Supporting STEM Education at UNCG by facilitating faculty networking, public outreach, curriculum innovation, and program grants.
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To Our Stakeholders

STRATEGIC HIGHLIGHTS
In our ninth year, the RISE Network continues to host inspiring speakers, productive faculty networking events, popular public outreach programs, grant proposal support and program management.

The RISE Network hosted three nationally recognized STEM Education experts for the speaker series and held five productive networking events for faculty from The College of Arts and Sciences, School of Health and Human Sciences, School of Education, and Joint School of Nanoscience and Nanoengineering.

Our fifth annual Science Everywhere event was a huge success, attracting more than 3000 participants and involving hundreds of faculty and student volunteers.

RISE Network leadership continues to be highly active in grant oversight and grantsmanship activities.

FINANCIAL HIGHLIGHTS
In 2018-19 the Provost's office supported the RISE Graduate Assistant and The Vice Chancellor for ORE provided funds to support operational costs. The Provost's Office also provided funds for a graduate assistant for the STAMPS program and supported a graduate assistant position for the facilitation of the campus wetlands. The College of Arts and Sciences Dean's office is also supporting summer salary for the Assistant Director. The Deans of CAS and the School of Education supported the Speaker series in 2018-19.

In 2018-19, the STEM departments were not asked to contribute to RISE's operation funds. However, this may change in 2019-20. Departments participating members on the RISE advisory board include Biology, Teacher Ed/Higher Ed, Mathematics, Physics, Geography, Chemistry, JSNN, Computer Science, and Kinesiology.

For 2019-20 with leadership changes, the Provost will again fund the RISE Graduate Assistant, as well as graduate students for STAMPS and the Wetlands. In addition, the Provost's Office will support part of the new Director's role. ORE will support the remaining release time for the Director and part of the Assistant Director's summer funds.

OPERATING HIGHLIGHTS
RISE seeks funding to support many activities: The UNCG Science Festival was supported by the NC Challenge grant as well as generous donations and support from several offices on campus. Best Logistics and LabCorp also provided funds. The Provost's Office also supports the project.

STAMPS: In 2015-16, RISE took on a leadership role for STAMPS (Science, Technology, and Math Preparation Scholarships) program. In 2016-17, Enrollment Management supported 21 new to UNCG students, and the College of Arts and Sciences is awarding small scholarships to continuing students. In 2017, UNCG received funding from the National Science Foundation for a new STAMPS program which was the FIRST RISE Network NSF proposal to be submitted to the National Science Foundation and FUNDED (5 years of funding Drs. Faeth, Patton, Sametz, Phillip, Taub, $999,953.00.). Dr. Boyce replaced Dr. Taub on the grant. When Dr. Faeth retired, Dr. Schug became a co-PI. The new funding supported 20 new to UNCG students for 2017-18; 18 in 2018-19, and 15 students were admitted for 2019-20. Enrollment Management is identified students who met the criteria for STAMPS: new to UNCG, 3.0 or better, 1100 SAT or ACT equivalent. All potential STAMPS students submit an application to the PIs. RISE is the Advisory Board for the new program. The Provost's office supports two GA and administration of the program.

Our research and evaluation will help us to understand whether or not we are meeting our goals and objectives and how to revise the project over time. What we learn will be shared with our University and will have lasting impact on how we recruit, retain, and mentor STEM students as well as other students. Findings will also be shared broadly.

In 2018-19, RISE facilitated two NSF proposals. In November we submitted a $5 million grant for a Louis Stokes Minority Participation project. The Mountain to Sea North Carolina Louis Stokes Alliance for Minority Participation program (M2S NC LSAMP) will be a new alliance among six, four-year, mid-sized universities
that enroll students from across the geographic range of North Carolina led by University of North Carolina Greensboro and including faculty and students from Appalachian State University, East Carolina University, University of North Carolina Asheville, University of North Carolina Wilmington, and Western Carolina University. The geographic range encompasses mid-sized regional universities across NC, from the Appalachian Mountains, to the Piedmont region, then the Coastal Plains, and finally, the Carolina coastline.

In March, we submitted a new S-STEM program: Clear Pathways ($1,000,000). The focus of Clear Pathways is to ensure the successful transition of STEM transfer students from Community Colleges to the University.

LOOKING AHEAD

The RISE Network had a highly successful year, inspiring the leadership and members to think even more creatively about the impact their scholarly activities may have on STEM education at UNCG and generate new and exciting ideas that move UNCG into the forefront of innovative STEM education programs. We intend to continue and improve our successful programs.

After dedicating numerous years of work to the RISE Network, Malcolm D. Shug and Lynn Sametz have decided to step down from their roles of co-directors. The RISE leadership positions will be filled with a new organizational structure. Christopher K. Rhea, Kinesiology is the incoming director of RISE and Tracey Howell, Mathematics will be the associate director.

Leaders and members will continue focusing attention on improving retention and success of undergraduate STEM majors, particularly those in underrepresented groups. They also intend to explore active approaches to in recruiting, and retaining quality STEM faculty across various departments.

Directors
Malcolm D. Schug, Ph.D. and Lynn Sametz, Ph.D.

New Directors
Director: Christopher K. Rhea, Ph.D.
Associate Director: Tracey H. Howell, Ph.D.
July 1, 2019
The RISE Network Speaker Series

The goal of the speaker series is to bring nationally recognized experts in STEM research and instruction to UNCG. This speaker series:

1. Brings new ideas to the UNCG faculty that will stimulate the conversation and generate new ideas around teaching and learning in the STEM areas, and especially secondary mathematics and science education.
2. Reaches a broad audience, including faculty involved in STEM research and instruction, as well as faculty who are interested in other areas of research and teaching, and graduate students in STEM areas and education.
3. Continues to evolve into a regular speaker series that is offered each year.

The series is supported by the College of Arts and Sciences, the School of Education, and the School of Health and Human Sciences. We are grateful for this support. We can see the impact of the series at UNCG and the potential to produce multiple ripple effects through other disciplines on campus. On behalf of the RISE Network, we would like to thank all of the funders for making the 2018-19 RISE Network Speaker Series a success.

Charles Ichoku  
NASA  
September 5th, 2018  
The Wonders of Wildfires

Charles Ichoku talked about the climatic influences of wildfires, their patterns, and their effect on agriculture in the northern Africa region. He discussed innovative remote sensing approaches to characterize fires and their smoke emissions. The discourse expanded to the impacts on the environment and climate of the atmospheric aerosols caused by fires. In particular, trying to understand if the fires, most of which were lit by farmers and herders, might be contributing directly or indirectly to changing rainfall patterns within the region.

Iris Wagstaff  
American Association for the Advancement of Science (AAAS)  
November 8th, 2018  
Innovations in STEM: Broadening Participation and Pathways to Success

Dr. Iris Wagstaff spoke about the future of the STEM workforce and the need to increase educational and career pathways for underrepresented groups. She offered a three-pronged foci approach which included scientific literacy, broadening participation in STEM and developing the STEM workforce. The presentation emphasized best practices and models for cultivating a diverse cadre of STEM professionals at the intersection of science, education, and policy.
**Jenny Dauer**

*Assistant Professor of Science Literacy in the School of Natural Resources at the University of Nebraska*

March 25th, 2019

*A Framework for Decision-Making to Promote Science Literacy in Large Enrollment Undergraduate STEM classes*

Dr. Jenny Dauer deliberated the need to prepare students to make effective and quality decisions grounded in STEM and for complex, real-world challenges. She argued that teaching science content knowledge isn’t enough to develop science-informed decision-making skills.

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**Networking Events**

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**Charles Ichoku**

*NASA*

September 6th, 2018

*The Past and Future of Lake Chad: Africa’s Great Lake*

This networking lunch engaged twenty-three guest in a set of conversations about Lake Chad, a water source shared by four countries and over 30 million inhabitants, which is currently facing severe drought. Dr. Ichoku spoke candidly about difficulties in studying the causes and the future of the lake. He further recommended possible scientific approaches to mitigate adverse impacts on the populations.

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**Iris Wagstaff**

*STEM Program Director at the American Association for the Advancement of Science (AAAS)*

November 8th, 2018

*NexGenSTEM: Cultivating Tomorrow’s Diverse Global Workforce*

This networking event spurred an informative conversation about the underrepresentation of groups in STEM. Iris Wagstaff highlighted some educational and professional development efforts, as well as shared evidence-based practices and models at the undergraduate and graduate levels to expand opportunities for underrepresented students. Thirty guests, both students and faculty, attended the RISE luncheon and participated in a lively conversation about broadening participation for underrepresented groups in STEM.
Navigating a Pathway from Teaching and Science to Science Education Research

This networking lunch engaged the audience in a conversation about improving students' science literacy and decision-making for real-world challenges. Jenny Dauer suggested supporting theories and practices in improving and preparing students about complex socio-scientific issues. She further explained the differences between fast thinking or informal decision-making and slow thinking or structure decision-making and their ability to optimize cognition.

Hidden No More
February 27th, 2019

STEM Women of Color

This networking event spurred a conversation between the panel of speakers, Ann Vaughan Hammond, Peggy Vaughan, Crystal Harden, Drs. Jamila Simpson and Stephani Page, and the 100 + audience members. They brought attention to the considerable challenges faced by women of color when pursuing careers in science, technology, engineering, and mathematics. As women of color who have made significant contributions in their field, the speakers discussed what it is like to be a leader within their respective fields and how we can help expand diversity in STEM education.

RISE and Office of Sponsored Programs Networking Lunch
January 30th, 2019

Networking across Boundaries: Meet a New Collaborator

This popular networking event lead by Aubrey Turner and Julie Voorhees, Office of Sponsored Programs, was attended by 30 faculty representing CAS, HHS, SOE, and JSNN. Faculty facilitators used keywords and word cloud to connect faculty with similar backgrounds of research and interests. The event was an excellent opportunity for faculty and staff to network with researchers across campus and has led to multidisciplinary research and STEM education projects.
UNCG Science Everywhere Day – April 13th, 2019: The Fifth Annual Science Everywhere was an amazing success. University staff, students, and faculty from across campus volunteered their time and energy to present over 100 hands-on science activities to the community. We had over 3000 participants come to the festival, even on a rainy day!

Over 120 STEM professionals, including faculty, graduate students, and undergraduates helped to present science to the community. In addition, we had 300 volunteers, including undergraduate and graduate students, UNCG Middle College students and preservice teachers, as well as 30 students from Welborn Middle School helped make the festival a success. Spanish interpreters and American Sign Language interpreters were available for non-English speaking and deaf communities, respectively.

- The entire Campus was filled with children, parents and grandparents, all of whom were actively engaged in Science.
- This year’s NC Science Festival theme was “Made in NC”.
- Pre-service education students led activities in the School of Education for learners of all ages. These future teachers shared what they are learning with a diverse audience.
- Sullivan Science Building, Petty Science Building, The School of Education Building, and the Coleman building housed all the other events that included petting reptiles and amphibians, programming a robot, K-9s and hands-on science from every discipline.
- The Joint School of Nanoscience and Nanoengineering joined the fun and brought their traveling educational NanoBus to the event.
- The School of Health and Human Performance was involved and many guests were able to experience the science of human movement and the science behind emotions.
- UNCG’s Planetarium provided three star-gazing shows.

Again, our STEM undergraduate and graduate students shared their knowledge, communicated their research to a broad audience, and collaborated with STEM oriented organizations from the Triad community.
Our guests: All attendees were given a passport/brochure, a tote bag and a t-shirt at the welcome tables. Children and youth received stamps at each station and when they left the event, they received prizes and a Junior Scientist Certificate—children of all ages enjoyed the festival from preschool age to high school students. This was a great day for UNCG, creating a fun and engaging learning environment for adults, teens, and kids alike. The adults were amazed by all of the things we do at UNCG. Science was everywhere. With over 100 activities on campus, from 3-D printing to making liquid nitrogen ice cream, there was something for everyone. Our only complaint was I couldn’t get to everything. Our response join us again next year April 25, 2020.

The RISE Network in partnership with the University of North Carolina Greensboro’s Offices of New Student Transitions & First Year Experience, University Events Team, University Communications, Intercultural Engagement, and the School of Education planned and implemented the Fifth Annual Science Everywhere Festival on April 13, 2019. Sponsors included the NC Science Festival, Best Logistics Group, WFMY News, LabCorp, UNCG Self Design Studio, and the National Science Foundation (NSF).

(See attached Appendix 3: UNCG Science Everywhere Day)
The UNCG Wetlands Project

Summary of the UNCG Wetlands Project

The UNCG Wetlands Project was initiated in 2016 and continues to be a productive and important focal point of campus activity in STEM Education. The Wetlands Committee is chaired by Drs. Malcolm Schug and Lynn Sametz, and has an appointed Graduate Assistant, Kristina Morales, who completed her second year as a Wetlands GA. This academic year, the committee chairs, and past chair, Dr. Parke Rublee (retired), wrote an op-ed for the Greensboro News and Record titled “UNCG Saves water resources as a community” highlighting the link between UNCG and the larger campus and city community that are involved in the UNCG Wetlands Project.

Faculty continue to use the UNCG Wetlands as an environmental educational resource in their courses in biology, chemistry, geography, social work, and community and therapeutic recreation departments. Some examples are class activities that explore wetland diversity in BIO 105 Major Concepts of Biology for non-biology majors, BIO 112 Introduction to Biology for majors, BIO 315 Ecology and Evolution laboratory for majors, BIO 522 Landscape Ecology, and BIO 549 Scientific Writing. Our new faculty member in Geography, Environment, and Sustainability, Sarah Praskievicz is developing course-based projects that align with her research in hydrology fluvial geomorphology and water resources.

Dr. Matina Kalcounis-Rueppell taught a scientific writing course for graduate students and senior undergraduates focused on analyzing acoustic monitoring data at the wetlands and two control sites similar to the wetlands to assess bat activity and diversity. The course culminated in a manuscript that is now published in the international journal “Wetlands”.

This year has been a year of expanding our education, outreach, and beginning research projects. Hundreds of students have used the wetlands as a learning experience.

Drs. Heidi Carlone and Sara Heredia have integrated the wetlands into research on science identity and environmental curriculum as part of their NSF SSTEM – BRIDGES funded project.

Dr. Martin Tsui and his doctoral student, Kristina Morales, also the wetlands graduate assistant, have continued study of methyl mercury production in urban wetland environments and are seeking external funding to support the research and outreach efforts.

Dr. Gideon Wasserberg has ongoing research on mosquito ecology focusing, in part on the campus wetlands.
The UNCG wetlands have become a focus of courses in undergraduate research (CUR) as part of the NSF funded CUR Transformation Project of which the Biology and Chemistry Departments are investigators. The PI’s on the project are Drs. Iglika Pavlova, Malcolm Schug, Jerry Walsh, and Terry Niles. As part of this project, national experts in CUR integration in biology and chemistry curriculum visit UNCG annually and have emphasized the opportunities that the UNCG wetlands provide for being a national model for using an outdoor living laboratory as a mechanism for hands-on research experiences for undergraduate education.

We have formed a formal partnership with the Greensboro Science Center as they initiate renovation on their own wetland bordering Country Park. The GSC Summer Camp has developed a wetland activity that is focusing on comparing the GSC and UNCG wetland water chemistry and biodiversity. Middle school and high school aged campers will visit both sites in summer of 2019 as part of their field experience.

The wetlands have attracted visitors from Grimsley High School and other local middle and high schools. They were featured as events in the Greensboro Tech Savvy Event sponsored by the AAUW and were popular activities in Science Everywhere. Dr. Malcolm Schug represents the Wetlands Project as a Sustainability Faculty Fellow and routinely gives presentations about the UNCG wetlands. The local Audubon Society released their UNCG Wetlands bird count data and invited Schug, Sametz, and Rublee to give a talk to the local chapter. They also participated in the Science Everywhere festival to teach participants about birds in Peabody Park and the UNCG wetlands.
Proposed Action Items for 2019-2020

Through Network meetings and other activities, the RISE Network continues to serve as a catalyst for grant opportunities and programs, as well as a conduit for connecting “STEM” faculty and mentoring new faculty in STEM related activities.

In 2019-2020, RISE will have new leadership. Therefore, as a Network, we will:

a) Transition in leadership
b) Analyze our goals and objectives leading into 5-year plan

Recruitment and Retention of Faculty and Students

We will advocate for the recruitment and retention of quality STEM (related) faculty and provide mechanisms for enabling this to happen such as:

c) Advocate for and facilitate the recruitment of joint hires of new faculty in the area of science education
d) Support new STEM faculty though encouraging their involvement in grant opportunities, networking activities, mentoring and linkages to other STEM related faculty.
e) Support submission of grant proposals that increase our ability to attract and retain quality STEM and STEM Education students, particularly women and underrepresented groups.
f) Serve as Advisory Board for funded activities promoting STEM Education such as the NSF STAMPS program.
g) Facilitate UNCG’s STEM funded programs such as MARCU, ITEST and INCLUDES
h) Develop a five-year plan for RISE

Research and Education

Identify UNCG employees at all levels and graduate students who are actively interested in pedagogical reform in STEM disciplines and encourage them to participate in RISE activities.

We will continue to work with the Office of Sponsored Programs and other UNCG entities to identify and submit proposals for funding opportunities that will strengthen STEM research and instruction on campus and provide other avenues for showcasing RISE issues. These include:

a) The preparation of interdisciplinary NSF, DOD, NIH, DOE, and foundation grant applications.
b) The continuation of the RISE speaker series with speakers that span RISE issue areas.
c) The continuation of RISE networking events/meetings to showcase RISE issues through speakers and coordinated topics that allow faculty, the UNCG community, community partners, k-12, LEA’s, and local universities to share information and build upon common resources and bring together faculty with common research interests around funding opportunities.
d) The enhancement of the RISE webpage and social media.
University and Community Collaborations

We will work cooperatively with other UNCG networks and units, with local and statewide organizations and agencies, and with the business community to promote STEM research and instruction within UNCG and our community. RISE does not house ongoing projects, but instead facilitates programs and projects initially and find more permanent homes for them as appropriate. For example:

a) Outreach Events and Festivals
   i. Facilitate the Science aspect of the sixth Annual Science Everywhere (April 25, 2020).
   ii. Promote Tech Savvy and IT for Girls (with AAUW)

b) Campus outreach support
   i. Transition the UNCG Wetland Committee Meetings and support sustainable wetlands on campus.
   ii. Facilitate trainings and conferences with STEM departments to encourage faculty and staff to learn new ways to communicate their science and to present STEM research and findings to reach a diverse range of audiences.
   iii. Build collaborations and partnerships between RISE and Advancement to promote RISE issues and increase collaboration and support.

State and National Outreach Support

a) Identify opportunities to collaborate with local businesses, community and state networks, JSNN, Gateway, and NC A&T to create STEM research and education and outreach to K-12 partners; and identify leadership opportunities for UNCG in STEM research and education.

b) Provide additional connections to our Alumni for the purposes of highlighting STEM and STEM education at UNCG, making connections for internships, and promoting campus activities.

c) Facilitate the North Carolina PKAL meeting (March 2020).
The RISE Network Advisory Board

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
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<tbody>
<tr>
<td>Malcolm Schug</td>
<td>Faculty co-director for the RISE Network and Associate Head, Department of Biology, College of Arts and Sciences</td>
</tr>
<tr>
<td>Lynn Sametz</td>
<td>co-director of the RISE Network and Project Director for UNCG’s STAMPS NSF program</td>
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<tr>
<td>Vicki Jacobs</td>
<td>Yopp Distinguished Professor of Mathematics Education, Department of Teacher Education &amp; Higher Education, School of Education</td>
</tr>
<tr>
<td>Stephen Tate</td>
<td>Head and Professor Department of Computer Science, College of Arts and Sciences</td>
</tr>
<tr>
<td>Jerry Walsh</td>
<td>Professor Department of Chemistry and Biochemistry, College of Arts and Sciences</td>
</tr>
<tr>
<td>Jeff Patton</td>
<td>Professor Department of Geography, College of Arts and Sciences</td>
</tr>
<tr>
<td>Matina Kalcounis-Rueppell</td>
<td>Head and Professor Department of Biology, College of Arts and Sciences</td>
</tr>
<tr>
<td>Promod Pratap</td>
<td>Associate Professor Department of Physics, College of Arts and Sciences</td>
</tr>
<tr>
<td>Ang Chen</td>
<td>Professor Kinesiology Department, School of Health and Human Sciences</td>
</tr>
<tr>
<td>Dan Herr</td>
<td>Professor and Nanoscience Department Chair, Joint School of Nanoscience and Nanoengineering</td>
</tr>
<tr>
<td>Edna Tan</td>
<td>Associate Professor of Teacher Education and Higher Education, School of Education</td>
</tr>
<tr>
<td>Heidi Carlone</td>
<td>Professor of Teacher Education and Higher Education, School of Education</td>
</tr>
<tr>
<td>Robert Anemone</td>
<td>Department Head, and Professor of Anthropology, College of Arts and Sciences</td>
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<tr>
<td>Lee Phyllips</td>
<td>Director Undergraduate Research and Creativity Office</td>
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<tr>
<td>Esther Leerkes</td>
<td>Associate Dean of Research, HHS</td>
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<tr>
<td>Troy Sadler</td>
<td>Associate Dean Research, School of Education</td>
</tr>
<tr>
<td>Talia Fernos</td>
<td>Associate Professor Department of Mathematics, College of Arts and Sciences</td>
</tr>
<tr>
<td>Christopher K. Rhea</td>
<td>Associate Professor &amp; Associate Department Chair for Research Kinesiology Department, School of Health and Human Sciences</td>
</tr>
<tr>
<td>Tracey Howell</td>
<td>Senior Academic Professional, Department of Mathematics and Statistics, College of Arts and Science</td>
</tr>
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RISE Network Member Grant Activity

Federal:


Koerner, S.E. (Co-PI). NSF MRA - 2020-2023; Collaborative Proposal: MRA: Estimating dark diversity in space and time to understand long-term vegetation dynamics at grassland NEON sites. $185,771 to UNCG. Pending.


Koerner, S.E. (Co-PI). NSF MRI - 2020-2024; Lead PI Raymann,. Mid-scale RI-1 (M1:DP): UNCG’s Plant and Pollinator Center for genes to ecosystem studies – enhancing research for environmental sustainability in the face of anthropogenic change. $4,203,825 for UNCG. Not Funded.

LoJacono, C.T. (Student), Rhea, C. K. (Principal), " Motor learning and transfer of functional gait and balance skills developed in a 6-week immersive virtual reality training program," Graduate Student Research Grant Sponsored by North American Society for the Psychology of Sport and Physical Activity (NASPSPA), $2,000 (June 2018 – May 2019).


Praskievicz, S. J. (Principal), "Large woody debris in low-gradient floodplain rivers: Spatial distribution, physical controls, and geomorphic effects," Sponsored by National Science Foundation (NSF). Not Funded.


Rathnayake, H. P. (Principal), "Nano Mosaic - A Novel Nano-Framework for Lithium," Sponsored by National Science Foundation (NSF I -Corps), $50,000. (Recommended and award will be announced soon).

Rathnayake, H. P. (Senior Personnel), "MRI: Acquisition of a Cryogenic High-Resolution Transmission Electron Microscope for Multi-disciplinary Research and Teaching at a Leading R-2 Research Institution," Sponsored by National Science Foundation (NSF), $5678,000.00, Declined.

Rathnayake, H. P. (Principal), "IGE: Nanotechnology Interactive Communication Commons (NICC)," Sponsored by National Science Foundation (NSF), $300,000.00, Declined.

Rathnayake, H. P. (Principal), "DOD HBCUMI Instrumentation: Acquisition of a High-Resolution Transmission Electron Microscope for Interdisciplinary Graduate Research and Educational Training," Sponsored by Department of Defense (DOD), $600,000 (Pending).

Rathnayake, H. P. (Principal), "Metal-biopolymer conjugates for sub-5 nm patterning and Functional Diversification on Useful Platforms," Sponsored by National Science Foundation (NSF), $300,000.00, Declined.


Rhea, C. K. (Principal), Ross, S. E. (Co-Investigator), "Investigating training associated blast pathology (INVICTA)," Sponsored by Henry M Jackson Foundation for the Advancement of Military Medicine, submitted on April 23, 2018, duration if funded: 5 years, award if funded: $1,017,201 . Under Review.

Rhea, C. K. (Principal), Ross, S. E., "Rehabilitation Evaluation of TBI Function prior to Return-to-full-duty (RETURN Study)," Sponsored by Department of Defense, Congressionally Directed Medical Research Program (CDMRP), Complex Traumatic Brain Injury Rehabilitation Research Clinical Research Award, Submitted on December 14, 2018, duration if funded: 3 years, award if funded: $2,000,000. Under Review.

Schug, M. (Principal), From the Mountains to the Sea. (Submitted November 2018). National Science Foundation.


Schug, M. D. (Principal), "EMERGE in STEM - Education for Minorities to Effectively Raise Graduation and Employment in STEM," Sponsored by North Carolina Agricultural and Technical State University (NCAT), $39,981.00


State:


Local:


“STEM Teacher Leader Collaborative: Gift from Summit Rotary” (Complete). (March 1, 2019). $2000 Gift from Summit Rotary Club of Greensboro for the STEM TLC. Involves Community Engagement.


Foundation:


Carlone, H. B. (Principal), "UNCG STEM Teacher Leader Collaborative," Sponsored by The UNCG Excellence Foundation, Inc (Duke Energy Foundation), $30,000.00.


Carlone, H. B. (Principal), "STEM Adventure Club (STAC)," Sponsored by Burroughs Wellcome Fund, $180,000 (with Heather Moorefield-Lang, LIS and Ben Dyson, HHS, to fund an after-school STEM club at Moss Street Partnership School).

Howell, T. Yasaki, D. Co-Principal Investigators. Moving the Metric: Calculus Corequisite Pilot. $8,489.78. 2018-2019


Rathnayake, H. P. (Principal), "A novel heterocyclic ionic plastic crystal and its conformational dynamics," Sponsored by ACS Petroleum Research, $110,000.00, Declined.

Rathnayake, H. P. (Co-Principal), "Acquisition of high resolution, multimode AFM for local characterization of nanoscale materials.," Sponsored by North Carolina Biotechnology Center (NCBC), Declined.


Rathnayake, H. P. (Principal), "Development of titanium based novel oxide and oxynitride thin film systems for photovoltaic solar cells with high power conversion efficiency (PCE)," Sponsored by North Carolina Agricultural and Technical State University (NCAT), $250,000, Declined.


Schug, M. D. (Principal), "A collaborative proposal between chemistry and biology to scaffold undergraduate research across the curriculum at UNCG," Sponsored by University of San Diego, $805.78.
RISE Network Member Publications (*UNCG Students)


RISE Network Member Presentations

**National:**


*Banton, R. J., Rhea, C. K., Bauman, R., Duckworth, J. D. (2018, August). Military Health System Research Symposium, "Development of an effective primary passive screening process to identify individual at risk of blast exposure vulnerability: Gauging Ambulation In Training (GAIT)," Dr. (Non-Academic), Kissimmee, FL, United States of America. Accepted.


Carlone, H. B., Mercier, A., Metzger, S. R., Annual meeting of the American Educational Research Association, "First-grade students as epistemic agents in engineering at a high-needs elementary school," AERA (Academic), Toronto, Canada. Accepted. (April 7, 2019).


Echeverría, S.E., Wattenberg, A., Vasquez, E., Murillo, R., Huang, T. (2019, Feb). Understanding the type of walking behaviors Latinos engage in to support walking campaigns. Active Living Research Conference, Charleston, SC.


Lewis, E., Howell, T. (2019). Designing a corequisite class to increase student success in Calculus I. Paper presented at the 98th meeting of the Southeast Section of the Mathematical Association of America, Cleveland, TN.


State:


Carlone, H. B., Mercier, A., Daphne, M., Claudia, W., Annual meeting of the National Science Teachers Association, "Empowering Teachers, Nurturing STEM Equity: The UNCG STEM Teacher Leader Collaborative," NSTA (Non-Academic), Charlotte, NC, United States of America. Accepted. (November 30, 2018).


Davis, J., Springall, B. T., Li, H., Kalcounis-Rueppell, M. C. Exploring social call production rate difference among bat species. The University of North Carolina at Greensboro 12th annual Carolyn & Norwood Thomas undergraduate research & creativity expo, Greensboro, North Carolina, 2018


Palazzolo, J., Goble, D. J., Labban, J. D., Ross, S. E., Duffy, D., Rhea, C. K., (2019, March 22). Pre-season postural control in athletes based on frequency of contact. Human Movement Science and Biomechanics Research Symposium, Chapel Hill. Accepted.


Pavlova, I. V. (2018, October 29). BioTAP virtual conference. “Graduate teaching assistants’ knowledge about teaching methods and classroom teaching practices in inquiry laboratory courses”.

Pavlova, I. V. (2019, February 25). Podcast interview on new diversity module in introductory biology and associated SoTL project (https://utlc.uncg.edu/podcasts/). by Peterson, UTLC at UNCG.


International:


Appendix 1: Networking and Speaker Series Flyers

Public talk: The Wonders of Wildfires:
How do we understand the climatic influences of wildfires, their patterns, and their effects on agriculture?

Dr. Charles Ichoku
Climate and Radiation Laboratory NASA
Goddard Space Flight Center

When: Wednesday, September 5th, 2018 at 4:00pm
Where: Sullivan Science Building Room 200

Networking Lunch: The past and future of Lake Chad: Africa’s Great Lake

When: Thursday, September 6th, 2018 from 11:30-1:15 pm
Where: Virginia Dare, Alumni House
RSVP: https://goo.gl/forms/ZIMhpBuxoZRaggpu2 by Monday, Sept. 3rd

Lake Chad, located near the center of Africa, is shared by four countries and is the main source of water supply and livelihood for more than 30 million inhabitants. Because of severe droughts along the African Sahel in the 1970s and 1980s, the lake’s surface water coverage went down by more than 90%. Scientists have been studying this phenomenon to understand its causes and predict the lake’s future, in order to recommend possible scientific approaches to mitigate any adverse impacts on the population that depends on it for survival.
Networking Lunch: NextGenSTEM: Cultivating Tomorrow’s Diverse Global Workforce

When: Friday, September 15th, 2017 from 11:30-1:30 pm.
Thursday, November 8th, 2018 from 11:45-1:15 pm

Where: UTLC Faculty Center
RSVP: [https://goo.gl/forms/MutljYvK31ALn2RM2](https://goo.gl/forms/MutljYvK31ALn2RM2) by noon on Monday Nov. 5th

To fully encompass underrepresented groups in STEM, it requires creating education and career pathways to develop the diverse talent need to advance areas of priority such as health, energy, and national security. The American Association for the Advancement of Science (AAAS) develops and supports STEM education initiatives through its Education and Human Resources Division (EHR) with three-pronged foci of scientific literacy, broadening participation in STEM, and developing the STEM workforce. Dr. Iris Wagstaff will highlight some of these educational and professional development efforts at the undergraduate and graduate levels, as well as, share evidence-based best practices and models for cultivating a diverse cadre of STEM professionals to tackle global problems at the intersections of science, education, and policy.

Meet Iris Wagstaff: Dr. Iris Wagstaff has over 25 years of STEM outreach experience in the community including developing informal science programs, mentoring, and developing strategic partnerships between industry, academia and organizations to enhance science education; particularly for underrepresented students. Her research examines the roles that science self-efficacy and science identity play in encouraging students who have been historically discouraged from the scientific enterprise. She is currently a 2015-2017 AAAS Fellow and is developing a strategic diversity initiative to expand opportunities for peer-reviewers, graduate fellows, and grant applicants to broader audiences.
Public Talk: “A Framework for Decision-Making to Promote Science Literacy in Large Enrollment Undergraduate STEM Classes.”

Date: March 25, 2019
Time: 4:00 pm-5:30 pm
Place: Alumni House: Virginia Dare Room

Networking Lunch: “Navigating a Pathway from Teaching and Science to Science Education Research

Date: March 25, 2019
Time: 11:45 am-1:30 pm
Place: Eberhart 310
RSVP: [Registration Link](#)
**First Come, First Serve**

Meet Jenny Dauer: Dr. Dauer is an Assistant Professor of Science Literacy in the School of Natural Resources at the University of Nebraska. Dauer’s research interests include developing and investigating science classroom models to support student decision-making practices and systems thinking. Dauer has a Ph.D. from Oregon State University in Forest Science, an M.S. in Ecology, and a B.S. in Secondary Education from Penn State University.
RISE Network & OSP Presents

Network Across Boundaries: Meet a New Collaborator!

Date: January 30th, 2019  Time: 11:45 am-1:30pm  Place: UTLC Faculty Center

Do you ever wonder what research is happening on campus? Would you like to meet others with shared research interests? Would you like to identify collaborators for pursuing funding? Are you interested in connecting with others who have received research grants? If you are conducting STEM research, providing STEM instruction, or evaluating STEM program outcomes, come participate in this networking event to get acquainted and explore endless possibilities for collaboration.

For questions, please contact: rise@unc.edu

Having trouble viewing the RSVP link, use the following link: https://goo.gl/forms/8b2wWlRj2Y68BR11Z
HIDDEN NO MORE: STEM WOMEN OF COLOR

February 27, 2019
4–5:30 p.m.
at UNC Greensboro
Sullivan Science Building, Room 101

Historically, women of color have faced considerable challenges pursuing careers in science, technology, engineering and mathematics. Join us on February 27, to hear from four women, who despite these challenges, have made significant contributions to their fields and are pushing society forward.

Ann Vaughan Hammond and Peggy Vaughan, daughter and daughter-in-law of Dorothy Vaughan, who was Langley Research Center’s first African American manager; Dr. Jamila Simpson, Interim Associate Dean for Academic Affairs for the College of Sciences at N.C. State University; Dr. Stephanie Page, Molecular Physiologist at Duke Molecular Physiology Institute and Morehead’s own, Crystal Harden. Director of Programs and Strategic Initiatives as well as Chief Diversity Officer, will speak in a panel discussion on what it is like to be leaders in their respective fields as well as how we can help expand diversity in STEM education.

FREE!! Open to the Public

MEET OUR SPEAKERS

ANN VAUGHAN HAMMOND & PEGGY VAUGHAN
Daughter and daughter-in-law of Dorothy Vaughan, one of the first female human computers at NASA and NASA's first African American manager.

DR. JAMILA SIMPSON
Graduated as the first African American woman to receive a B.S. degree in meteorology from N.C. State University.

DR. STEPHANIE PAGE
Creator of #BLACKandSTEM, a community on Twitter dedicated to connecting African-Americans in STEM career paths.

CRYSTAL HARDEN
Director of Programs and Strategic Initiatives, as well as Chief Diversity Officer at Morehead Planetarium and Science Center.
Appendix 2: Departments Represented at RISE Events

Departments

Anthropology
Biology
CAS Dean's Office of Research
Counseling and Educational Development
Chemistry and Biochemistry
Computer Science
Communication Studies
Center of Women's Health and Wellness
Department of Physics
Entrepreneurship Cross-Disciplinary Program
Geography, Environment, and Sustainability
Human Development and Family Studies
Institute for Community and Economic Engagement
Kinesiology
LaunchUNCG
Math & Statistics
NC Entrepreneurship Center
Nanoscience
Office of Research and Engagement
Office of Sponsored Programs
Physics and Astronomy
Public Health
School of Education
SOE Office of Research
Student Success Center
Student Success Initiatives
Teacher Education and Higher Education
Undergraduate Research, Scholarship and Creativity Office
University Communications
The RISE Network in partnership with the University of North Carolina Greensboro’s Offices of New Student Transitions & First Year Experience, University Events Team, University Communications, Intercultural Engagement, and the School of Education planned and implemented the Fifth Annual Science Everywhere Festival on April 13, 2019. Sponsors included the Best Logistics Group, NC Science Festival, WFMY News, LabCorp, UNCG Self Design Studio and the National Science Foundation (NSF). The Fifth Annual Science Everywhere was an amazing success. University staff, students, and faculty from across campus volunteered their time and energy to present over 100 hands-on science activities to the community. Many facets of STEM at UNCG were showcased for the community. Over 3000 participants came to Campus on a rainy Saturday.

Over 120 STEM professionals, including faculty, grad students, and undergraduates helped to present science to the community. 300 volunteers, including undergraduate and graduate students, UNCG Middle College students, the High Point YWCA, as well as 30 students from Welborn Middle School also attended and helped make the festival a success. Spanish speaking interpreters and American Sign Language interpreters were available for non-English speaking guests and for guests from the deaf community, respectively. The North Carolina Science Festival sent data collectors to assess the demographics and diversity of the festival. The entire campus was filled with young children, parents, and grandparents all of whom were making various science and engineering related projects.

All attendees were given a passport/brochure, a tote bag and t-shirts at the welcome tables. Children and youth received stamps at each station and when they left the event, they received prizes and a Junior Scientist Certificate—children of all ages enjoyed the festival from preschool age to high school students. This was a great day for UNCG, creating a fun and engaging learning environment for adults, teens, and kids alike. The adults were amazed by all the things we do at UNCG. Science was everywhere. With over 100 activities on campus, there was something for everyone. The only complaint heard from the guests was that they couldn’t get to everything. Join us again next year on April 25, 2020.
Appendix 4: Third Year Small Grant Report

RISE Small Grant 2017 Awardee REPORT (September 2018)

Building the capacity for implementation and evaluation of inquiry labs in the Biology department.

Iglica Pavlova, Academic Professional, Biology Department

Background:
The Biology department has initiated a transition from traditional cookbook laboratories toward inquiry instruction in introductory courses. To ensure a high-quality experience for our students, we need to create a sustainable structure for evaluating student learning and attitudes and making instructional improvements based on the evaluation. In a further step, our department is also moving toward revising the biology curriculum toward course-based undergraduate research experiences (CUREs). CUREs have a higher level of research authenticity, student agency and collaboration compared to even inquiry instruction; these elements all require thoughtful implementation based. To support these reforms, we need to build the capacity and recognition for biology education research in our department.

Study purpose:
In the Spring 2017 semester we implemented two inquiry sections of BIO 112 laboratories where students worked in teams to design, implement, analyze, and improve their own experiments for three different experiments. Students were introduced to both the theory and practice of experimental design and statistical testing. This study's goals were to evaluate students’ 1) understanding of experimental design and statistical analysis, 2) science learning attitudes, and 3) science research skills relevant to inquiry and CURE formats (e.g., experimental design, data analysis including statistics, presentation and communication of scientific data).

Study design:
Students in the control group (2 sections of BIO 112L with traditional instruction) were compared to students in the experimental group (2 sections of BIO 112L with inquiry instruction). The study has a quasi-experimental design with students having no prior knowledge at registration of the instructional method in the laboratory section. Students in both groups were administered Pre/Post surveys at the start of the semester (before instruction) and at the end of the semester. The Pre/Post surveys incorporated validated instruments for experimental ability (E-EDAT), statistical understanding the context of biology (SRBCI), science learning attitudes (BioCLASS), as well as a self-evaluation of science research skill level. In addition, students in the experimental group completed an end-of-semester assessment and self-reflection.

All data were de-identified before analysis. Statistical analysis was performed by ERM graduate student Juanita Hicks, and biology graduate student Jacob Cleary assisted in coding the written answers from the E-EDAT and the reflections. Both were fully supported by the RISE Small Grant for this research.
**Major findings:**
The major findings from the pilot study are as follows:

1. There was a statistically significant difference in statistical ability at the end of the semester (as judged by the SRBCI instrument) for students in the experimental, but not the control group; both groups started with similar levels of knowledge on the Pre-test. The SRBCI is a valuable instrument with a good discrimination index to use in future studies.

2. On the E-EDAT, students scored higher on the Pre-test (6.7 average score for both groups) compared to published results (about a 3 average score in Marsan et al, 2016). This suggests that they have a good understanding of some of the fundamentals of experimental design. The higher scores can be at least partially explained by the fact that we administered the test electronically (versus the slower method of writing by hand that is standard administration for the E-EDAT). Students likely reached a ceiling with the relatively short time limit for the test and there was no observed improvement in the control versus experimental group on the E-EDAT. While we are testing the usefulness of the EEDAT in a larger study of all BIO 112 sections in 2017-18, we need to find or develop new ways to capture elements of understanding of scientific process that our students are still in the process of learning.

3. Students in both test groups scored high on the Pre BioCLASS survey (75.8%, control group, 68.2%, experimental group), with prompts targeting areas such as enjoyment of science, persistence in learning, and making connections. While this survey seems to have limited value in our hands for capturing important changes that we were able to document in other ways (via the end-of-class reflections, see below), these data indicate that we do not face big challenges with student attitudes. The results support the notion that overall, our students are open to learning and engaging in the process of science.

4. For students’ self-assessment for science research skills there was a statistically significant Pre vs. Post difference for one item (interpreting experimental data) in the control group and seven items in the experimental group. Students in the experimental group report gaining confidence in doing background research, developing their own research question, performing an independent experiment, using Excel, performing statistical analyses, using evidence to develop arguments, and writing lab reports. These results support a favorable difference for inquiry/CURE vs. traditional formats of instruction toward research skills.

5. Rich data were collected in written self-reflections in response to five open-ended prompts regarding aspects of lab that students found 1) most interesting/fun, 2) most valuable, and 3) most difficult, as well as prompting to reflect on changes in their thinking on 4) the process of science and 5) introductory biology labs. The answers were coded using a grounded-theory approach noting emergent themes in respondents’ answers, rather than based on the experimenter’s pre-conceived notions; the coding was done by JC to limit bias. A notable sense of personal involvement and agency stood out in answers to more than one of the prompts. For example, the most common code for the prompt on what aspect of that semesters labs was most
interesting or fun was that students felt actively involved in the experimental choices, with 61.5% of students scoring in this category.

Quote from answers to the most interesting or fun aspects of labs prompt
- "I absolutely loved the set-up of this lab. Doing multiple replications of experiments and running statistics and then thinking outside the box was awesome and I hope UNCG adopts this style for introductory labs instead of a prefixed prelab, data sheet, and conclusion questions." Even more strikingly, in prompt to how students feel about the process of science, 84.6% formulated answers – each one different and showing the individual students’ own engagement – on how they understood the scientific process better through their personal experience in experimentation. 35.9% of student answers emphasized that science is complex and requires rigorous process (this was the second most prevalent code for this prompt).

Quotes from answers to “what do you think changed the most about how you think and feel about the process of science
- “I learned that scientific experiments contain many confounding factors that must be accounted for. Designing a good experiment can be difficult and obtaining clear results is even more so. It made me have a greater appreciation for the science field and made me want to take more science course.”
- “I realized that even the best experimental design can be improved upon. Even though the experimental question that is being investigated is important, it is equally important to examine your design and look for ways to improve the experiment.”
- “I actually like the process of collecting and interpreting my own results now”
- “Science can be fun but it’s a lot of work to get data and to make sure your data is correct so that your hypothesis is correct”
- “I started to think outside the box more in this lab since we had to worry about confounding factors and other variables where with other experiments being prefixed, we didn’t have to think about much.”

Implications and wider significance Statistical reasoning is a valuable quantitative science skill and this pilot study indicates that it can be developed in introductory science courses, and in our context. Moreover, the inquiry/CURE setting provides an authentic venue for students to apply statistical concepts to their own experiments, which may support both their learning and positive affect needed to develop this difficult, but important, skill. By starting early and in authentic contexts as in our experiment, we can build on our students’ statistical skills over time to help them achieve the mastery they need for STEM careers.

Experimental design is a complex multi-component skill that requires understanding the process of science and that are the focus and expected benefit of inquiry/CURE instruction. Because the promise of the E-EDAT was not captured in this pilot study, we will pursue alternative assessment methods that focus on student written work (such as lab reports), presentations, or answers to more pointed questions that target important aspects of understanding the process of science.
The end-of-class reflection seems to be able to capture students’ sense of agency, which the inquiry/CURE intervention in our study particularly targets through instruction toward “mastery experiences”, emphasizing process and growth for all students through repeated opportunities for effort and success over the course of the semester. It is very important to be able to capture improvements in students’ self-efficacy beliefs as they have been strongly linked to choice of STEM majors and careers. Expanding the self-reflection to all sections of BIO 112 will help not only help us promote introductory students’ metacognition more widely, but also determine whether “mastery experiences” in our inquiry/CURE sections can indeed make a difference for the students’ sense of self-efficacy.

**Summary**

Through the RISE Small Grant, our department was able to accomplish the following goals:

1. Complete a pilot study of an instructional method that has new features that we plant to disseminate in the wider science education community.
2. Demonstrate increased learning and improved science attitudes, which have been linked to STEM persistence/STEM career choice using an inquiry/CURE format in introductory biology, BIO 112.
3. Establish the usefulness of different assessment instruments and suggest areas that require further development.
4. Receive valuable advice on study design and analysis (via ERM graduate student Juanita Hicks).
5. Study-specific methods are often needed to capture learning in particular areas of interest as with experimental design ability.
6. Develop biology education research capacity within the department, including the ability of graduate students to engage in the process and demonstrate more widely the value of evidence-based teaching.

Thank you for your support!
Appendix 5: Fourth Year Small Grant Proposal

RISE Small Grant Fall 2018 Awardee Proposal

In-lab observations of teaching assistants in introductory biology and chemistry to understand productive instructor-student interactions and to create video materials for instructor training.

Department of Chemistry & Biochemistry: Jerry Walsh, Professor, and Spencer Russell, Lecturer

Biology Department: Iglika Pavlova, Academic Professional, and Meg Horton, Senior Lecturer

Proposed Project: In both the chemistry and biology departments at UNCG, graduate teaching assistants (GTAs) are central to instruction of undergraduate students in the required large-enrollment introductory level laboratory courses. We seek to involve them more deeply into the wider effort to inspire our diverse student body towards persistence and careers in STEM. We would like to 1) understand the supports that GTAs require to become excellent teachers who can foster engaged critical thinking, and then 2) incorporate what we have learned into our GTA training. The need for improved teaching to support learning is true in both our traditional sections, and also in the inquiry research-based sections that we are transforming under the NSF/CUR (Council of Undergraduate Research) Transformations Project.

We propose to video/audio record instructors and student working groups in laboratory sections of introductory chemistry and biology. A recording will provide data that will be used for both 1) educational purposes (to create GTA training materials) and 2) research purposes (to answer questions about the influence of GTA teaching on student learning). For the videos, the sections will be chosen to showcase teaching by experienced instructors and focus on scenarios where students are actively engaged in thinking, such as when designing an experiment or making inferences from data. For the research, we will address two major questions: A) How do instructors respond to student questions, especially with regard to encouraging further thought? B) How do students respond to instructor prompting, especially with regard to engaging in reasoning? Observations will follow the Laboratory Observation Protocol for Undergraduate STEM (Velasco et al., 2016), with addition of prompts monitoring inquiry instruction from the Teaching Assistant Inquiry Observation Protocol (Miller et al., 2014). Our focus on the nature of interactions between student and instructor can provide direct evidence of the quality of instruction, allowing us to add to the literature which is mostly based on self-reporting. The research will provide additional information that we plan to further use in improving GTA training in both departments.

Dr. Zeynab Badraddine, a qualitative methods science education researcher who specializes in video/audio recorded data, will guide us in data collection and processing. In contrast to isolated earlier attempts to record lab instruction, we think that a focused effort by a team (with a minimum of two faculty per department) guided by an expert will produce materials that are usable for both teaching and research purposes. Iglika Pavlova has also been trained in GTA assessment in the Biology Teaching Assistant Project. Melissa Beck with UNCG IRB has confirmed the feasibility of using an external expert.

Expected Results/Future Funding: 1) Educational component: Create video clips to be used in GTA training, demonstrating productive instructor behaviors. 2) Research component:
Understand instructor behaviors that promote student reasoning and lead to effective student learning, especially in CUR TP environments. The research is expected to be novel and support our application for an NSF IUSE grant.

**Proposed Budget**: $5,000 total for 1) $2,500 – video/audio equipment to produce high quality data from both instructor and student stations that allows study of the relationships between the two. (See separate attachment with approximate budget before any educational discounts). 2) $2,500 – stipend for consultant who specializes in the collection and processing of video and audio data for educational research.
Appendix 6: LSAMP Proposal

Abstract: The Mountain to Sea North Carolina Louis Stokes Alliance for Minority Participation program (M2S NC LSAMP) will be a new alliance among six, four-year, mid-sized universities that enroll students from across the geographic range of North Carolina led by University of North Carolina Greensboro and including faculty and students from Appalachian State University, East Carolina University, University of North Carolina Asheville, University of North Carolina Wilmington, and Western Carolina University. The geographic range encompasses mid-sized regional universities across NC, from the Appalachian Mountains, to the Piedmont region, then the Coastal Plains, and finally, the Carolina coastline. As is true of the diversity of the famous 1,175 mile Mountains-to-Sea Trail stretching from the North Carolina Smoky Mountains to the coastal Outer Banks region, the institutions in the M2S NC LSAMP enroll a highly diverse student body of approximately 100,000 students, roughly 80,000 of whom are undergraduates and 17% declared STEM majors, and 3.9% URM STEM majors (i.e., LSAMP defined STEM fields). Alliance partners have had a rapid increase in minority enrollment and graduation in STEM disciplines, creating a large pool of URM STEM students eligible for LSAMP support. The alliance is designed around the concept of embracing these changes and expanding our knowledge about URM students to address broader impacts on nation-wide success in STEM education and careers in a changing demographic and cultural landscape. Alliance partners have core similarities in student support programs and student profiles and will work synergistically because they are aligned with the strategic objectives of the UNC System: 1) Access, 2) Affordability and Efficiency, 3) Student Success, 4) Economic Impact and Community Engagement, and 5) Excellent and Diverse Institutions. Each of the system schools has already committed to priorities that are consistent with the system-wide strategic plan, and this will help provide more of a common language across which we can begin to share ideas and work together as an alliance. Finally, the alliance partners span a diverse geographic region in North Carolina and serve a broad diversity of students with a variety of needs, each with their own signature programs and support to meet those needs. Partner institutions are in a unique position to learn from other institutions and provide support that will elevate student opportunities and success.

Intellectual Merit: The M2S Alliance is comprised of six mid-size public universities with rapidly diversifying student populations. We hope to better understand what is required to attract URM STEM majors to these campuses, retain them in STEM degrees, and graduate them into STEM careers and/or higher education opportunities. How do these students develop STEM identities and affiliations? What are the necessary support systems to retain these students at key transition points in their education (entry, transfer, courses)? How do we, as faculty and administrators, increase the probability of successful student outcomes? While the LSAMP focus is on students, we also need to create inclusive campus climates. What are the essential components of “inclusive excellence” on campus? Our faculty are an essential component of creating a welcoming campus and sustaining these initiatives.

Broader Impacts: We hope the combined elements of this Alliance create a model for other LSAMP programs at mid-sized universities and will enable universities to foster URM STEM students in multiple settings. This in turn will help to change the climate at universities so that we all work toward increasing the number of successful URM STEM student outcomes. Our partnerships with business and industry will help to broaden the STEM URM workforce, create role models for URM STEM students, and change future students’ expectation for their personal career outcomes.
Appendix 7: Clear Pathway Proposal

**Abstract:** *Clear Pathways* is designed to develop and implement a successful transition process for the rapidly increasing number of Community College students who transfer into four-year University STEM programs. Our goal is to provide a process that will facilitate their timely graduation and simultaneously decrease the gap in graduation rates between transfer and traditional students. Our objectives are as follows:

1. Raise awareness and establish clarity of pathways for community college students to aid them in the transition to S-STEM disciplines at four-year universities.
2. Provide financial and academic support for community college students transferring into S-STEM disciplines during the transition period to the university.
3. To develop, implement, and sustain specialized services for transfer students after the transition to University to retain them in STEM disciplines, and graduate them in a timely manner into STEM careers or higher education opportunities.

*Clear Pathways* will recruit and support three cohorts of 15 transfer students (45 total) by meeting with and providing timely information to potential S-STEM students at local community colleges. Once committed to attending the University, students will be assigned a faculty advisor specializing in transfer students and asked to participate in a summer course designed to create a cohort, familiarize students with campus resources and university coursework expectations and interact with faculty in their selected major. Throughout the program *Clear Pathways* students will have peer and faculty mentoring, enhanced access to undergraduate research opportunities and internships with STEM industry partners, the benefit of an interdisciplinary science seminar series, visits to STEM labs and field locations, and significant financial support.

Qualitative and quantitative data will be collected concurrently to extend the breadth of inquiry and to capture the richness and diversity of *Clear Pathways* participant experiences. Data sources will include observations, participant surveys and S-STEM STAMPS comparison group surveys, focus groups and interviews, and mini-case studies including a photo voice component.

The evaluation will use a mixed method approach for both the formative and summative evaluations. Throughout the evaluator will seek to identify emerging themes and patterns. Questions to be considered are as follows: a) Do themes emerge around specific items in the data? b) How do these patterns (or lack thereof) help to shed light on the broader study question(s)? c) Are there any deviations from these patterns and how can they be explained? d) Do any of the patterns/emergent themes suggest that additional data needs to be collected or study questions need to be revised? e) Whether the patterns that emerge support the findings of other corresponding qualitative analyses or quantitative analyses.

**Intellectual Merit:** *Clear Pathways* will help to inform the research about how to matriculate, sustain and graduate S-STEM community college transfer students as they develop a sense of belonging, self-efficacy, and science identity. Project findings will add to the research and provide a greater understanding of how a S-STEM cohort affiliation supports transfer students’ sense of belonging, self-efficacy and science identity. The project will increase our understanding of critical factors and programming that enable transfer students to succeed at a four-year university. This research will provide greater detail about how cohort and support activities nurture successful students in STEM and whether single activities or a suite of activities are necessary for ensuring that success. This new research will compare *traditional students with transfer students* in S-STEM programs so that we can understand similarities and differences between the two groups and create a successful environment for all S-STEM students.
**Broader Impacts**: This research will help other universities identify activities that they can undertake to increase the likelihood that well-qualified transfer students interested in STEM persist in and graduate as STEM majors. Research is clear that transfer students need to form an affiliation with a faculty mentor upon their arrival at the “host” institution, but creating that relationship is often difficult. We need to change that now. Additionally, we need to understand what the essential support services are needed for transfer students that lead to an environment that facilitates success and graduation into a STEM career. Answering these questions will provide information that other universities can use for developing more successful pathways to support STEM transfer students. The results of this program will add to our understanding as to how to successfully integrate S-STEM transfer students into a four-year university and graduate these students into higher education and the workforce.
Appendix 8: RISE One Page Summary

What is RISE?
The RISE Network is a coalition of educators and researchers involved in STEM (science, technology, engineering, and math) education. The network provides access to STEM funding and research opportunities, promotes working partnerships, offers a monthly lunch series, and sponsors special events such as workshops and guest speakers. Network members include UNCG faculty and researchers, community educators, and grant specialists.

The impetus for the network came from a national push to improve STEM education as well as the work of UNCG’s Math-Science Recruitment and Retention Task Force. The task force identified a need at UNCG for better coordination between math and science educators and researchers and increased confidence levels in teaching critical thinking skills and higher levels of math and science. To address these issues and strengthen UNCG’s position in STEM education, the RISE Network was created in 2010.

RISE’s Mission:
The goal of the RISE Network is to enhance and expand the already strong partnership between research educators and science, mathematics, and technology educators in the community and at UNCG. This is accomplished by developing a network of interested partners to better coordinate STEM education and research across campus. The network enhances UNCG’s ability to broaden access to STEM fields by:

Supporting curriculum development through revising STEM courses in order to offer an inquiry-based collaborative method of instruction designed to foster skills in critical thinking, quantitative reasoning, and communication, with the goal of promoting the STEM literacy of our graduates.

Enhancing the extent to which UNCG supports high-quality STEM education in pre-K–12 classrooms by designing research-based projects that generate and disseminate knowledge about STEM content and pedagogy and are responsive to student, teacher, and district needs.

Facilitating collaboration between local community and business leaders and UNCG concerning scientific literacy skills, skills needed for the next generation of the (local) workforce, and instructional policies and programs to meet these needs.

Providing support for faculty and staff who seek external funding to support the efforts listed above.

How can RISE Benefit You?
The RISE Network is designed to benefit individuals from all disciplines and backgrounds. RISE sponsors a STEM research/education speaker series and cross disciplinary networking events that promote new partnerships that may expand research and funding opportunities. RISE has taken the lead on outreach events such as the development of the Wetlands and Science Everywhere. Faculty and staff may apply for our small research grants.

Contact Us
You can contact us through the RISE email at rise@uncg.edu or you may contact the co-directors, Lynn Sametz at l_sametz@uncg.edu or Malcolm Schug at mdschug@uncg.edu.