Using citizen science and service learning to improve environmental science literacy

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There is a relatively small, but growing body of literature that demonstrates that citizen science (CS) projects improve participant understanding of science and the scientific process [1]. In an effort to recruit and increase scientific literacy in general education and low-level Earth and Environmental Science courses, a service learning or CS component was added in the Fall 2017 and Spring 2018 semesters (n=220 students). Online and in-person sections of a general education course, "Sustainable Environments" participated in CS projects, another general education class, "Disasters: Geology vs. Hollywood" participated in a service learning project analyzing heavy metals in soils, and the "Physical Geology" course participated in development and implementation of a public science education event. Assessments of student learning and self-efficacy included both graded essays and self-reporting surveys.

Recent studies on the influence of citizen science measure knowledge gains by assessing knowledge of related science facts learned from a project. We take a qualitative approach, exploring students' self-perceptions of increased knowledge of science, the scientific process, and discussion board responses. While we are limited to self-reports and class assignment performance, these may be valuable because we know little about the public's perception of CS [2]. The implementation of these projects in general education classes allows us to see the diverse student body's view of CS and its influence on their scientific literacy. These self-reports show that 57% of students enjoy the citizen science project compared to 40% of students in the Disasters class and 43% in Physical Geology.

In comparing these interventions and assessing their relative success, we will discuss (a) the engagement of the CS project compared to service learning projects that were implemented, (b) the advantages and disadvantages of giving students more choice in their project, and (c) the influence of situational factors, such as a project gone wrong.

[1] Bonney *et al.* (2016) *in Public Understanding of Science* **25,** 2-16. [2] Lewandowski *et al.* (2017) *in Citizen Science: Theory and Practice* **2,** 1-9.