

ABSTRACTS

#1 Innovations in REU Programming

Joe Ayoob, PhD TECBio REU @ Pitt

“You can’t spell ‘TraNSFormative’ without NSF in the middle” was something that I heard during my first REU Review Panel at NSF. This followed on the heels of my first REU PI meeting where long-time Program Officer Sally O’Connor told us that the secret to successful renewal applications is innovation. I took these messages to heart and made it my goal to include something new and exciting in each of our program proposals. In this lightning talk, I will give an overview of the various innovations included in each iteration of the Training and Experimentation in Computational Biology (TECBio) REU Program at the University of Pittsburgh that have had a profound effect on student engagement, cohort building, satisfaction, and ownership of the program.

#2 A Developmental Mentoring Model in the Biology NSF-REU at the University of Notre Dame **Xuemin (Sherry) Lu**, University of Notre Dame, Notre Dame, Indiana

At the Biology NSF-REU at the University of Notre Dame, we employ a developmental mentoring process that guides interviewees through the selection stage and continues to nurture scientific growth throughout the summer.

#3 Confidence, Competence, and Community: An Immersive REU Laboratory Orientation **David Zuzga**, The Wistar Institute in Philadelphia, Pennsylvania

Our REU site incorporates a two-week hands-on laboratory Orientation prior to the research internship to prepare students who have little or no prior research experience. During this period, students learn core molecular and cellular biology techniques while working on a shared discovery-based research project, which increases confidence, productivity, bonding within the cohort, and readiness to contribute in host laboratories. It also provides us an opportunity to observe students in the lab setting, which informs the internship matching process.

#4 Using Proposal Posters to Accelerate Learning and Research Engagement **Jen Eklund**, Institute for Systems Biology (ISB) in Seattle, Washington

A mid-summer poster session: our program asks students to present "proposal" posters a few weeks into the program rather than a poster session at the end of the summer. I will share the benefits of making this shift.

#5 Research Teams Enhance Scaffolded Mentoring Among Peers and Mentors

Authors: **Audrey Barker Plotkin**¹, Benjamin Goulet-Scott¹, Benton Taylor², Grace Burgin²

¹ Harvard Forest, Harvard University, Petersham, MA, USA

² Harvard University, Department of Organismic and Evolutionary Biology, Cambridge, MA, USA

The Harvard Forest Summer Research Program in Ecology engages a cohort of ~20 undergraduates each summer, organized into 4-6 research teams comprising multiple students, mentors, and research projects. Research teams preserve the primary mentor-mentee relationship while providing a broader mentoring network and support among students and mentors. We know that developing relationships with mentors from a variety of career stages benefits student growth as scientists, but we wondered how heterogeneity of previous research experience among students affected student gains and program satisfaction. As part of a 10-year longitudinal study, we surveyed students before and after the program to assess self-reported gains in scientific identity, research skills, and self-efficacy. We analyzed data from our 2016-2023 cohorts to discern whether student heterogeneity in prior research experience affects overall student satisfaction with the program. We found the highest overall satisfaction from students whose research teams comprised the largest range of prior research experience among the students. This effect was especially strong for students with no prior research experience, and was neutral for students with previous research experience. The scaffolded mentoring provided by teams with varying research experience among mentors and students benefits students, especially for those participating in their first research experience.

#6 I-BEST (Interdisciplinary and Broadening Engagement in STEM Training)

Carrie Kouadio, University of California, Merced (UC Merced), Merced, California

In this talk, we will focus on the UC Merced I-BEST REU program's whole group activities which cover a range of useful and motivating topics and are led by experts (held each Monday and Friday of the program).

#7 Nine Years of Impact: Best Practices from a Sustained REU Site

Rita Teutonico,

We have been running our REU Site for almost 9 years now so would highlight some of the best practices we have learned from our experience. A few of the keys to success are having a strong peer mentoring program and a robust career pathways professional development plan.

#8 Research Experiences for Undergraduate Site Mystic Aquarium: Collaborative Research: Plankton to Whales: Consequences of Global Change within Marine Ecosystems

Tracy A. Romano^{1,2}, PhD
Paola G. Batta-Lona², PhD
Danielle Lavoie^{1,2}, MSc
¹Mystic Aquarium
²University of Connecticut

The Mystic Aquarium Research Experiences for Undergraduate (REU) Site represents the first NSF-funded REU site hosted at an aquarium. Developed through a partnership between Mystic Aquarium (MA) and the University of Connecticut's (UConn) Department of Marine Sciences, the REU program recruits students—particularly those who might not otherwise have access—to STEM pathways through immersive, interdisciplinary marine science research experiences. It builds strong laboratory, field, professional, and science communication skills, preparing students for successful STEM careers by integrating rigorous research training and targeted professional development. Science communication is a major highlight of our REU. The students participate in a two-part science communication workshop which culminates in a poster presentation on their projects to Aquarium visitors. Also, students are interviewed and videotaped for the REU's website, do a social media takeover and can interact with the public on special event days at the Aquarium e.g. Women in Science. In addition, students communicate their findings to a scientific audience through abstracts and oral presentations at UConn. The science communication for our REU in total, fosters scientific engagement with diverse audiences. This collaboration offers students the benefit of a top tier research university as well as expert experiential learning from the non-profit MA, leveraging the expertise and resources from each for an immersive and successful REU.

#9 Applied improvisation training for BIO REU participants develops their science communication skills, supports well-being, and fosters community

Kate A. Giffin, Katherine L. Furman, Bibi Alike Sulaman, Ashley Hughes, Gary Lehman, **R. Keith Duncan (REU PI)**

Effective science communication relies on core tactical and interpersonal skills, yet many training programs overlook the latter. Applied improvisation is an effective tool for teaching both skill sets. Here, we aimed to improve communication skills in a diverse group of undergraduates engaged in 10-week summer research programs. We implemented a weekly improv-based communication curriculum for REU participants, evaluating self-assessed gains in various communication skills at the end of the summer program and up to four years after.

Participants reported substantial gains in core communication competencies such as confidence, adaptation, and presentation skills, but they also reported improved psychosocial wellbeing and a stronger sense of community. Alumni, up to 4 years post-program, indicated persistence of these gains with over 85% of the participants reflecting positively on their improv training. Our experience showcases improv as a uniquely effective tool for enhancing creativity, increasing risk-tolerance, and fostering a collaborative mindset, traits that are essential for navigating scientific and professional environments. We find that improv is ideal for creating an inclusive science communication training environment.

#10 Orientation “project pitch” activity: building cohort and science process skills.

Rosemary Smith, Rocky Mountain Biological Laboratory (RMBL)

Background: The “Project Pitch” activity engages students as they collaborate to design and propose a research project. They present a poster of their project to peers and mentors and vote for best pitch! This orientation activity follows demonstrations of current research projects at RMBL and precedes the development of their independent research proposal.

Purpose: Students collaborate and develop the skills necessary to design and propose an experiment in a low stakes activity.

Methods: Students randomly select parameters for their research topic: community type (e.g., meadow, aspen, aquatic) and method (e.g. quadrat/meter tape, data logger, drone image, long-term dataset) and generate a research question, develop methods, and graph predicted results. After 2-3 hours students present a 5 minute “project pitch”, for a prize.

Key Outcome: Students realize that it is possible to design an experiment with limited scope, equipment, and time, and that success is based on focus and collaboration!

Relevance: Beginning research students struggle with developing a question, finding background information, selecting variables, and designing an experiment that tests a prediction. This activity demonstrates to students that they can complete the steps to develop their own proposals.

#11 Research Experience for Undergraduate Students in Multi-omics Tools to Understand the Molecular Interactions in Living Systems

Ramesh Katam, Department of Biological Sciences, Florida A&M University, Tallahassee FL 32307

Global agricultural and biological challenges increasingly require an integrated understanding of complex molecular interactions within living systems, particularly under environmental stress conditions. Systems biology, combining omics technologies and data science, offers powerful tools to address these challenges and to understand better plant resilience, disease pathways, and host interactions.

The primary goal of this REU program at Florida A&M University is to train undergraduate students, particularly those from underrepresented groups or institutions with limited research opportunities in advanced systems biology research to encourage STEM career pathways. Participants engage in a 10-week summer research experience, working with a multidisciplinary faculty team across biology, chemistry, and computer science. Students apply omics approaches and computational modeling to investigate stress responses, disease networks, and plant-host interactions, while also receiving training in research ethics and biosafety.

Preliminary outcomes indicate that students gain hands-on experience in cutting-edge technologies, improve their scientific communication skills through conference presentations, and develop strong academic and professional networks. These experiences enhance their readiness for graduate studies and careers in STEM fields. This program strengthens workforce diversity and innovation in science by equipping students with interdisciplinary skills and fostering long-term engagement in research critical to solving global biological and agricultural challenges.

#12 Setting Expectations for REU Acceptances

Laura Muller, The Jackson Laboratory

Current funding constraints have left students feeling that research opportunities are more limited than in previous cycles. As a result, they applied to a larger number of REU programs, including those that were generally within their field but not closely aligned with their specific research interests. Wanting to keep options open, students accepted into programs requested extensions on decision deadlines or accepted positions only to later rescind them for one that they think better align to their goals.

While a shared announcement timeline across REU programs—similar to those used by graduate schools—could help mitigate these issues, the varied and often combined funding sources of REU sites make such coordination difficult in the short term. Therefore, we propose adjustments to student-facing messaging that clarify expected timelines and appropriate norms for acceptance decisions.

#13 Research at the Water's Edge: Building Pathways in Marine and Estuarine Biology

Paulinus Chigbu, University of Maryland Eastern Shore, Princess Anne, Maryland

The Biology Research Experiences for Undergraduates (BioREU) program at the University of Maryland Eastern Shore (UMES), led by Dr. Paulinus Chigbu, provides intensive summer research training in marine and estuarine science. This NSF-funded REU site supports undergraduate students through a ten-week mentored research experience focused on coastal rivers, lagoons, and estuaries of the Mid-Atlantic region. Students engage in laboratory and field research addressing topics such as marine ecology, fisheries science, microbiology, water quality, and ecosystem dynamics, working closely with UMES faculty mentors and graduate students. The program integrates professional development through workshops on experimental design, data analysis, scientific communication, ethics, and career pathways. Participants present their findings at a formal research symposium and are encouraged to disseminate results at regional and national scientific meetings. The UMES BioREU emphasizes workforce development, graduate school preparation, and long-term engagement in environmental and biological sciences.

#14 Involving REU students in taxonomic research

Wendy L. Applequist, Missouri Botanical Garden

The Missouri Botanical Garden's REU program in botany and plant conservation includes mentors who conduct floristic and revisionary taxonomic studies. Undergraduate students are often exposed to lab and field methods, but seldom have opportunities to contribute to herbarium-based research. We seek to introduce undergraduates to taxonomic research. Mentors develop projects in their families of interest that will be consistent with students' limited available time and experience. Sometimes, students begin a global or regional revision of an entire small genus or infrageneric taxon; in other cases, the mentor selects a limited number of species for them to study. Minimally, they learn to observe specimens closely and group them by morphology, identify species' distinguishing features, and choose names and types for new species; some use morphometric techniques to resolve challenging species complexes. As time permits, mentors guide them through

additional stages in the preparation of a draft journal manuscript. Students are enthusiastic about these projects' immediate relevance to botanical knowledge and conservation, and proud to have their names permanently associated with any new species described.