



Undergraduate Research and the Success of the VisREU Site: Promising Practices and Lessons Learned

Vetria L. Byrd, PhD, REU Site Coordinator, Principal Investigator (2014/2015)

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REU Site: Research Experience for Undergraduates in Collaborative Data Visualization Applications

ABSTRACT

The REU Site: Research Experience for Undergraduates in Collaborative Data Visualization Applications (VisREU) although still in its infancy has been very successful in its mission to broaden participation in visualization not only among women and members of underrepresented groups but also in its mission to introduce visualization to non-STEM fields with data visualization needs. Students are paired with a faculty research team and a visualization mentor. Faculty researchers provide research projects and data; the visualization mentor works closely with the undergraduate student and research team to ensure the data visualization needs of the project are being met while giving students an in-depth look at and appreciation for the visualization process. Upon completion of the 8-week program students understand the true purpose of visualization is insight. To-date the VisREU site has produced 22 data visualization agents of insight. Participants have matriculated to graduate school, joined national labs, and participated in other highly competitive summer research program. For the two years of its existence a student from each cohort has been selected to present their research at the annual NSF REU Symposium. VisREU participants have given numerous presentations outside of the program, participated in national student poster competitions annually, and attended professional conferences. In 2015 two student papers were accepted for presentation at REUNS conference. This poster shares promising practices and lessons learned from the first two years of the VisREU Site.

RESEARCH AREAS

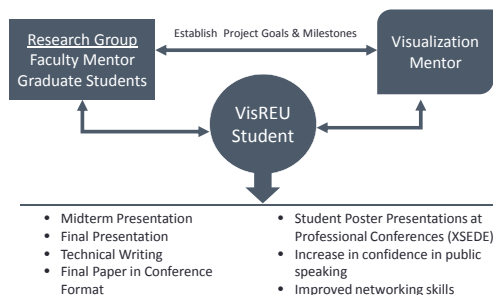
Anthropology, Genetics and Biochemistry, Geophysics, Sociology, Molecular Modeling and Simulation, Plant Population and Community Biology, Inorganic Chemistry, Parks Recreation Tourism Management, Social Media, Social Media Listening, Social Networks, Management of Information Systems, Computer Science, Physical Chemistry, Digital Humanities, Anthropology and Sociology, Biological Sciences, Education and Electrical and Computer Engineering, Civil Engineering, Athletics, Watershed Restoration and Protection Plan Development, Forestry and Natural Resources, Industrial Engineering and Biological Sciences.

LESSONS LEARNED

Program Expectations	Expectations should be revisited often with research faculty to ensure faculty expectations align with the mission of the program. If at any time they differ, it is in the best interest of the students and the program to consciously and efficiently develop a solution that will enable the student to make the most productive use of their time in the program.
Utilizing Resources	Sometimes utilizing resources, might include showing students how to be efficient in their Google Searches; however, this needs to be done in a tactful way. Students are strongly encouraged to ask research faculty questions for which they are unable to find answers to utilizing other resources they have available to them.
Students from Host Institution	It is equally, if not more, important that research faculty from the host institution support the program guidelines and reinforce the program requirement that all participants, including students from the host institution, participate fully in the program.
Participant Motivation	If students are not engaged and/or have decided that the program is not what they expected, it is in their best interest of everyone involved to amicably terminate the contract. Failure to do so in a timely manner will impact the morale of the entire cohort. Student mentoring was a good mechanism for assessing motivation.

PROMISING PRACTICES

- Instead of presenting one long lecture on research methods a **mini-course on research methods was developed by REU Site staff, and presented over the first three weeks of the program.** All students were required to attend. This allowed for a gradual and gentle introduction to the many aspects of conducting and reporting research.
- **Funding to support student participation at a conference** or in a venue that simulates a conference-like atmosphere increased student confidence in their work, gave students opportunities to present and tailor their work to fit various audiences.
- In year two (2015) **faculty were asked to include in their presentation the contribution the student was making to the research project and specifically state the importance of the student's work.** This gave the entire cohort exposure to a broad range of research and they were able to see the significance of their work in a much larger context.

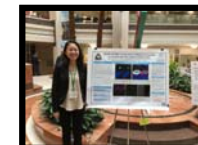


2015 VisREU Cohort



HIGHLIGHTS AND ACHIEVEMENTS

- Students Mentored: 22
- Publications: 9
- Student Conference Talks: 2
- Poster Presentations at professional conferences: 21
- One student from each cohort (2014/2015) selected to present research results at REU Symposium at NSF
- 2014 & 2015 VisREU Cohorts present research results in Student Poster Competition at Extreme Science Engineering Discovery Environment (XSEDE) Conference
- 2015 Cohort invited to participate in the REU 2015 NC/SC REU Site Conference



“The skills I learned about visualization and research at the VisREU have definitely been a big part in my success this year. So thank you so much for the opportunity, it was life changing :)”
*~ Kathleen Kyle, Florida State University
 2015 VisREU Cohort*

- [§]**O'Brien, S., Song, B.** Colorful Math: Using LIDAR Data to Three-Dimensionally Visualize and Analyze the Dynamics of a Deciduous Tree. REUNS/IEEE MASS 2015 Conference, Dallas, TX, October 19-22, 2015.
 - [§]**Salazar, C., Giacalone, K., and Mobley, C.** Is the Glass Half Full or Half Empty? Is the Water Murky or Clear? REUNS/IEEE MASS 2015 Conference, Dallas, TX, October 19-22, 2015.
 - [§]**Lewis, A., Feltus, A., and Smith, M.** Visualization and interaction of multiple layers of high dimensional biological data. Annual Biomedical Research Conference for Minority Students, Seattle, Washington, November 11-14, 2015.
 - **Byrd, V.L. (Organizer), Cox, D., Smith, M., and Cottam, J.** "Could Visualization Provide a Pathway to STEM?" IEEE VisWeek 2015: Panel. Chicago, IL, October 25 – 30, 2015.
 - **Byrd, V.** "Advancing the Frontiers of Interdisciplinary Research by Broadening Participation in Visualization," Byrd, V. Gordon Research Conference on Visualization in Science & Education, August 02 – 07, 2015 Bates College, Lewiston, ME (poster presentation)
- [§] Student publication/Presentation