HOLISTIC EDUCATION IN WATER RESOURCES THROUGH EXPERIENTIAL LEARNING: ENHANCED ENVIRONMENTAL UNDERSTANDING, CONCRETE IMPLEMENTATION OF CLASSROOM THEORY, AND INSPIRATION OF A LASTING ACADEMIC INTEREST

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Abstract. Experiential learning has emerged as a critical component of academia and education, especially in Science, Technology, Engineering, Mathematics (STEM) pedagogy. Among other active learning techniques, field experiences are a long standing part of science laboratory courses which inherently provide experiential learning opportunities. These opportunities can inspire students to continue their education in aquatic sciences and to disseminate their newfound water resources knowledge in social settings. Our goal was to highlight two major forms of learning themes resulting from field experiences and to provide a conceptual framework that highlights how these two themes fit into STEM education for non-science majors. To achieve this goal, we investigated the pathways of two students with similar non-science areas of study and career aspirations and noted their divergences and lasting impressions.

INTRODUCTION

Experiential learning is a process that allows students to experience, reflect, think, and act "in a recursive process that is responsive to the learning situation and what is being learned" (Kolb and Kolb 2005). As such, courses that include experiential learning opportunities allow students to gain useful academic and interpersonal skills that can be applied in other areas of study as well as in the workforce.

The Biological Marine Environment (MARS 1020) course is a combined lecture/lab course for non-science majors that explores biological marine sciences. The lab component of this course includes two field trips to Lake Herrick on the University of Georgia campus. The Lake Herrick lab field provides students with a concrete experience to teach basic principles in aquatic ecology, aquatic ecology field methods, and experimental design/execution.

The field experiences at Lake Herrick allowed students to concretely implement laboratory procedures learned in the classroom with academic content and interpersonal skills to answer a scientific question in the field. As a result, non-science majors gained an ample understanding of STEM topics and utilized their diverse backgrounds to approach a scientific question with varying points of view.

This study aims to 1) highlight two major learning themes resulting from field experiences, and 2) provide a conceptual framework of how these themes fit into STEM education for non-science majors.

MODEL DEVELOPMENT

A conceptual model (Figure 1) was developed using the personal experiences of two similar students – Student 1 and Student 2 – who each enrolled in the MARS 1020 course. Student 1 and Student 2 were both non-science majors studying International Affairs. Both participated in the ROTC programs provided by the University of Georgia and intended to acquire military careers.

Student 1 and Student 2 enrolled in MARS 1020 to satisfy the life science requirement for the University of Georgia. Both recall the course being recommended to them by a peer. Lab group assignments were made early in the semester, partnering Student 1 and Student 2 with one another.

Student 1 and Student 2 completed an Osmoregulation Lab and a Behavior Lab that taught the processes linked to Winkler Titrations and that introduced the students to research and experimental design. Additional lab experiences, sometimes requiring dinner meetings or study sessions, increased group cohesion and trust.

Student 1 and Student 2 applied the technical skills and newfound group coordination acquired in the Primer Experiences to the Lake Herrick Lab. Certain academic

and interpersonal skills were gained as a result, leading to the formulation of a set of learning themes (see Figure 2).

The implications for Student 1 were largely academic. After the course's completion, she volunteered with a water-quality research group and developed an interest in pursuing a water resources certificate. She is even considering career opportunities related to water quality research and aquatic ecosystems.

The implications for Student 2 were largely social. He has informed others of the environmental knowledge gained as a result of his experience in MARS 1020, specifically the Lake Herrick Lab. He has also taken advantage of the relationships that he developed during labs; he consistently meets with his former TA and classmates for mentoring and advice.

RESULTS

The field experience at Lake Herrick inspired long term academic and social interests in water resources. One student continued to pursue their academic interest through volunteer research on Lake Herrick water quality by using opportunities within the Warnell Aquatic Resources Group (WARG). Another student was inspired to spread knowledge of their experiences at Lake Herrick through social settings.

Two forms of learning themes were identified as a result of the field experiences at Lake Herrick: academic and interpersonal (see Figure 2). The academic learning themes fostered the development of academic skills, including data collection, data analysis, and data coordination. The interpersonal learning themes promoted the acquisition of skills associated with teamwork and project management.

DISCUSSION

Experiential learning using campus water resources can help students in a variety of fields acquire similar skills and knowledge exemplified by Student 1 and Student 2.

Water resources experiential learning can also provide capstone lab experiences that serve to synthesize learning and skill building provided by introductory labs. Additionally, such experiences group individuals together – individuals that may or may not have similar backgrounds – and require the development of critical interpersonal skills to complete any project (Pahl-Wostl 2002).

The academic and interpersonal skills developed as a result of experiential learning settings can be applied to both a student's professional career and to their personal development. Accordingly, we believe that additional experiences similar to the Lake Herrick lab should be provided in introductory science courses, such as MARS 1020L or BIOL 1104L.

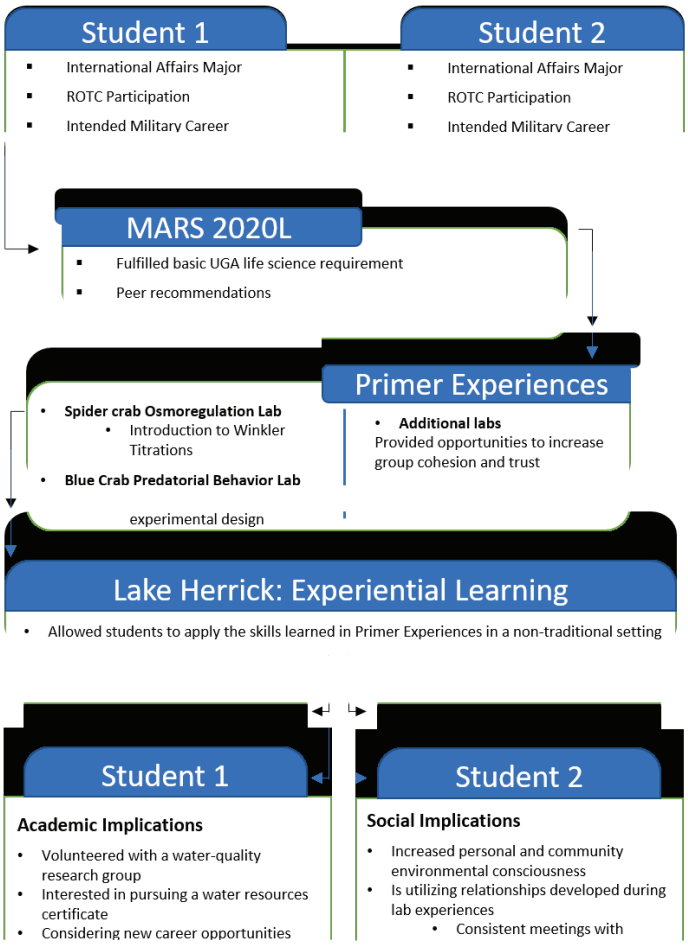

Figure 1. Non-science major Student experiences through lasting interest in water resources.

Additionally, we believe that experiential learning based on campus water resources can be broadly applied across skill and knowledge levels to help students develop into successful, skilled individuals.

CONCLUSION

Experiential learning, particularly with campus streams or Lake Herrick, allows UGA students to acquire a set of academic and interpersonal skills that can be applied inside and outside of the classroom. The learning themes associated with experiential learning include academic skills such as: data collection, data analysis, and data coordination. Additionally, we identified learning themes associated with interpersonal skills including: teamwork and project management.

Experiential learning not only has the potential to professionally interest students in a given subject area, but it can also help students value knowledge of their experienc-

es and create long-lasting relationships. As a result, more individuals can be inspired to dedicate aspects of their studies and careers to a previously unconsidered subject area. In our particular instance, students can become inspired to teach others about environmental awareness can be spread to individuals outside of the academic setting.

LITERATURE CITED

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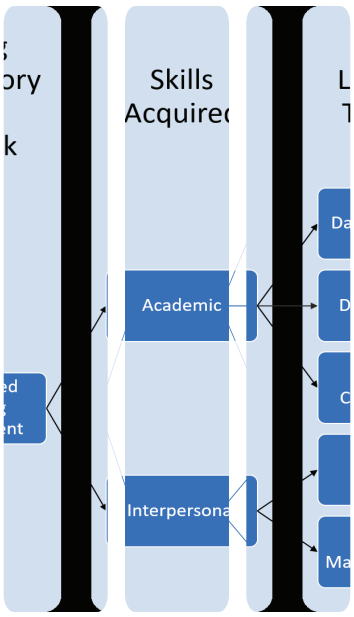

Figure 2. Generalized learning themes derived from our two focal students.