CREATING WELL-INFORMED CITIZENS AND VIGOROUSLY TRAINED PROFESSIONALS THROUGH HOLISTIC LEARNING EXPERIENCES USING CAMPUS WATER RESOURCES.

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Abstract. Water resources at the University of Georgia provide vital educational opportunities to students of all majors. In an introductory organismal biology lab (BIOL 1104L), our team of psychology and communications students conducted an experiential learning project at Lake Herrick, creating our own experiment inside a microcosm of the lake. This experiment facilitated application of unique skills and methods, both in biology and effective group communication. The longitudinal aspect of this project provided necessary skills transferable to our own fields of study. Our experiences at Lake Herrick prompted us to learn more about the water resources on campus, changing our perspectives regarding their use and treatment.

Through the course of this project, our lab group applied and expanded upon new skills, explored a new field of study, and discovered the water resources available to us on campus. The learning experiences provided by Lake Herrick inspired introspection into the similarities between the teamwork methods used in the project and the educational philosophies present in our areas of study. We analyzed our microcosm experiment in the context of team learning, using educational and communication concepts.

Our learning experiences provided by Lake Herrick achieved all levels of Bloom's taxonomy of learning and Fink's taxonomy of significant learning. The team based nature of this project provided vital skills in communication, task execution, and task completion that are transferable between academic and professional settings. Our models demonstrate a framework for providing holistic learning experiences to non-science major students utilizing campus water resources. In conclusion, campus water resources are valuable tools for providing holistic experiential learning opportunities to students with the goal of creating well-informed citizens and rigorously trained professionals.

INTRODUCTION

Lake Herrick provides experiential learning opportunities to non-science majors at the University of Georgia. Experiential learning opportunities teach students science and research techniques through interaction with a local surface water body. Additionally, use of campus water resources provides learning opportunities in teamwork, communication, and environmental stewardship. These experiences are opportunities for students to grow academically, personally and professionally. Educational experiences that use water resources can often be transferred to a variety of academic and professional settings.

Students in BIOL 1104L (Introduction to Organismal Biology Lab) used Lake Herrick as a setting to learn water quality testing methods and as content for an eight-week microcosm experiment. At Lake Herrick, students worked in groups to create microcosms of Lake Herrick and then designed their own experiment to analyze and monitor various components of their microcosm- including dissolved oxygen, plant health, bacteria presence, etc.

Our overarching goals were to 1) contextualize our experiences in team learning, 2) synthesize our experiences utilizing team learning and small group communication concepts, and 3) create a model demonstrating the role of campus water resources in educating non-science majors as academics, professionals, and citizens.

METHODS

Student pathways to campus water resources

All undergraduate psychology students at the University of Georgia are required to take BIOL 1104L as a life sciences general studies course as part of their degree requirements, leading each of us to participate in the course. While we share similar backgrounds, our diverse futures were all positively impacted by our experiential learning practices in this course. Maddie is an intended occupational therapist. Christine is also a communications major seeking work in industrial psychology, and Aiyanna is an intended organizational social worker. In each of these disciplines, we can continue to apply the skills we obtained in this course.

Model comparisons.

Fink's taxonomy of significant learning is a circular model that proposes learning occurs when a significant change is made to the learner's life (Fink 2013). Each domain of the model changes the learner in a different way (Figure 1). Foundational knowledge provides factual information, such as the way lab equipment is used or what dissolved oxygen is. Application is the process of using the foundational knowledge in some way, like taking measurements or setting up a microcosm.

Integration connects the application to other people and areas of life, providing environmental awareness and data collection skills for the future. The human dimension connects students through teamwork and problem solving related to their learning. Caring inspires individuals to analyze how their learning affects their lives, creating deeper values and new interests. Through all of these steps, one can learn to learn, or direct their self to inquire and learn further, beginning the cycle again.

Bloom's taxonomy (Bloom 1956) is a hierarchy of learning that promotes higher forms of thinking in education, rather than rote memorization of facts. Each step in learning expands upon the previous. Remembering facts is the most basic form of learning, but understanding and applying that knowledge help one learn further. We chose to represent our learning process of group communication in Bloom's taxonomy (Figure 2), rather than the scientific process we modeled using Fink's taxonomy.

We remembered the basics of communication and understood their importance, but had trouble applying concepts to our group, as many novice teams do. We chose to explore these issues further by analyzing where we fell short in communication, evaluating our abilities and desires to improve, and creating a new form of group communication that worked for everyone. All these steps are forms of higher thinking and directed learning, allowing us to fully grasp the realm of communication. Bloom's taxonomy here represents holistic learning, transferrable across educational disciplines, professional settings, and informed citizens, that campus water resources provides students.

Figure 3 summarizes the applications of Lake Herrick fieldwork in academic and professional arenas. Reading left to right, it is clear how activities in this experiential learning process built skills that are beneficial on an immediate, practical level and long-term for students and future employees. The first column on the left lists specific exercises in the laboratory experiment as well as the general methods of data collection and group collaboration implemented.

The second column demonstrates attributes of the fieldwork group project that can be applied to professions. The third column lists the academic skills learned from the experiment, which can benefit project participants as lifelong consumers of research. Finally, we infer in the fourth column about specific potential modes of application for which the participants can implement the skills listed in the previous columns into their lives and careers. The last column is an area of future research and refinement, as it only highlights points of widespread applicability to all professionals; the project can have more specific implications depending on the trajectory of the individual's future.

DISCUSSION

Bloom's and Fink's taxonomies are models of learning that encourage betterment of the individual and their environment as they undergo the learning process. We utilized these models in order to take a psychological and communication based approach to the way non-science major students learn and grow as a result of their experiences with campus water re-sources.

Bloom's hierarchy encourages the learner to do more than rote memorization, as the highest level of learning is being able to create something from the process. Many classes do not give students the opportunity to learn deeper, but in BIOL 1104L, we were creating from the beginning, putting together our own material and experiment. The ability to use large-scale, concrete information like that we collected from Lake Herrick gave students a unique opportunity to complete their learning to the deepest level.

Fink's Taxonomy of Significant Learning can be applied broadly and specifically to what we learned as students in BIOL 1104L. We completed this process over the course of the semester, as we learned the basics about microorganisms and their environments in the classroom and applied that knowledge at Lake Herrick in order to obtain the data needed for our group's microcosm. Our knowledge and understanding is now being applied outside the classroom, as we spread our knowledge and environmental awareness to our community and careers, teaching others and being able to apply those same learning processes to other areas of our life.

CONCLUSION

Campus water resources are a vital part of experiential and complete learning for non-science major students at the University of Georgia. Students take away hard science knowledge and group communication skills, as well as information about our water resources and larger environment around them that can be transferred to future applications as citizens and professionals. The skills and knowledge they take away from these courses can be applied in broader contexts throughout their lives and careers, creating educated students, citizens, and professionals.

ACKNOWLEDGEMENTS

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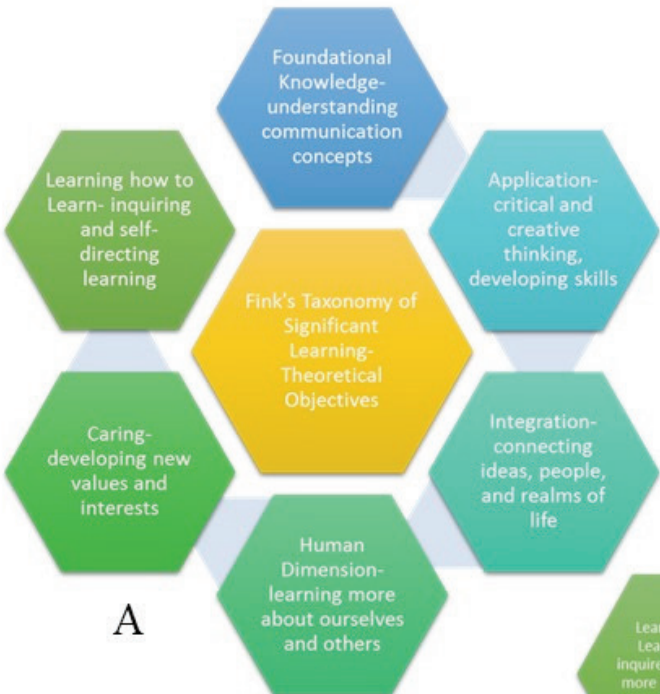

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B

C

Figure 1. A) Fink's taxonomy of significant learning demonstrates the process of complete learning experiences that change perspectives as well as knowledge. B) General examples of each aspect of significant learning. C) Specific examples of each aspect that were realized through BIOL 1104 exercises at Lake Herrick and the microcosm experiment.

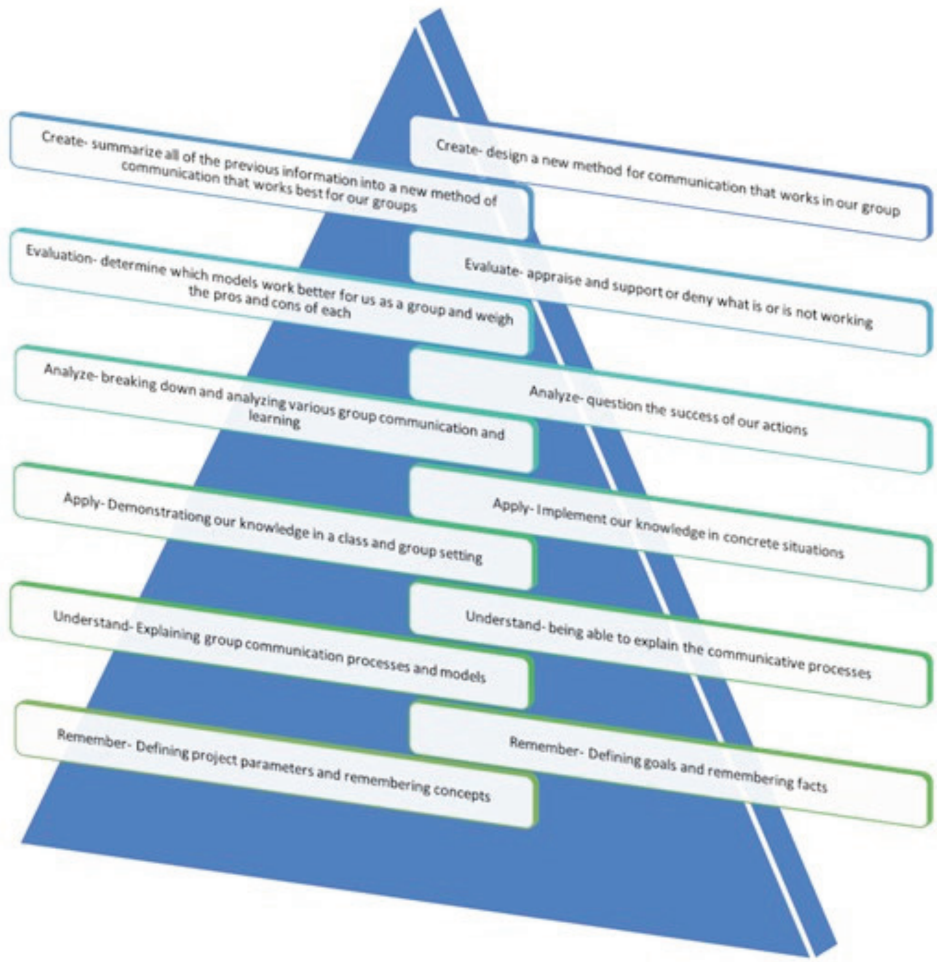

Figure 2. Bloom's taxonomy (Bloom 1956) is a hierarchy of learning that promotes higher forms of thinking in education, rather than rote memorization of facts where each step in learning expands upon the previous. Communication concepts practiced and learned through the Lake Herrick experience and subsequent microcosm experiment were associated with various aspects of Bloom's taxonomy.

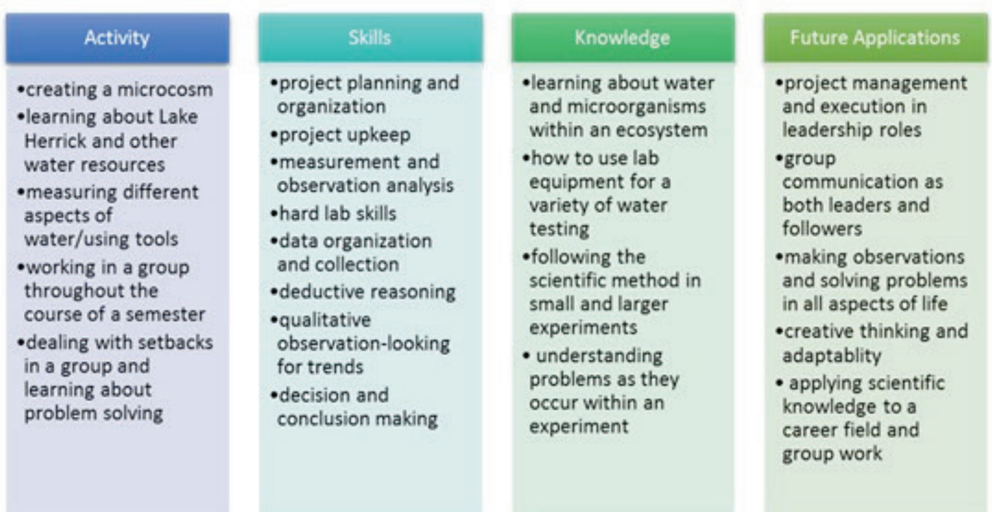

Figure 3. Individual learning activities, in the field and lab, led to acquisition of skills and knowledge that can be applied outside of the original biological context. Experiential learning using campus waters has immense potential for teaching and training future professionals across disciplines.