

EDUCATIONAL ENGAGEMENT AND THE ENVIRONMENT: INVESTIGATING
SERVICE LEARNING IN THE NONHUMAN SCIENCES

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Abstract

Classic definitions outline service learning as engaging students in experiential education where learning goals are reached when service activities are combined with reflective assignments. In an effort to integrate education with volunteerism, service learning allows students to enhance their coursework with field experience and activism that succeeds in helping provide assistance to a community, environmental, or global problem. Service learning is a flexible concept that can be molded to fit many educational disciplines and curricula. It can be expanded to encompass an entire course or narrowed to a project or requirement within a course restricted by a curriculum. At many schools, and especially at East Carolina University, there are many service learning courses and opportunities. Most, however, occur in the health and human sciences; opportunities in the areas of environmental and earth sciences are more limited. Most higher education institutions, even those in urban settings, are surrounded by biota and conservation issues that can serve as appropriate outlets for environmental service learning. Some schools have incorporated direct service programs such as planting trees and implementing recycling plans. Others have taken material learned in the classroom and developed lesson plans that were taught in K-12 schools. As the world's environmental needs continue to magnify along with its population, there will be an increased necessity for attention to natural resources and nonhuman inhabitants. Conditions for connecting humans to the environment are all around. Crafting the right combination of service project with instruction and education can be the corridor for bringing humans and the environment together.

Introduction

Service learning is a concept that is both historic and new. Hands-on learning, and then termed experiential learning, has been in existence since the times of apprenticeships as described by John Dewey (1938). Service learning is new in that it was only identified directly as an educational tool in the 1970s and did not become widespread until the 21st century (Fiske, 2002). The term “service learning” was not coined until 1967 by Robert Sigmon and William Ramsey (Titlebaum et al., 2004).

There are many definitions and classifications of service learning in literature and in the educational system. No one meaning can encompass all its purposes and applications in individual projects. The US National and Community Service Act of 1990 states that service learning is a method under which learning and development occurs “through active participation and thoughtfully organized service” and meets terms that include addressing community needs, coordinating with an institution of secondary or higher education, and fosters civic responsibility. Through learning, the students must experience the academic curriculum or educational components addressed by the class as well as a complete reflective process (National and Community Service Act of 1990, p. 5). Jacoby (1996) later offers a classically summarized definition that is utilized by many higher education institutions surveyed:

“Service learning is a form of experiential education in which students engage in activities that address human and community needs together with structured opportunities intentionally designed to promote student learning and development (p. 5)”

Along with its many definitions, service learning typology has multiple approaches. Many literature sources use the term, “service-learning.” The hyphenated form emphasizes the integration of community service and academic scholarship. Other times “service learning” will be used, unhyphenated, even in the same document. Sigmon (1997) suggests that in this name, the two terms are viewed separately, implying they do not encompass an integrative academic learning style and neither component in the experience is expected to enhance the other. Eyler and Giles (1999) propose the hyphen symbolizes the reflection process that unites the service and the learning. However, in many books, websites, and papers, “service-learning” and “service learning” are used interchangeably. SERVICE-learning and service-LEARNING are sometimes used to differentiate knowledge gained from primarily volunteer-focused projects in contrast to an academic concept that involves some small amount of volunteerism (Sigmon, 1997). For the purpose of this investigation, I use “service learning” in order to eliminate confusion over the inconsistent use and provide overall simplification for the project.

Despite the many definitions and understandings of the term, “service learning” programs must reflect important requirements that ensure efficiency. Successful service learning projects exhibit the principles of *engagement*, *reciprocity*, *public dissemination*, and *reflection* (Dumlao, 2008). *Student engagement*, i.e., students being engaged with the world around them, allows students to make connections through academic work to the community and public needs around them. This makes subject matter more relevant and offers a sense of applicability to the real world for students. *Reciprocity* refers to the overall and complete participation by all involved parties. Constructing the project

contributes to an educator's own knowledge and skill set and offers a regenerated career direction. Service learning projects also offer a new way to connect with students. Students should be viewed as colleagues, not workers or clients, in order to feel responsibility as members of a greater community (Jacoby, 1996). Service learning projects are also encouraged to have *public dissemination*, in the form of some element of communication or display to promote public knowledge and participation. This presentation becomes especially important when components of the project implement data collection or surveys (Dumlao, 2008).

The most crucial component of a service learning program is the opportunity for *critical reflection* by the student. This allows students to draw connections between the curricular learning goals and the value of service. Through meaningful reflection, students should be able to see their learning and subsequent work as having a positive impact on the issue at hand, thus instilling satisfaction as well as fulfilling academic goals. This can be in the form of discussion boards, journal entries, or final projects. Reflection methods do not have to be restricted to written essay form in order to be successful. Class discussions, scrapbooks, and blogs are all documented ways of integrating critical thinking into the service activity (Dumlao, 2008). According to Eyster and Giles' (1999) "5 C's of effective service learning reflection," student reflection must be 1) *continuous*, 2) *connected*, 3) *challenging*, 4) *contextualized*, and must be 5) *coached*. In order for the reflection process to be successful and comprehensive, a continuous, circular process of reflection must occur before, during, and after the service process. The experiences and reflections must directly integrate the course learning objectives and service project, connecting the student to the learning and the

service. Effective reflection should induce a learning extension for the student that is challenging and pushes the student to examine their experience in a contextualized, meaningful way. This stretch will allow the test of critical thinking and problem solving to serve as a medium to help the student draw conclusions. Faculty are responsible for guiding students through the new experience and may be called upon for emotional or intellectual coaching during reflective processes. Adequate, successful coaching allows students to develop new ideas, explanations, and interpretations for what they are learning. Students also can develop life skills to take with them post-service learning experience.

Service learning offers benefits for all parties involved: the students, faculty members, institutions, and community partners. In contrast to the typical higher education experience where the focus is on individual performance, service learning emphasizes collaboration across the student body, faculty, and community organizations, involving group problem solving and shared expertise experiences (Ward, 1999). Students who engage in active learning gain an understanding of the subject's relevance and importance of application to the real world. Students who have participated in service learning have reported being better able to recall the material (Eyler & Giles, 1999). This enhanced understanding is accompanied by life and academic experience that will be important in helping students choose directions for career paths and professional development (MacFall, 2012). The student will also gain a broadened awareness of societal issues and needs while developing a sense of civic responsibility and, hopefully, encouraging future community involvement. According to the National Commission on Service Learning (Fiske, 2002), the combination of service

learning experiences with interpersonal and critical thinking skills significantly enhances the complete intellectual package students will carry away from a course and increases their motivation to participate in service and school activities. Service learning also has been shown to increase academic understanding with particular improvement in writing skills (Astin et al., 2000). Most importantly, service learning prepares students to be active citizens.

Faculty also benefit from service learning opportunities. Although the development of a service learning course may be difficult, faculty and the institution will experience long-term benefits following its implementation. Professors get a more enriching teaching experience as well as fulfill civic responsibilities. They also facilitate the creation of new research, scholarship, and award opportunities (Dumlao, 2008). Professors are able to pursue thematic teaching through problem-solving, requiring service learning students to incorporate multidisciplinary areas of knowledge to formulate a solution (McDonald & Dominguez, 2005). The institution is able to extend its resources into the community, who also greatly benefits from the formation of this partnership. The college or university as an institution is also introduced to needs of private sectors through the newly obtained, and often informal, research and research questions service learning uncovers (Gutstein et al., 2006). Service learning provides the human resources many organizations are often lacking. At the same time, organizations of all disciplines participating in service learning are helping to foster the enrichment of students and faculty. All participants can experience and reinforce the value of community engagement along with the benefit of integrating academics.

For this paper, I set out to review the historic and current literature on service learning with a focus on a new extension, environmental service learning. I approached this using the Joyner Library databases including Web of Science and Science Direct with search terms “environmental service-learning/service learning” and “service learning in the environment/natural sciences,” seeking particular emphasis on use of environmental issues in hands-on inquiry, volunteerism, and most importantly, service learning. I reviewed a copious amount of sources. Of these, I chose approximately 13 that demonstrated environmental service learning (Table 1) and I selected four for more detailed treatment. This selection was based on the project description’s thoroughness as well as course’s applicability to the three types of service learning I chose to describe. It was also important that the case studies were published within the last 10 years. Each one selected was a direct descendent of environmental service learning with clearly defined goals and outcomes, not just a brief description.

Environmental Service Learning

Active engagement in curricular lessons promotes more involved learning for the student and teacher. Incorporating service learning into a course can help drive concepts to be more relevant for students and allow teachers to break the lecture and note taking mold. For classes in the social sciences, students can participate in projects that allow them to directly interact with and experience social issues such as poverty, politics, and working in schools. For the medical sciences, students can relate volunteer work in hospitals, nursing homes, or specialty clinics to their classes. However, service learning in the nonhuman sciences can require a little more creativity. The world is full of environmental and conservational needs that are capable of being incorporated into

curriculums for many science disciplines. Physics and chemistry, earth sciences, and biological sciences all are appropriate housings for environmental service learning (Leege & Cawthorne, 2008). Some projects may fall into the broader category of conservation and promoting awareness on an important issue. This type of thinking can promote a change in mindset that will help higher education have an active role in creating a more sustainable future (Cortese, 2003). Even simple volunteer projects can incorporate basic lab and sampling techniques. As long as students are investing in some form of knowledge achievement or knowledge stretch when completing the project and subsequent assignments, they are participating in environmental service learning.

Environmental service learning combines current environmental issues and service needs with curricular subject areas. Through these projects, students are engaging in a stronger informed knowledge of conservational and ecological developments while developing skills they can use to take action and make educated decisions in the real world on environmental and other science-based issues (McDonald & Dominguez, 2005). Some common goals for an environmental course include providing research experience for students, becoming acclimated with field methodology, and better acquainted with literature-searching, data analysis, and research strategies (Firmage & Cole, 1999). A service learning project that focuses on a specific environmental issue can help students make these connections. Through the lecture component, students gain the subject knowledge needed to address the issue. After either choosing their issue or being assigned by the professor, students will then

work, often collaboratively, to address the problem. The reinforcement of the curriculum is integrated through reflective assignments.

As innovative teaching techniques continue to grow in popularity throughout all levels of education, it is well known that students are more actively engaged when learning through hands on activities (Wilczenski & Coomey, 2007). Sometimes, greater engagement during class promotes higher interest in the subject matter. Environmental service learning has been shown to increase student's awareness in the environment and environmental problems even for non-biology and non-environmental studies majors (Astin et al., 2000). These students typically have a harder time establishing science's relevance in their lives. Packer (2009) cites a case study where in an introductory biology class for non-majors, one three-hour lab section of students was altered to include service learning components while other lab sections experienced a more traditional science lab. The service learning lab section worked with a local farm manager to develop projects that appealed to non-science majors such as education and marketing. Students in the service learning section participated in volunteer work as well as working on the projects during some lab days. On other lab days, the students completed the same activities as the non-service learning section, but also participated in discussions and reflective assignments related to the farm projects. Students were assessed through the reflective assignments, a final exam question, and answering the New Ecological Paradigm (NEP) survey. The NEP survey was used to determine if the changes in students' feelings about the environment were induced by participation in the service learning projects. The evaluation found that students in the service learning section had changes in attitudes and values concerning the environment as well as

reduced stereotypes about farmers, agriculture, and food supplies. Overall, the students in the service learning section had a greater awareness for the relationship between consumers, farmers, and the environment and contributed more positive evaluations for the instructor and the course. The study was even able to conclude that students in the service learning section were more likely to engage in local agricultural initiatives after graduation (Packer, 2009).

The literature to date suggests that environmental service learning can fall into three major categories: 1) *academic service learning*, 2) *research-based service learning*, and 3) *outreach service learning*. *Academic service learning* involves engaging in a goal-driven project where the “service” is to meet the needs of an issue. Knowledge on the subject comes from the curricular lessons, which is then reinforced through work given to the community need. In *research-based service learning*, the “service” is to provide information or data that contributes to the understanding or knowledge of a concern. Through research-based service learning, in contrast, students ask questions related to a community need and work through a more investigative process to collect and analyze data and subsequently draw conclusions and propose solutions (Reynolds & Lowman, 2013). In *outreach service learning*, students become acquainted with contemporary education methodology while learning a new scientific concept related to the curriculum. The students will then teach this concept to primary school students, secondary school students, or at a community program or event, thus generating understanding, interest, and awareness in the subject.

Some programs favor academic service learning because it often produces a tangible result. Donaghy and Saxton (2012) constructed a general chemistry class at

State University of New York (SUNY) - Syracuse in which students were offered the opportunity to enroll in a Service Track where their exam and final grades are buffered by participation in a service learning project. One project option was working with Carpenter's Brook Fish Hatchery, a county-run fish hatchery about 20 miles from the university that was in danger of closing due to lack of funding. Students volunteered in teams throughout the day to keep the fishery open, working in shifts around their class schedules. Through direct experience, students learned about dissolved oxygen, water quality, volatile organic compounds, and generally how chemistry must be understood to run a business. In return, Carpenter's Brook Fish Hatchery could remain open (Donaghy & Saxton, 2012).

Many research projects have the chance to grow into research-based service learning projects. The need for human resources can become an opportunity for students to learn while simultaneously contributing to the greater knowledge. In Durham, North Carolina, Duke University offered an undergraduate research-based service learning course called "Conservation Biology of the Eno River State Park" as a first year writing course or an environmental science or biology seminar (Reynolds & Ahern-Dodson, 2010). Each semester, the course instructors collaborated with state park officials to coordinate research projects that could support park needs. Examples of past projects include small mammal inventories, monitoring aquatic salamander populations, mapping invasive plant species, and overall water quality research. Reflective writing assignments and final research presentations were organized to accomplish learning objectives. Community service work completed helped local conservation and biodiversity efforts (Reynolds & Ahern-Dodson, 2010). Students

actively learned curriculum material through fieldwork as well as the literature reviewed to create projects. At the same time, they were afforded the opportunity to work alongside research professors, understand the inner workings of research science and fieldwork, and see how research can be productively applied to community problems.

Another common example is for a service learning course to oblige students to teach content to another audience through outreach programs in the community at area elementary, middle, and high schools or community events. This facilitates new ways of learning by the original student as well as enhanced learning by the school students. The Science Education Outreach Program (SEOP) at the University of California, Davis allows students across multiple science disciplines to become familiar with contemporary educational theory and methodology and design a lesson using this new knowledge (Gutstein et al., 2006). This lesson was then taught to secondary education or community program target audiences. Environmental applications of this outreach service learning included aquatic toxicology activities concentrated on riparian zones and water quality for high school students and a watershed exploration program as a field trip precursor for upper-elementary students. Outside of school hours, students implemented interdisciplinary activities in community gardens for an urban after-school literacy program (Gutstein et al., 2006). Undergraduates were able to actively apply the pedagogy approaches and content knowledge to teaching situations and facilitate service learning experiences in other groups. Since many of the students were pursuing careers in education, this avenue for expanded learning provided professional skills and contributions to be stockpiled for future career and teaching opportunities.

Challenges

All learning has challenges and service learning is no exception. Some of these obstacles include grading, group workload issues, and the need for multiple independent projects and community partnership conditions. Certain project situations are more efficiently completed when students collaborate. However, individual grades are typically necessary for an academic class. Some teachers choose to incorporate individual assignments along the way followed by a group project at the end. This is sometimes coupled with self- and peer-evaluations of the service and project components for individual participation grades. When choreographing multiple groups, it is important for instructors to maintain communication with the students, community partners, and other participating faculty to ensure goals are being met (Firmage & Cole, 1999). Environmental service learning comes with its own unique concerns of weather and fieldwork safety. Faculty can account for weather by planning flexibility into the schedules with back-up activities. Working with some community organizations can involve significant transportation and liability challenges. Many colleges and universities have established volunteer centers that provide resources such as insurance for students volunteering and would be or are willing to expand for service learning classes. While many organizations recognize the benefits of partnering with a service learning class, not all causes are fit for the purpose. In order to meet the academic requirements of a course, students must be actively engaged and learning in addition to contributing to the need. For example, river cleanups are frequented for volunteer projects. In order for the project to relate to the service learning criteria, students must do some sort of activity and learning that relates to the curriculum such as testing water quality parameters or investigating where the pollution sources originate.

Success in service learning, especially in environmental service learning, has thus far been difficult to quantify. The case studies addressed previously primarily use survey methods, i.e., before, during, and after questionnaires, as well as evaluations. All projects also implement reflective assignments and projects through which instructors track progress. Gutstein et al. (2006) had students provide anecdotal feedback as well as surveyed the perceived influence of the project on future goals. Donaghy and Saxton (2012) examined the increase in student participation in the Service Learning Track over the Traditional Track course option and also observed higher grades in the Service Learning Track. Still, one may ask if students are truly learning *better and more* via service learning opportunities. In surveys by Eyler and Giles (1999), most students report having deeper subject understanding, being better able to analyze problem causes and solutions, and finding learning to be more enjoyable. Students testify learning more efficiently through service learning because the experience allows for expansion on knowledge learned from lectures and readings (Eyler & Giles, 1999). The opportunity to apply the learned content helps students make sense of the subject and its relevance to the real world. Many students expect that information learned will stick with them more efficiently because it was not learned during cramming in order to make passing grades on tests. Most of these revelations were made through reflective assignments and quantitative data of academic success is still lacking. Assessment of factual learning is difficult because traditional methods, such as exams, are not always the most efficient gauge of service learning's influence on learning goals (Eyler & Giles, 1999). Therefore, if grades are not the best indicator of learning outcomes, other quantitative methods are waiting to be established.

Student reflections are only capable of covering personal achievements, and sometimes more clarification on learning success is needed. Jordan et al. (2012) proposed a new framework for evaluating citizen science literacy that can be implemented in service learning environments as well. This framework advises that after establishing learning goals, learning outcomes should be the next course of action. Program success can be measured on the individual-, program-, and community-level by measuring achievement within each of these levels. In order for the outcomes to be realistically evaluated, they must be “specific, measureable, attainable, relevant, and timely” (Jordan et al., 2012, p. 307). Examples of indicators of individual success may include increased awareness of the environmental issue, scientific method, subject knowledge, and motivation to continue service. Programmatic outcomes could involve improvements in overall systematic understanding, engagement means, strengths and weaknesses, and data use and accessibility. Outcomes at the community level may result in improved outreach and public impact as well as a stronger social presence (Jordan et al., 2012). If program developers assess proportions of indicators met at the conclusion of the class, in addition to gaining knowledge of student success, they will learn about the overall program accomplishments and be able to make adjustments for the future.

History

East Carolina University’s values are based upon the school’s motto, *servire*, meaning “to serve” established in 1915 (ECU, 2014). One of the mission statement’s main goals is the commitment to unite values and strategic action in a way that empowers students and community members to become better leaders in society (ECU

Comprehensive Standards, 2012). The university places strong emphasis on service through education, research and creative activity, and leadership and partnership.

Chancellor Steven Ballard's continued vision for the Leadership University is supported by the presence of the Service Society, an honorary organization that recognizes not only ECU students who are active in the community, but also faculty and staff. East Carolina University has established the service learning committee as a division in the Faculty Senate to address service learning and its implementation at the university. ECU has been a member of the North Carolina Campus Compact, a division of the national Campus Compact organization, since 2003.

Service Learning at ECU

The Service Learning Committee, a standing committee of the East Carolina University Faculty Senate, is responsible for reviewing course designation processes and classes and making recommendations to the Senate, serving as the liaison between the Faculty Senate and the Volunteer and Service Learning Center, and coordinating the annual ECU Service Learning Conference. Service learning is defined by the university as "a method of instruction that has the benefit of meeting academic course objectives and helping students develop a sense of engagement and social responsibility." Courses must fulfill three guidelines as designated by the Service Learning Committee: 1) service learning must be formally structured and relevant within the course's academic curriculum, 2) the community-based learning activities must be organized so that students directly serve a community need, and 3) students must connect the service opportunities and activities to the course curriculum and societal issues as a whole through reflective assignments (ECU Service Learning Committee,

2012). Proposed “Service Learning Designated (SL)” courses that meet these guidelines will then undergo an application process and must be approved by the Academic Committee, Faculty Senate, and finally the Chancellor before being listed in University catalogs. Service learning designation was first established and approved by the Chancellor through a Faculty Senate resolution in 2008 (ECU Faculty Senate, 2012). Before 2009, faculty could self-declare their course or certain sections of their course as service learning and register it with the Volunteer and Service Learning Center. After the resolution, faculty were required to undergo the formal designation processes allowing students to add service learning attributes to their transcript. Since implementation of the resolution, there has been a steady increase in the number of Service Learning Designated Courses at ECU, as well as an increase in student participation.

The Volunteer and Service Learning Center (VSLC) is the main support resource for professors seeking service learning course designation. It was established in 1990 and currently carries a mission to “foster an environment where individuals learn about themselves and their community, take action through service, and advocate for lasting social change” (ECU VSLC, 2014). The VSLC maintains partnerships with many local and national community needs and facilitates connections between agencies and courses. It offers a wide variety of workshops, conferences, and orientations for students and faculty, as well as liability insurance. The VSLC is also available for assessing serving learning components and courses for effectiveness and community value and collecting valuable data from students.

During my study, the VSLC made helpful updates to its website, making navigation for students and faculty considerably more manageable. The website was expanded to include a current course listing, course designation guidelines, information on workshops and retreats, and updated links to external resources. There was also an additional tab highlighting ECU's annual Ethics of Public Service Symposium. This symposium takes place in the spring and features ECU's current and intended initiatives while partnering together service-related units and the North Carolina Campus Compact.

The Thomas Harriot College of Arts and Sciences (THCAS) is one of main divisions of East Carolina University and houses 15 departments in the humanities, mathematics, as well as natural and social science departments. Although THCAS has one of the largest undergraduate bodies, it has one of the smallest presences in public service. According to the 2009-2010 academic year annual report as described in the Faculty Senate's Comprehensive Standard related to the Public Service Mission, the college participated in three public service projects. These included implementing and evaluating a project for Latino community health advisors, providing testing for students to enter the North Carolina Early Mathematics Placement Testing Program, and sponsoring the Peace.Love.Pirates.Cure cancer awareness fair.

During this investigation, an informal website survey was conducted of 33 schools including ECU and its peer and aspirational peer institutions (Table 2). The main purpose of this review was to examine the state of service learning at these colleges and universities and discover which schools, if any, had significant service learning presence in the nonhuman sciences. First, the school list was expanded from

the list of peer and aspirational peer institutions to include regional schools and some larger institutions. Next, each school's website was explored and a searched for the terms "service-learning" and "service learning." The main objective was to explore the extent of service learning's presence at each institution and what resources are provided. I was also looking for accessible class lists from which I could deduce what disciplines the service learning classes covered. There was much variation in the development and depth of information provided from the different websites and programs. However, only eight, almost one-fourth, of the schools surveyed provided service learning opportunities in environmental and non-human-based courses. It is anticipated that service learning may have a stronger presence in schools than perceived due to limitations such as website functionality and accessibility.

According to Campus Compact's 2012 survey, environmental issues and sustainability ranked sixth on the list of top ten issues addressed by service learning programs; over 85% of participating schools had environmental service learning programs or courses (Campus Compact, 2014). Of the list summarized in Table 3, only 9% of the Fall 2013 Service Learning courses resided in THCAS (see Appendix 1 for an expanded complete list). Over one-third of ECU's service learning courses were located in health departments in other colleges. Though no environmental studies or environmental sciences major currently exists at East Carolina University, there is a significant environmental and conservational presence on campus. The ECU Department of Biology houses multiple classes in the marine, ecological, animal, and botanical sciences. The Thomas Harriot College of Arts and Sciences also houses the biology-affiliated North Carolina Center for Biodiversity, which serves as an outreach

tool to promote research and education in global biodiversity to the school and surrounding community. Since many of the biology classes have required three or four-hour labs, there are opportunities where nonhuman service learning could be incorporated. Smaller, local projects can be completed during longer-blocked lecture classes.

The eastern North Carolina communities surrounding ECU also offer many opportunities for nonhuman community-institution partnerships that are within reasonable transportation distance to the school. The West Research Campus is a 500-acre university owned property used for experiments and could offer space for a service learning project involving ecological concepts such as invasive species mapping and water quality assessment. The Tar River has many needs that can be addressed in a service learning class. Some tributaries even run through ECU's campus (Green Mill Run). Local community gardens are another trending accommodation for academic learning partnered with volunteerism. The VSLC offers extensive and useful resources to connect faculty and classes to causes and provides full lists, syllabi, and program models. VSLC is willing to work with professors wishing to develop partnerships between the university and communities.

Resources

Campus Compact is a nationally renowned higher education organization that is dedicated to recognizing and promoting campus based community service and civic engagement. Developed under a mission of challenging campuses to re-address commitments to public service, presidents are encouraged to sign their school up under this declaration on civic responsibility. It supports over 1,100 colleges and universities

composed of more than six million students. The national Campus Compact is divided at the state level with 34 state affiliates that represent most, but not all, private and public universities and colleges. Membership in Campus Compact provides schools invaluable resources and assistance for helping to build community service and service learning partnerships and foundations. Campus Compact offers an immense collection of helpful resources on its website and through its state affiliates. General resources include help for faculty, students, and presidents. They range from program models and syllabi to comprehensive toolkits and workshops. Of the 33 schools I reviewed for this study, 28 are members of Campus Compact.

Service learning is one of Campus Compact's major initiatives. Campus Compact offers assistance to nearly every aspect of a service learning course. Faculty/instructors can gather ideas from model program and service learning syllabi databases. These databases are searchable by discipline, academic year, and state, and contain hundreds of examples from across the country. Although there is a strong presence of programs in the human and social sciences, Campus Compact also houses an impressive list of examples in the nonhuman sciences. These programs range from courses examining global climate and conservation issues to projects centered on local issues such as watersheds and agricultural projects. Support does not cease at program and course ideas. Campus Compact offers assignment guides for professors crafting the critical reflection component of the service learning course and suggestions for other evaluation methods.

Campus Compact also supports schools seeking the Carnegie Community Engagement Classification. Carnegie Classification draws its foundations from Campus

Compact's Indicators of Engagement Project. The award's goal is to reinforce the links between campuses and communities by strengthening college and university commitments to public service. According to Campus Compact, achieving Carnegie Classification gives campuses legitimacy, accountability, and an institutional identity as motivators for community engagement. The application process provides schools the opportunity to conduct a comprehensive self-assessment that requires the unification and cooperation of multiple campus departments. This self-assessment can help campuses identify gaps and needs in the public service sector and overall departmental communications. This can result in the reformation of campus committees and redirections towards public service initiatives.

East Carolina University sought and was awarded Carnegie Community Engagement Classification in 2008 from the Carnegie Foundation in recognition of ECU's public service accomplishments. Service learning was one of the qualifying components of the Carnegie application. Based on this application, the university was able to make recommendations on community leadership and engagement needs as well as use the classification to raise awareness about the ideal service campus model. The recommendations included needs for common definitions, improved data collection and analysis, and better corridors for public service collaboration within and around the university. Community partnerships underwent revitalization and resulted in a new set of strategic directions for the university and its recommitment to community engagement. These details can be found in the ECU Faculty Senate's Comprehensive Standard 3.3.1.5 Public Service Related to Mission (2012).

Conclusion

At the time of this review, no service learning course existed at ECU in the nonhuman sciences. Near the publication of this manuscript, it was announced that a newly formed service learning course was set to be offered in Fall 2014 under the Biology Department. This plant biology course will give students the opportunity to investigate and remove local invasive plants in correlation with learning about how plants are able to outcompete and overtake new landscapes through biological mechanisms. The installation of this course is reflective of the advancement service learning is undergoing across higher education institutions.

Experiential education has been around for a long time, but its protégé, service learning, is becoming a popular pedagogical method for connecting the academic curriculum to community needs. Environmental service learning has outstanding potential to fulfill some of those needs and contribute to participants' awareness. Through many different methods such as academic service learning, research-based service learning, and outreach service learning, service learning in the nonhuman sciences can be molded to create an appropriate rejuvenation to traditional lecture teaching. Schools are making promising strides in advancing their service learning expanse and they have many resources available to help them continue to grow. Data on the success of service learning has thus far mainly been limited to student and faculty evaluations and testimonials. In order to better understand the effects of student learning and understanding, more quantitative research on assessment of service learning is needed. Methods such as the New Ecological Paradigm Survey (Packer, 2009) and level based outcome evaluations (Jordan, 2012) show promising pathways for advancement. Service learning and environmental service learning are becoming

increasingly popular methods of experiential education. With innovations forthcoming, this industry shows encouraging growth with hopes of expanded opportunities and eventual complete discipline coverage.

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Table 1. Listing of case studies of or containing environmental service learning programs examined for this review.

Case Studies Selected for This Review	Case Studies Not Selected for This Review
Donaghy & Saxton (2009)	Barton (2000)
Gutstein et al. (2006)	Bixby et al. (2003)
Packer (2009)	Brennan (1998)
Reynolds & Lowman (2010)	Handa et al. (2008)
	Harrison et al. (2013)
	Leege & Cawthorne (2008)
	MacFall (2012)
	McDonald & Dominguez (2005)
	Montgomery (2004)

Table 2. Survey of service learning websites and Campus Compact (CC) affiliation.

*denotes peer institution, **denotes aspirational peers.

School	City/State	Enrollment	Service Learning Notes	CC Member?
Appalachian State University	Boone, NC	18,000	<ul style="list-style-type: none"> No course list Appalachian and the Community Together Programs. Students have opportunities for Service Learning, Community-Based Research, and Service-Based Internships 	Yes
Campbell University	Buies Creek, NC	6,000	<ul style="list-style-type: none"> Service learning abroad opportunities through internships 	Yes
Central Michigan University*	Mount Pleasant, MI	21,000	<ul style="list-style-type: none"> Examples of recent projects, 10 principles to practice in academic service learning Mediated through the FaCIT Team (Faculty Center for Innovative Teaching), service learning projects can receive grants to help with course integration 	Yes
Coastal Carolina	Conway, SC	9,300	<ul style="list-style-type: none"> Three courses, not associated with particular department, more like colloquia Experiential Learning programs 	Yes
Duke University	Durham, NC	15,000	<ul style="list-style-type: none"> 34 departments, 85 SL course sections, some funded by grants. Have multiple environmental service learning programs, criteria listed Director of Duke Service Learning emphasizes the five R's of service learning and Duke's definition of service learning 	Yes
Durham Technical Community College	Durham, NC	5,000	<ul style="list-style-type: none"> Power point overviewing theory, background, leaders Resources from Teaching Learning Center 	Yes
East Carolina University	Greenville, NC	27,000	<ul style="list-style-type: none"> Course list provided, no environmental courses Resources provided for faculty Definitions 	Yes
East Tennessee State University*	Johnson City, TN	12,000	<ul style="list-style-type: none"> Introduction to Service Learning and Advanced Service Learning courses FAQ List 	Yes
Florida International University*	Miami, FL	37,000	<ul style="list-style-type: none"> Business-focused SL classes Student Resource Handbook, seems to be more volunteer-focused and less curriculum focused Relies on responsibility of the student to fill out forms, choose organization, etc. 	Yes
Georgetown	Washington, D.C.	17,000	<ul style="list-style-type: none"> Service learning trips offered Possible medical courses 	Yes

School	City/State	Enrollment	Service Learning Notes	CC Member?
North Carolina Central University	Durham, NC	8,000	<ul style="list-style-type: none"> • Service learning site but with unlinked syllabi and course applications 	Yes
NC State University	Raleigh, NC	34,000	<ul style="list-style-type: none"> • Service learning opportunity through Dept. of Parks, Recreation, and Tourism Management and possible presence in nonprofit partnerships • Service learning initiative (broken link) • Page with helpful outside links • Has environmental service learning 	Yes
Northern Illinois University*	DeKalb, IL	25,000	<ul style="list-style-type: none"> • No course list • “Engaged Learning” • Have a Presidential Task Force on Curricular Innovation 	Yes
Ohio University – Main*	Athens, OH	27,000	<ul style="list-style-type: none"> • Courses exist, couldn’t find • Useful definitions • Faulty Website 	Yes
Old Dominion University*	Norfolk, VA	24,000	<ul style="list-style-type: none"> • Study Abroad programs • Have initiative, but no evidence of progress, recently established 	Yes
Pitt Community College	Winterville, NC	12,000	<ul style="list-style-type: none"> • Significant nursing service learning resources • Website minimal • External Links 	No
Southern Illinois University – Carbondale*	Carbondale, IL	19,000	<ul style="list-style-type: none"> • Large course list, significant environmental presence • Seeking Carnegie Classification 	No
Texas Tech University*	Lubbock, TX	33,000	<ul style="list-style-type: none"> • Course List provided, one environmentally focused • Center for Active Learning and Undergraduate Engagement is resource for students • Environmental service learning classes present 	No
University at Buffalo**	Buffalo, NY	30,000	<ul style="list-style-type: none"> • Service learning present through scholarship programs and classes but direct links not found • Website difficult to navigate 	Yes
University of Clemson	Clemson, SC	21,000	<ul style="list-style-type: none"> • International Opportunities • Community Scholar programs • Specific service learning program, challenging website navigation, Biology DNA program for service learning 	Yes
University of Louisville**	Louisville, KY	16,000	<ul style="list-style-type: none"> • International Service Learning is main program • Limited programming 	Yes

School	City/State	Enrollment	Service Learning Notes	CC Member?
University of Missouri – Kansas City*	Kansas City, MO	16,000	<ul style="list-style-type: none"> • Course list provided, only one environmental • Very useful website • FAQ list 	Yes
University of Nevada – Reno*	Reno, NV	18,000	<ul style="list-style-type: none"> • Course list available with syllabi, none environmental • Well-designed website 	Yes
UNC Chapel Hill	Chapel Hill, NC	29,000	<ul style="list-style-type: none"> • Course list available, substantial with 4 environmental programs • APPLES Service Learning program, student led • Service learning initiative • Environmental service learning present 	Yes
UNC Pembroke	Pembroke, NC	5,700	<ul style="list-style-type: none"> • Course list available, few courses, no environmental classes • Limited website, not much information 	Yes
UNC Wilmington	Wilmington, NC	12,700	<ul style="list-style-type: none"> • Course list not available • No official process • No links on site 	Yes
University of North Dakota*	Grand Forks, ND	12,000	<ul style="list-style-type: none"> • No course list • Program specific • Honors, Nutrition, Nursing 	Yes
University of South Carolina – Columbia**	Columbia, SC	33,000	<ul style="list-style-type: none"> • Provide course and study abroad opportunities, list provided • Disciplines include Engineering, Psychology, Accounting, and Nursing • Service-Learning Pro Tracking software 	Yes
University of Southern Mississippi*	Hattiesburg, MS	15,000	<ul style="list-style-type: none"> • No course list • Grant program established • No description • Possible seminar, fellowship opportunities 	No
Virginia Commonwealth University*	Richmond, VA	32,000	<ul style="list-style-type: none"> • Possible graduation requirement • Opportunities to be a teaching assistant • Well-designed website with videos • Environmental service learning present 	No
Wake Tech	Raleigh, NC	63,000	<ul style="list-style-type: none"> • No course list • Definitions and opportunities listed, benefits for faculty, students, community partners • Documents on reflection 	Yes
Western Michigan University	Kalamazoo, MI	24,000	<ul style="list-style-type: none"> • Course list provided, no environmental courses • Well-designed website with resources for all components 	Yes
Wright State University*	Dayton, OH	13,000	<ul style="list-style-type: none"> • Environmental service learning found • Office of Service Learning • Service Learning Librarian 	Yes? Inactive Link

Table 3. A snapshot of some approved service learning courses at East Carolina University as of Fall 2013.

Course Level	Course Type	Undergraduate	Graduate
ANTH	Anthropology	1	
BUSI	Business	1	
CDFR	Child Development and Family Relations	2	
COAD	Counselor and Adult Education	1	1
COMM	Communications	4	
EXSS	Exercise Sports Science	1	
HLTH	Health	2	
HNRS	Honors	1	
HSMA	Health Services Management	1	
IRHE	Interdisciplinary Rural Health Education	2	
ISDN	Interior Design	1	
LEED	Leadership Education		7
MGMT	Management	1	
NURS	Nursing	2	
NUTR	Nutrition	1	
PSYC	Psychology	1	1
RCLS	Recreation and Leisure Studies	1	
REHB	Rehabilitation Studies	1	
TOTALS		33	9

APPENDIX 1. List of service learning (SL) designated courses offered at ECU Fall 2013

ANTH 3150: Applying Anthropology to Contemporary Cultural Issues

BUSI 2200: Business Leadership I: Team-Building and Interpersonal Skills

CDFR 2280: Introduction to Child, Family and Community Services

CDFR 3290: Theory and Practice in Family and Community Services

COAD 1000: Student Development and Learning in Higher Education (Maynard Scholars and Education Housing Community Sections)

COAD 6404: Counseling in Schools

COMM 3142: Small Group Communication

COMM 3180: Intercultural Communication

COMM 4040: Media, Culture and Society

COMM 4080: Communications Senior Seminar

EXSS 5800: Physical Activity and Aging

HLTH 2500: Peer Health Education Training

HLTH 3020: Health Problems II/Health Disparities

HNRS 2116: Living Green: The World between Technology and Humanity

HSMA 2000: Professional Roles and Environments in Health Care

IRHE 2500: Service-Learning in Interdisciplinary Teams --

IRHE 3102: Interdisciplinary Rural Health Education Independent Study

ISDN 4700: Problems in Interiors (Interior Design and Merchandising)

LEED 6098: Instructional Leadership for Teaching and Learning

LEED 6902: Strategic Leadership for 21st Century Schools

LEED 6903: Micro-Political Leadership and Decision-Making within a Legal Context

LEED 6904: External Development Leadership for Cultivating Partnerships

LEED 6905: Managerial Leadership for Complex School Operations

LEED 6906: Human Resource Leadership for Professional Growth

LEED 6909: Cultural Leadership for Systemic School Improvement

MGMT 4262: Small Business Institute

NURS 3340/3341: Nursing Care of Children

NURS 4210: Nursing Care of Populations and Communities

APPENDIX 1. List of service learning (SL) designated courses offered at ECU Fall 2013

NUTR 4400: Global Perspectives in Nutrition

PSYC 3206: Developmental Psychology

PSYC 6328: Human Measurement

RCLS 3004: Leisure Programming and Design Laboratory

REHB 2000: Survey of Community Resources in Rehabilitation and Health Care