

Interdisciplinary Service Learning: Two Approaches to Solving One Problem

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ABSTRACT

We propose an interdisciplinary, comprehensive and immersive approach to integrating service learning and research into the STEM (science, technology, engineering and mathematics) classroom. Presented here are two examples of experiential learning activities integrated into STEM curricula that align learning objectives around the central theme of food security. Results show that when students are intimately connected to real-life problems within the community, student appreciation for the complexity of solving real-life problems deepens.

Keywords: STEM, Conference Proceedings, Teaching Quality, Hands-on Learning

INTRODUCTION & BACKGROUND

Research has shown that students are more engaged and become aware of problems faced by members of their own community after taking part in service learning based classroom activity (Markus et al., 1993; Mentkowski & Rogers, 1993; Giles, 1994; Bringle & Hatcher, 1996; Shumer et al., 1999; Lui et al., 2004). These types of quality learning opportunities engage and retain groups at risk of dropping out of STEM programs (Lee, 2002). Creating service learning experiences that are meaningful to the students, community and community stakeholders can be challenging however. The four components of food security (availability, stability, access and utilization) as defined at the 1996 World Food Summit, make an ideal framework for creating interdisciplinary service learning and research opportunities that not only engage students but also encourage further interest in STEM courses. Here we present an interdisciplinary, comprehensive and immersive model for integrating service learning and research into the STEM classroom by addressing the four key components of food security.

METHODOLOGY

Food security related activities were integrated into two different courses at University of Wisconsin-Stout: Botany and Physiology. Botany students addressed **availability** by empowering the community to grow their own food through the establishment of four-season growing (FSG) facilities (hoop houses) at a community garden. Botany students also addressed **stability** by researching season extension strategies to improve yield of local food in cold climates. Physiology students were directed in the establishment of a preventative health clinic (PHC) at a local food pantry to increase **access** to health care and provide patients with a holistic understanding of food **utilization**. To ensure that curricular experiences resulted in transformational quality pedagogy for the student and significant outcome for the community, four key principles were applied to the design and implementation of the work: both projects were carefully aligned with course learning objectives and goals; were interdisciplinary in nature; made a tangible and overt connection to a food security stakeholder; project outcomes were aligned with the needs of the community. Data collected from student personal reflections was analyzed using quantitative and qualitative methods.

FINDINGS

The reflection activity showed that all botany students participating in the FSG garden were able to communicate their growing successes and failures and suggested strategies for successful season extension. Approximately 25 percent of groups were able to successfully harvest edible or otherwise useable plants from their season extension efforts. All students were able to create reports to present to the community garden board detailing their FSG project and describing strategies for improving future crop yields. A breakdown of botany student comments following the service learning activity showed four major themes (Table 1). Results obtained from the reflection activity post PHC demonstrated that physiology students understood how course concepts directly related to the service learning activity; that they were better citizens for having participated in the service learning activity; that they felt positively about the impact of the service learning activity on the community; and that the overwhelming majority of them understood the underlying factors that necessitated the need for the health clinic within the community (Table 2). When asked if physiology students would be encouraged to take another STEM course based on their experience on the present, the results were statistically significantly in favor of taking another STEM course (results not shown).

Table 1. Results of Botany Student Reflections, N = 24

Student Appreciation for:	
The complexity of crop selection, growth and management	100%
The influence of soil, temperature and light on plant growth	100%
Ability to articulate the needs of food crop end-users	16%
Ability to make suggestions for improved plant growth methods	100%

Table 2. Results of Physiology Student Reflections, N = 30

Student Appreciation for:	
Connection between course content and real world applications	100%
Self-improvement by participating in health clinic	97%
Fundamental needs of the health clinic	93%
How health clinic benefitted the community	87%

SUMMARY

These results demonstrate that aligning service learning and curricular goals to the needs of food security stakeholders in the local community results in transformational curricular experiences, and that these tangibly impactful experiences are very important motivating factor for students to master STEM learning objectives that have been integrated into the framework of the associated curricular activity.

SUGGESTIONS FOR BEST PRACTICES & CONCLUSIONS

Projects should be carefully planned with the learning objectives as the primary goal and the needs of the community food-security stakeholder as a close second. Successful projects should allow students to have direct contact with the food security stakeholder. All projects should incorporate multiple opportunities for skills assessment and student self-reflection.

In conclusion, framing service learning projects around a central theme, such as food security serves to benefit both student and community. These interdisciplinary types of projects

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allow students to think about a central problem from multiple perspectives, thus providing the student an appreciation for the complex nature of solving real-life problems within a community.

FUTURE WORK

Future research includes an in-depth assessment of the affective domain (Bloom's taxonomy) (Bloom, 1956) on student learning via service learning that is centered on food security.

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Maleka P. Hashmi, Ph.D., obtained her BSc. Hons in Physiology and MSc. in Pharmacology from universities within the UK. Having obtained her PhD in Physiology from the University of Georgia, Athens, she then completed a post-doctoral fellowship at the University of Wisconsin-Madison. Dr Hashmi established a preventative health screening clinic in 2011 to serve the uninsured within the local community. The clinic is run entirely by students as part of a food security themed service learning initiative. Dr Hashmi can be reached at hashmim@uwstout.edu

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