Plastics, Oceans, and Earth: Field-Based Learning Influencing Education

Julie E. Masura, Cheryl L. Greengrove, and Peter A. Selkin

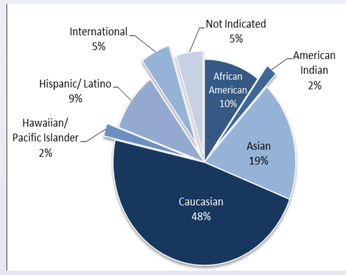
Division of Science and Math, School of Interdisciplinary Arts and Sciences, University of Washington Tacoma

INTRODUCTION

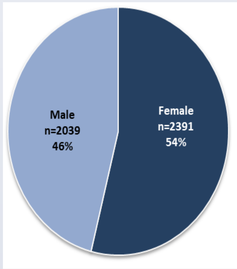
Experiential and hands-on learning is embedded in the Environmental Science curriculum at University of Washington Tacoma. Faculty at UW Tacoma offer several opportunities for students to engage in field-based learning to explore science topics. These experiences are intended to enhance students' ability to apply the process of doing science, use quantitative reasoning, and connect science with society. This presentation will highlight student projects from three courses including introduction to science (100-level), oceanography (200-level), and field geology (400-level).

UWT DEMOGRAPHICS

- Urban Commuter Campus
- Demographics
  - Diverse student population
  - 80% transfer students
  - 65% first in family
  - 10% veterans



Diversity of UWT Student Population



Male to Female Ratio at UWT

Entrance to UWT

INTRODUCTION TO SCIENCE

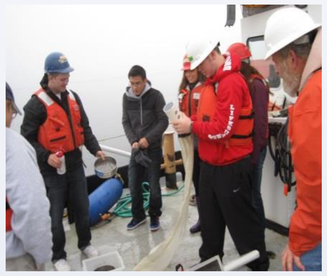
Description: Introduction to Science: Oceans Full of Trash is a general education course, affording a field experience for incoming freshmen. Initially students watch popular videos and review internet reports and blogs. Students then collect samples from a local beach and bay to evaluate the presence of plastics in the ocean. Results from the field are then evaluated against the popular media. A survey is given to each student at the beginning and end of the course to assess their growth in learning the process of scientific applications and discovery.

Objective: Gather field evidence to better understand complex environmental issues based on scientific approaches.

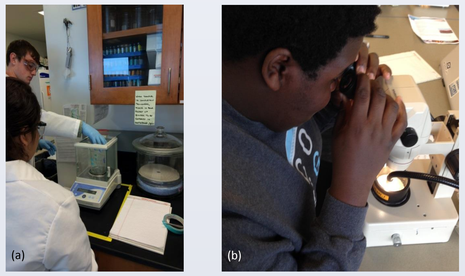
Outcome: Create environmental awareness based on experiential activities instead of from the popular media.

Wordle First Impressions Introduction to Science Survey

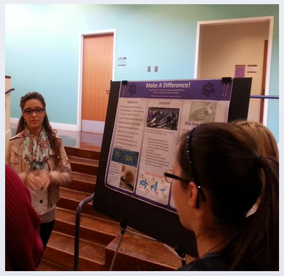
Freshmen Sampling for Plastics on Beach



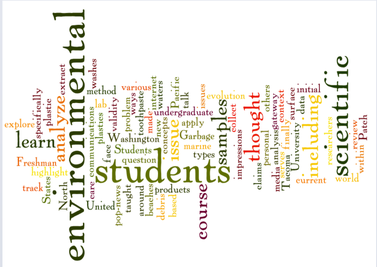
Freshmen Sampling for Plastics on R/V Barnes



Freshmen Analyzing Samples at the Center to Urban Waters (a) Measuring Mass (b) Picking Plastic



Freshmen Presenting at Student Showcase at UWT



Wordle Final Impressions Introduction to Science Student Survey

OCEANOGRAPHY

Description: Oceanography is a laboratory science course designed for both science and non-science majors. Students participate in lectures and laboratories with an oceanographic cruise on a research vessel, affording students an opportunity to explore the local estuary and apply methods learned in class.

Objective: Making "real-world" connections from large scale oceanographic concepts to the local estuary through field-based measurements.

Outcome: Create a comprehensive report on observations with scientific interpretation focusing on oceanographic applications.

Environmental Science Students Preparing Rosette on R/V Thompson. (a) Student Guiding Overboard (b) Student Preparing Sample Bottles

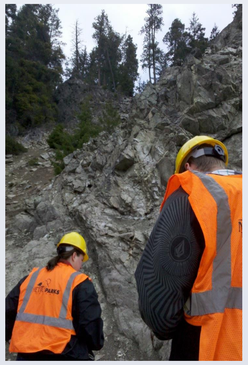
FIELD GEOLOGY

Description: Field geology is aimed mainly at junior and senior environmental science and studies majors with a range of geologic knowledge. Before graduation, environmental science majors are required to take a field course, of which field geology is an example. Students improve fundamental geology skills (e.g. three-dimensional visualization, data collection, rock identification) while making connections between field observations of regional landscapes and published scientific literature.

Objectives: Use geological tools to interpret regional Earth history, relate published geological research to fieldwork, and communicate geoscience concepts to fellow students.

Outcome: Create a peer-reviewed field trip guide that describes the geological history of a terrane or set of related outcrops, using both data collected during the field course and published work.

Students discussing turbidites of the Aldwell Formation, Olympic National Park.



Students looking for contacts between amphibolite and metasediment to delineate the Indian Creek Shear Zone (near Rimrock Lake, WA).

Students sketching basalt flows and geomorphic features related to Pleistocene megafloods, Goose Lake, WA.

CONCLUDING THOUGHTS

Field-based experiences are not only important for upper division environmental science majors, but also important for all students at the university. Fieldwork has been documented as a high-impact practice in the science education literature. Results from each of these courses have shown that students gain a better understanding of concepts addressed in class when they participate in real-world, hands-on activities. Furthermore, fieldwork is invaluable for advancing student learning and creating the excitement needed to recruit and retain undergraduates at the university and in the sciences. Confidence gained by doing fieldwork has resulted in many of these students becoming leaders in their chosen area of study.

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