



PROJECT REPORT

Experiential Learning in the 21st Century: Service Learning and Civic Engagement Opportunities in the Online Science Classroom

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Abstract

Online higher education programs provide opportunities and access to students who might not have enrolled in a higher education program otherwise. As the demand for these online programs increases, including those in the STEM fields, the need for experiential learning opportunities becomes critical. Experiential learning in the online environment can take place in a multitude of ways, can generate student engagement, and can incorporate collaborative learning opportunities. Together, these courses will involve hands-on learning experiences that address real-world needs, service learning, and civic engagement, all which encompass the central focus for these

opportunities and are the foundation on which these courses will be built.

Introduction

A growing demand for online higher education programs brings with it the challenge of incorporating civic engagement responsibilities into an online environment. According to the 2015 Survey of Online Learning, conducted by the Babson Survey Research Group and published in the Online Learning Consortium's Online Report Card (Allen et al. 2016), 2.85 million students are taking all of their courses in an online environment, while another 2.79 million are taking at least one online course.

To put that in perspective, more than one in four students (28 percent) took at least one online course in the fall of 2014. Southern New Hampshire University's College of Online and Continuing Education (SNHU COCE) currently serves online students and offers more than 200 online college degrees and certificates, including those in Environmental Science and Geosciences. The demand for individuals in these fields is expected to increase 10 to 11 percent faster than average between 2014 and 2024, according to the Bureau of Labor Statistics (2016); therefore, providing innovative, hands-on, experiential learning opportunities for these students is crucial.

SNHU COCE incorporates experiential learning opportunities into its online STEM programs with a unique approach. Experiential learning is grounded in the work of John Dewey, Kurt Lewin, and Jean Piaget (Kolb 1984). Dewey (1938) argued that education and learning are social and interactive processes and stated that there is a connection between education and personal experience. Lewin and his Lewinian Model of Action Research and Laboratory Training focused on learning as facilitated by experience, acquisition of data, and observations. Piaget's Model of Learning and Cognitive Development incorporates aspects of these two, but also adds reflection and action to the mix. Together, the philosophy of experiential learning can best be described as a process of learning as opposed to learning on the basis of outcomes (Kolb 1984). According to Kolb (1984), "knowledge is created through the transformation of experience." (See *Figure 1* for a depiction of experiential learning in the 21st century framed in the context of Kolb's experiential learning cycle.)

The purpose of the experiential learning courses for our online learners is to provide students with an opportunity to gain experience in their chosen field. In this report, we'll focus specifically on civic engagement and service learning opportunities within the experiential learning courses. Civic engagement and service learning opportunities promote a sense of community and civic responsibility using reflective thinking to develop the students' academic skills. Students participating in these types of immersive opportunities have the chance to work in local communities, address current environmental issues, and assist communities in implementing solutions. Course outcomes for the experiential learning courses revolve around guided reflection. The act of

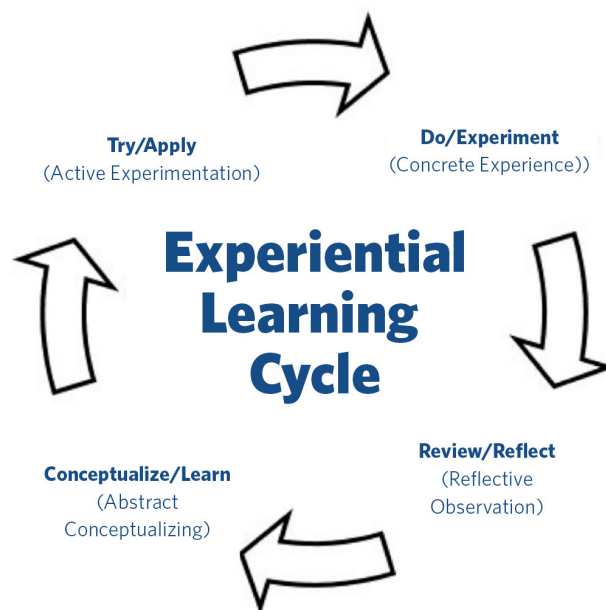


FIGURE 1. Experiential Learning in the 21st century framed in the context of Kolb's experiential learning cycle (Kolb 1984).

reflection is often a process that allows for the reorganization of knowledge and thought in order to attain greater insight (Moon 2004, 82). According to Moon (2004), understanding, decision making, resolution, and action outcomes can result from the use of reflective processes, including reflective journaling. Together, these reflective processes link reflection with the process of learning.

In the experiential courses, students reflect on scientific practices and real-world situations; they reflect on how experiential learning opportunities play a role in driving the achievement of their goals, and examine the relationship between the application of scientific inquiry and their real-world experiences. Students engage in reflective learning by participating in various discussions with their peers (collaborative reflection), along with writing in weekly journals to document their journey through the many experiences they encounter (personal reflection). (See *Figure 2* for an overview of student journal guidelines.) Upon completion of the course, students produce a guided written reflective piece that summarizes all of their experiences and details how those experiences have influenced their personal goals and future career path and helped identify what questions they may still have as they go forth in their educational and professional careers.

Overview: Your journal is a valuable tool for reflecting on and analyzing your experiences each week. Your instructor will provide you with feedback each week that can inform your approach and help you create a more successful final project. You will use your collective journal entries and instructor feedback as tools for crafting your final written reflection.

Prompt: In addition to the weekly journal critical elements that you will see each week, this journal entry requires you to describe both your background and the expectations around this experiential learning opportunity.

For this journal entry, you should summarize your experience and provide specific details to address the following:

- **Background and Expectation Critical Elements**
 - Describe your **interests and background** within the field of science.
 - Describe your **expectations** around the experiential learning opportunities in this course, as well as how this course will assist you in your personal and career development.

You should also address the following:

- **Weekly Journal Critical Elements**
 - Provide an overview of tasks and key activities (training, discussions, labs, assessments, etc.) in which you were engaged during the week, and describe how you applied **scientific inquiry** to work through these tasks and key activities.
 - Describe an objective of your weekly tasks and activities that you were **successful** in accomplishing, and explain why you were successful.
 - Consider an objective from your weekly tasks and activities that you were **least successful** in accomplishing, and:
 1. Describe how you identified those **challenges**. Consider any prior coursework and/or work experiences.
 2. What did you learn as a result of this experience? What might you do differently in the future to minimize the chance of reoccurrence, or how might you change your approach to **resolve** or overcome it?
 - Summarize your weekly experiences and what you have gained from them using appropriate **scientific terminology**.

FIGURE 2. An overview of journal guidelines

Online Experiential Learning in Science through Service Learning and Civic Engagement

Service learning has been identified as a high-impact practice that promotes higher-level learning and success (Kuh 2008; Brownell and Swaner 2010). The National Task Force on Civic Learning and Democratic Engagement (2012) is calling for renewed energy in community engagement, civic engagement, and service learning. Service learning and civic engagement involve building a sense of responsibility to one's community and allow students the opportunity to apply concepts and ideas learned in class to real-life situations and scenarios (Holland et al. 2008, 165). Experiential learning with an emphasis on service learning and civic engagement in the online science learning environment can take place in a multitude of ways and can, in fact, generate high levels of student engagement and collaborative learning opportunities. The learning can take place in both the student's local community and in the online environment where students interact with their peers and a faculty member, sharing, communicating, problem solving, and reflecting throughout the course.

At Southern New Hampshire University's College of Online and Continuing Education, the goal is to provide students with meaningful learning experiences that connect to real-world relevance. To achieve this goal, an online science experiential learning undergraduate course has been created for our Environmental Science and Geoscience majors that includes varying topics that rotate throughout the year. Students may take this elective course up to two times in total. (See *Figure 3* for the Course at a Glance Overview.)

Students engage in short-term immersive learning experiences that span roughly two months and include a minimum of seventy documented hours of experience. (See *Figure 4* for the required weekly student timesheet template.) Students have the opportunity to engage in service while concurrently reflecting on their experience, exploring personal and professional development opportunities, applying scientific concepts to real-world situations, and developing competencies and skills around a desired career interest. The course also allows students to make personal connections in their field of interest and provides a face-to-face experience where students can demonstrate competency in the field to potential future employers, colleagues, or collaborators.

Module	Topics and Assignments
1	1-1 Experiential Learning Weekly Activities (Non-graded) 1-2 Discussion 1-3 Background and Expectations Journal 1-4 Timesheet Activity 1-5 SNHU Career Center (Non-graded)
2	2-1 Experiential Learning Journal 2-2 Timesheet Activity
3	3-1 Experiential Learning Journal 3-2 Timesheet Activity
4	4-1 Discussion 4-2 Course Mission Journal 4-3 Timesheet Activity
5	5-1 Experiential Learning Journal 5-2 Timesheet Activity
6	6-1 Discussion 6-2 Experiential Learning Journal 6-3 Timesheet Activity
7	7-1 Final Project Submission: Written Reflection 7-2 Timesheet Activity
8	8-1 Discussion 8-2 SNHU Career Center (Non-graded)

FIGURE 3. Course at a Glance Overview



SCI 360 Timesheet Template

This sheet must be filled out to capture your experiential learning activities for each module. By the end of this course, you are required to complete a minimum of 70 hours of course-related activities. It is strongly recommended that you strive for 10 hours each week.

These timesheets **MUST** be filled out weekly.

Full Name: [Click here to enter text.](#)

Module: [Click here to enter text.](#)

Activity Confirmation (for instructor use only): [Click here to enter text.](#)

Week of (Monday start date)	Title of Activity	Activity Type and Source	Hours Completed
mm/dd/yyyy		Type: Source:	
mm/dd/yyyy		Type: Source:	
mm/dd/yyyy		Type: Source:	

FIGURE 4. Weekly Student Timesheet Template

Examples of topics that focus on service learning and civic engagement in science for the online science experiential learning course are discussed below.

Service Learning

Service learning is a form of experiential learning that involves equal focus on student learning and community service goals. Service learning encompasses both reflection and reciprocity, where students actively participate in the service learning project and reflect on their experiences, in a dynamic action-reflection process. In *Service-Learning in Higher Education* (1996), Barbara Jacoby writes, "Service-learning is a form of experiential education in which students engage in activities that address human and community needs together with structured opportunities for reflection designed to achieve desired learning outcomes." Therefore, in the online experiential learning course, students are actively engaged in learning opportunities that address a real-world need, while also providing time for reflection and discussion as learners progress towards mastery of course learning outcomes.

Service Learning and Grant Writing

Students learn to write a science grant in a real-world setting. They are tasked with finding and working with a local community partner organization in their area (such as a local, state, or national agency or park, museum, wildlife center, science center, aquarium, or zoo). The students work with their chosen entity to develop a grant proposal for funding that will be submitted to a granting agency for consideration. Students are not assessed on the outcome of the grant application process, but rather the outcomes and assessment focus on the experiential reflective learning process. In this experience, students make connections in their local community, serve the organization's need by submitting a grant on their behalf, and gain a marketable skill.

Service Learning and Field Experience

Field experience can be interpreted broadly, but generally refers to gaining experience in the field in which the student would like to work. For example, it may include service in a branch within the Department of the Interior, e.g. National

Park Service (NPS), United States Fish and Wildlife Service (FWS), United States Geological Service (USGS), or serving on a local (city or county) geographic information system (GIS) project. Conversely, it may involve students who serve as data analysts on a scientific study that encompasses large data sets ready for analysis and synthesis. In this case, students work collaboratively with a faculty member who provides the raw data for the course, and the team of faculty and students work together to analyze and synthesize the data. The data analysis and synthesis could also include a final communication of those science results in a journal, data report, or other research publication.

Field experience allows students to gain skills that will help them in their future careers, and to make connections in the field, add to their professional network, and serve the needs of a community project or organization by serving its overall goal or mission in some capacity.

Civic Engagement

Civic engagement centers on making a real-world difference in the community while concurrently developing knowledge, skills, competencies, and abilities to achieve successful course and community project outcomes. Civic engagement can take on many forms in the higher education environment, and it prepares students to be engaged citizens. In our civically engaged experiential learning opportunities, students work on authentic science projects that are designed to make a difference in the community and provide students with real-world experience in science.



FIGURE 5. In online experiential learning, the world is our lab

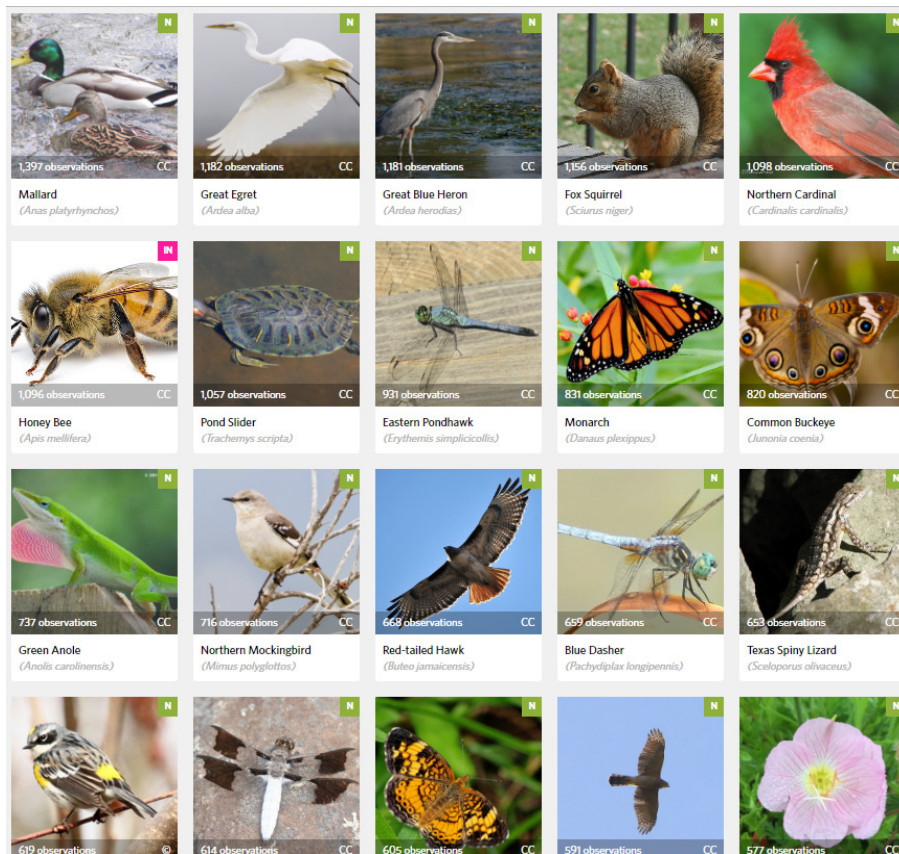


FIGURE 6. Updated Species Guide on iNaturalist

Civic Engagement through Community Citizen Science

In the online science experiential learning classroom, the world is our lab (Figure 5). Citizen science, or public participation in science, offers science students the opportunity to engage in science along with a greater community of collaborators or participants. Students gain experience facilitating and leading the public in real-world science. For example, students may create a citizen science species monitoring project on iNaturalist and host a BioBlitz in their local area. A BioBlitz refers to a period of time (such as a weekend) when organisms in a certain geographic area are surveyed and documented. The iNaturalist mobile device app allows for the BioBlitz to take place, with participants using smart phones and uploading images of the organism to the iNaturalist project.

In 2017, the "City Nature Challenge," which began in California in 2016, became a national event. The April "City Nature Challenge" (Natural History Museum of Los Angeles County 2017) coincided with "National

Citizen Science Day" and included a friendly BioBlitz-style competition among sixteen cities across the United States. The "City Nature Challenge" uses iNaturalist to document species in a given area during a set period of time. Therefore, events like this can be a way for students to get involved in their local community and organize, lead, and facilitate BioBlitz events with the public. Engagement in community citizen science and BioBlitz events can lead to publishing ideas and opportunities for students, including the creation of a blog relating their experiences. Reporting about the experience is beneficial to the learning process, and also serves to reinforce an important aspect of the science process: communicating the science. In addition, science students help identify organisms that come in from participant ob-

servations during the challenge, and ultimately student participation helps to "crowdsource" and update species guides for each region. (See Figure 6 for an example of the updated species guide from the North Texas area, following the 2017 City Nature Challenge.) In 2018, the City Nature Challenge will be a global event. Imagine the unlimited possibilities for your own students when the world comes together in a locally engaged, globally connected iNaturalist BioBlitz next spring.

Conclusion and Discussion

The journey into experiential learning in the online science classroom has only just begun and the service learning and civic engagement examples discussed in this article are only the beginning for online experiential learning opportunities in science. We look forward to continuously learning from our students and our colleagues, and to applying collective stakeholder feedback as we further expand our course topic offerings. We welcome and invite

discussion and collaboration with the entire SENCER community as we continue the exciting journey and evolution in online science education to serve the twenty-first-century learner.

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