrás was awarded the NSF CAREER Award and the Cottrell Scholar Award for her revolutionary scientific contributions and her outstanding contributions to STEM education.

Lisa Merriweather is an Associate Professor of Adult Education in the Department of Educational Leadership. Dr. Merriweather has served as a mentor to several African American doctoral students and is the co-PI for UNC Charlotte on an NSF AGEP-NC Alliance award as the social science researcher. She also serves on the IChange Team for the ASPIRE Alliance. She has worked collaboratively with Dr. Tempest bringing qualitative research expertise to the engagement program “Service-Learning: A Bridge to Engineering for Underrepresented Minorities - An Action Research Project”.

Alignment with Regional and National Priorities

UNC Charlotte is currently undertaking a strategic planning process, building upon previous successes. The draft strategic plan includes the key values of “Diversity, Equity, and Inclusion” and “Access and Social Mobility,” and also the focus to “live our values by leading in equity and engagement.” Included in this focus area is the following goal: 1) Be a leader in diversity, equity, and inclusion to support our students, employees, and alumni and heighten our impact on society [emphasis added]; and 3) Invigorate policies and practices that support our faculty and staff to create a University that will be one of the best places to learn and work. Chancellor Gaber has made diversity, equity, and inclusion (DEI) a priority, which is underscored by the appointment of the Chancellor’s DEI Council. By April 2021, the DEI Council is expected to update the University’s Plan for DEI to “achieve the goal of creating and ultimately, sustaining, a model campus for DEI” (Office of Diversity and Inclusion, 2020).

UNC Charlotte has a demonstrated commitment to this goal, including its participation in ASPIRE: The National Alliance for Inclusive & Diverse STEM Faculty Institutional-Change Initiative, and as Co- PI in the NSF AGEPE NC Alliance, focused on increasing the number of URM students in graduate education. UNC Charlotte’s commitment to ensure students have the opportunity to be successful is underscored by the Office of Academic Diversity and Inclusion’s (OADI) work. While open to all students, the Office emphasizes academic support to underrepresented students. Indeed, a national nonprofit organization called “Excelencia in Education” ranked UNC Charlotte first among four-year colleges in the state of North Carolina for the number of Latino students enrolling and receiving degrees at the University.

Prioritizing DEI is also consistent with the UNC System’s strategic plan. The plan states that the system’s campuses “... form an inclusive and vibrant university system, committed to excellence and the fullest development of a diversity of students, faculty, and staff” (University of North Carolina System, 2017). The UNC System Racial Equity Task Force’s recently released Final Report also highlights the need to prioritize DEI initiatives. Among the Task Force’s recommendations are the commitments to “Examine and improve recruitment, hiring, promotion, and retention policies and practices to build a racially diverse and equitable University of students, faculty, staff, and top leadership” and to “Develop and support programs that improve equitable outcomes” (University of North Carolina System, 2020).

The promotion of DEI is also consistent with regional and national priorities. The Council of Graduate Schools, for example, states that, “Supporting diversity and inclusion in graduate education is both an economic and a moral imperative” (Council of Graduate Schools, 1996; Updated and Reaffirmed 2019; emphasis added). The U.S. Department of Education states that, “More work remains to ensure educational opportunity for all students in higher education.” (Office of Planning, 2016). During his recent confirmation hearing, Secretary for Education Miguel Cardona indicated that that the Department of Education will “boldly address education inequities head-on” moving forward (Murakami, 2021). The National Science Foundation, which has funding mechanisms to support DEI initiatives in education has also affirmed a commitment to fostering the creation of a “diverse, high-performing workforce that draws from all segments of society and values fairness, diversity, and inclusion to promote the progress of science” (Office of the Director, n.d.). Private foundations also support DEI initiatives in higher education, including The Howard Hughes Medical Institute, which funds initiatives to support universities efforts to “substantially and sustainably increase their capacity for inclusion of all students, especially those students who belong to groups underrepresented in science.”

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Contributing Members

Participating Faculty	Title	Expertise
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Andrea Dulin, PhD	Project Director ADVANCE Faculty Affairs and Diversity Office Division of Academic Affairs	Diversity Equity, and Inclusion; Program Evaluation
Lisa Merriweather, PhD	Associate Professor, Educational Leadership Cato College of Education	Equity, Social Justice, Adult Education, Doctoral Education, Informal Education, Mentoring
Rosario Porras-Aguilar, PhD	Assistant Professor Department of Physics and Optical Science College of Liberal Arts and Sciences	Science Promotion; Community Outreach
Elizabeth Stearns, PhD	Professor and Undergraduate Coordinator Department of Sociology College of Liberal Arts and Sciences	Race and Gender, Sociology of Education
Brett Tempest, PhD	Associate Professor Department of Civil & Environmental Engineering William States Lee College of Engineering	Engineering education research; Student diversity; Service Learning