Background

The What’s in Our Waters (WOW) program was designed by graduate students from the Biology and Environmental Toxicology programs at Clemson University (CU) in June 2013. WOW has established a successfully running model with the AP Environmental Science class of a local high school in Central, SC. The programs’ success and the collected data are useful for both educators working to evolve environmental education and as well as researchers working to increase interest in citizen science. The structure of this program brings attention to South Carolina’s water resources and alters students’ perceptions of science and scientists.

Goals and Objectives

Goal: Teach students the importance of responsible citizen science

Objectives: • Teach students about waterways and water quality as well as proper scientific research and communication, while providing mentoring and teaching opportunities for college graduate students.

Program Methodology

Students are first introduced to citizen science, watersheds, water quality measures, and field testing through an in-class introduction. The following class period, students are taken to field sites to gather data on local streams. Students are responsible for developing a college-level lab report based upon their findings. Finally, students synthesize their research into a poster presentation. These steps have been broken down into three phases: collect, report, and speak.

The Three Phases

Phase 1: Collect

Students work in the field to collect:
• Chemical Parameters
• Macroinvertebrate Counts
• Bacterial Counts

Students Learn To:
• Identify major sources of fresh water pollution
• Name and describe basic water quality monitoring parameters—pH, dissolved oxygen, conductivity, particulates and temperature
• Identify macroinvertebrates and bacteria used as biological indicators of water quality

Phase 2: Report

Students are expected to:
• Complete a lab report
• Summarize their findings

Students Learn To:
• Develop technical writing skills and ability to state information scientifically
• Use data to develop causal relationships
• Summarize basic research protocols and collection methods based upon field work
• Make inferences about the relative water quality of a freshwater ecosystem

Phase 3: Speak

Students present findings:
• Create a poster reviewing experiment
• Develop graphs and tables to display data
• Present poster at a symposium or conference

Students Learn To:
• Construct visual data representation including graphs/tables of changes of water quality monitoring parameters over time
• Introduction to statistical analysis and importance of statistics in research methodology
• Public speaking skills and the importance of scientific communication
• Field and answer questions about research

Program Benefits

For Graduate Students:
• Develop mentoring skills
• Communicate scientific processes in lay terms
• Share personal research quickly and succinctly
• Build a future of scientists and informed citizen-scientists

For High School Students:
• Provide research opportunities/resume building
• Open career options and perspective on who scientists are
• Add technical writing and scientific posters to portfolio
• Prepare for AP Environmental Science exam

The Future

• Measure the impact and outcomes of this project through quantitative and qualitative pre- and post-outreach surveys
• Expand our current model to other graduate school/high school collaborations in other parts of the state/country
• Grow the number of students reached both within the university and high school systems
• Develop continuous monitoring schedule of adopted sites to contribute data to online system

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