Campus as Living Learning Lab: Best Practices in Applied Sustainability Learning on Campus

Lead Author: Maria Boccalandro, Cedar Valley College, TX
Contributing Authors: Brandon Morton, North Lake College, TX, Jerry Owens and Sonia Ford, Richland College, TX

Background

"Community college enrollment has declined sharply since its peak in fall 2010, but completion rates have either held steady or increased slightly, depending on the cohort year, student demographics, and other variables... To meet the demand of more educated and skilled workers, it is necessary to bring more students—of all ages and backgrounds—into community college, and to get them to graduation. Achieving this will remain a central focus of community colleges everywhere[1]." It is imperative that students complete their higher education degrees so that they earn a salary that guarantees quality of life for their families.

The decline in enrollment and tightened budgets are affecting the quality of the infrastructure that require maintenance that are deferred. Community colleges must meet a diverse group of student's needs. Student services and learning experiences are needed that enhance student's engagement. How can all this be done? Keep students engaged with relevant curricula that meets the demands of the job market and improve the operations of the campus.

First published in 2008 and re-released in 2018 with support from the Kresge Foundation, The Campus as a Living Lab: Using the Built Environment to Revitalize College Education[2] , tackles some of the biggest challenges faced by institutions in these endeavors, from breaking down internal institutional silos to engaging industry in curriculum development. This guide was co-published by the American Association of Community Colleges (AACC) through their Sustainability Education and Economic Development Center (SEED Center) and the U.S. Green Building Council's Center for Green Schools and it highlights eight essential elements to building effective living labs.

The overall recipe for institutional success prescribed by this guide is that every major sustainability infrastructure project should include the following key stakeholders: Instructor, Division Chair, Academic Dean or Vice President, Facilities Director, and Human Resources Director. These roles are important to consider for an institution to embrace both a student-centric framework and achieve long-term sustainability goals, especially for institutions that do not have a dedicated sustainability department. This model embraces academic rigor with applied sustainability learning, facilitates interdisciplinary experiential-project-based learning, and engages faculty, staff and students in a collaborative process to reduce carbon emissions and advance green infrastructure.

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[1] Juszkiewicz, Jolanta. Trends in Community College Enrollment and Completion Data, 2017. Page 9. (09/26/2018)
https://www.aacc.nche.edu/wp-content/uploads/2018/04/CCEnrollment2017.pdf
[2] The Campus as a Living Laboratory.
https://theseedcenter.org/wp-content/uploads/2018/01/Campus-as-a-Living-Lab.pdf

In 2017, the Association of the Advancement of Sustainability in Higher Education (AASHE), Arizona State University School of Sustainability and Portland State University Institute for Sustainable Solutions released *A Guide for Applied Sustainability Learning Projects: Advancing Sustainability Outcomes on Campus and in the Community*[3]. This guide provides an in-depth, deep dive into how research-centric institutions are transforming campuses and communities with applied sustainability science, education, change management, and partnership development.

Also in 2017, several sustainability researchers and staff came together to form the Campus as Lab Community of Practice[4]. Participating community college districts include Dallas County Community College District, Johnson County Community College District, Northern Virginia Community College and San Mateo Community College District. Rachelle Haddock of University of Calgary and Caroline Savage of Princeton University are co-authoring a similar publication to this chapter, working title: Campus as Lab: Using Post-Secondary Campuses as Petri-Dishes for Advancing the Sustainable Development Goals. Haddock and Savage seek to provide a "high-level overview of the campus as lab concept as a "petri-dish" approach that sits at the intersection of sustainability theory, policy, and practice". Furthermore, they seek to identify institutions that have adopted definitions of 'campus as a living lab' and establish pan-institutional framework that provides a collaborative network that seeks to implement the 17 Sustainable Development Goals with campus as lab programs. The 17 Sustainable Development Goals are global targets to achieve by 2030 to establish a better future for our economy, our society, and our environment.

As community colleges redesign and retrofit campuses in greener ways, many forward-thinking institutions are using these projects as hands-on learning opportunities for students. These so-called "living laboratories" merge academics and campus facilities management to provide students with real-world skills and, for the institution, a path to meet its sustainability goals.

In order to help colleges teach more soft skills areas like character traits, interpersonal skills and change agent skills, the Education Design Lab has announced that it will start a two-year research project called the BadgedToHire Project to study how effective "micro-credentials" might be in helping students from marginalized backgrounds succeed with education completion and employment. For example, technical and vocational programs at community colleges readily teach trade skills like HVAC, plumbing, and electrical technology, but how do these same programs teach skills like customer service, empathy, and patience? The research study is supported by a grant from the Lumina Foundation and involves University of Maine, San Jose State University, and Central New Mexico Community College.

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[3] Beaudoin, F.D., Brundiers, K. (2017) A Guide for Applied Sustainability Learning Projects: Advancing Sustainability Outcomes on Campus and in the Community. Philadelphia: Association for the Advancement of Sustainability in Higher Education (AASHE). https://hub-media.aashe.org/uploads/A+Guide+for+Applied+Sustainability+Learning+Projects_v1.0_03.03.17_Final.pdf

[4]

The study will also include input from regional specific employers of those institutions that have also previously worked with the Education Design Lab. One of those companies is TLC Plumbing base in Albuquerque, New Mexico, and they are working directly with Central New Mexico Community College to include four skills areas in the plumbing program: active listening, customer validity, needs and values identification, and understanding diverse perspectives.

The American College Personnel Association (ACPA) headquartered at the National Center for Higher Education in Washington, D.C., in collaboration with the U.S. Partnership for Education for Sustainable Development outlines a specific guide for institutions with goals for soft-skills training and sustainability education, Change Agent Abilities Required to Help Create a Sustainable Future . In order to be a successful sustainability change agent, an individual must understand sustainability issues in economy, environment, and society, must have a value system to support change motivation, and must have specific change agent abilities. Change agent abilities include a diverse array of 15 character traits such as resilience, optimism, emotional intelligence, curiosity and passion. To teach these character treats should be the goal of a successful sustainability education program.

Cedar Valley College (CVC): Solar Sculptures and Campus Orchard Help Beautify the Campus

The planning, development and culmination of a project requires strong faculty leadership and support of the administration, including the Sustainability Office or Coordinator, Facilities Staff , Upper Administration Support, Faculty from many Disciplines, Human Resources Staff, Students from different Courses. Beginning in 2014, Cedar Valley College students and faculty began a project called the Solar Powered Ceramic Sculpture. Over the course of several semesters, different cohorts of students developed the project in two phases. IN the first phase, students focused on design and creation of a small scale prototype of the 8ft by 12ft sculpture. By 2018, the ceramic base was ready for installation of the solar photovoltaic panels. But before funding for solar PV was identified, students utilized batteries for the movement of the sculpture exhibiting renewable energy topics of battery storage.

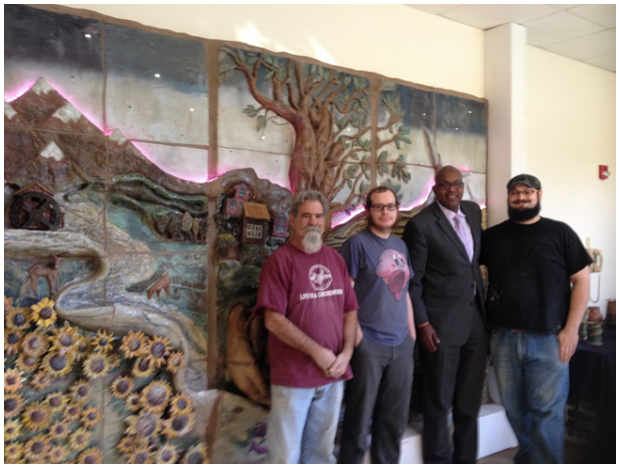


Photo: Cedar Valley College President Dr. Joe Seabrooks with art faculty and students in front of Solar Sculpture.

Before the students started working on this project, CVC students, faculty, and staff had identified through a comprehensive master planning process that open space across the campus generally needs to build on existing beautification both exterior and interior of buildings. The concept of sustainability can be complex and hard to explain through visual communication alone. Art faculty, sustainability staff and facilities department staff decided to work together on a project where students could directly help to beautify the campus and help explain the concept of sustainability by creating a big ceramic sculpture that integrates several disciplines of study. Donations were received from community businesses of about 1000 pounds of clay. More than 200 students worked on the sculpture for 2 years. Their problem-solving skills involved three stages, first stage focused on design, the second stage involved creating the sculpture in smaller pieces that could later be assembled, and finally install the sculpture and energize the moving parts of the sculpture.

Campus community gardens for vegetables and native plants are wonderful for beautification of the campus, but maintaining the gardens throughout the year is difficult with limited staff and resources, especially considering faculty who leave for the summer. Sustaining student involvement has its own unique challenges for first generation students, students with jobs and families, students completing their program within a semester or two, or the ongoing challenge of students staying focused and committed while exploring their career pathway at college. The garden itself presents many challenges with new students and inexperienced students. For example, although we installed a weed barrier under the planting bed, unwanted plants still sprouted in the garden and regular weed maintenance has been a great opportunity for students seeking daily or weekly volunteer opportunities from courses of faculty involved in supporting the gardening projects.

Additional living lab projects supporting overall campus beautification involved a special workshop on Aquaponics and another on Bokashi Composting. Both workshops involve classroom-based lectures from community guest speakers and outdoor hands-on activities to help beautify the campus using sustainable methods. The Bokashi Compost workshop has been the most successful. Bokashi composting is a type of composting involving anaerobic bacteria that ferments green waste and good waste and transforming the waste into a nutrient rich compost tea ready to be used for all campus gardens. By using this method, we have been able to involve local community guest speaker who also teaches this method to schools in the Netherlands.

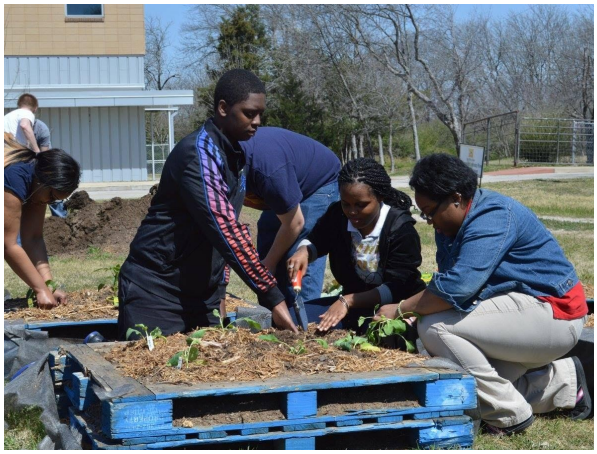


Photo: Students reuse pallets from the facilities shipping and receiving department as raised gardens.

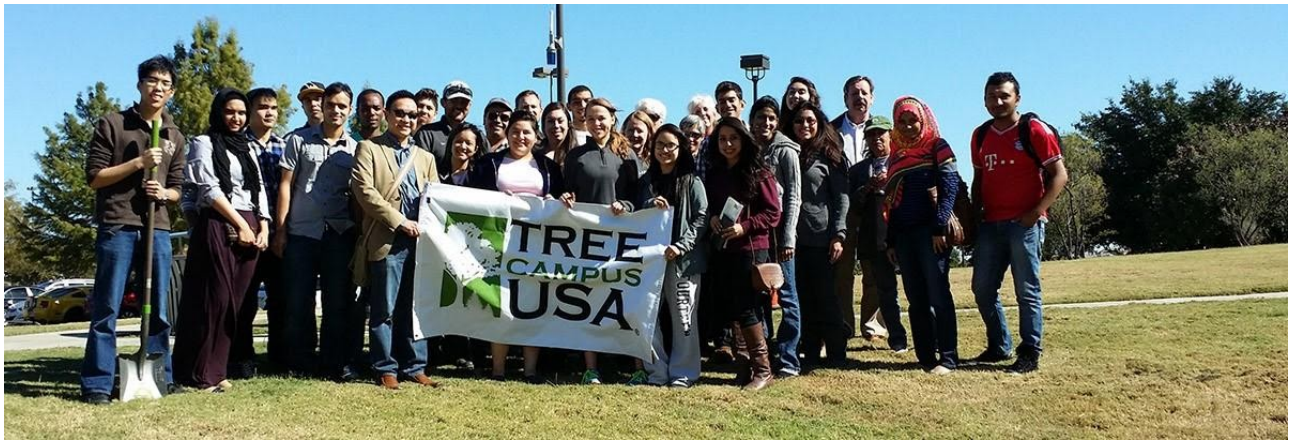
Marketing and promotion of the Living Lab projects is very important to continue with the new projects that turn into a permanent program and support the general philosophy of teaching. The projects can be enhanced if the whole college participates in the detection of problems that the students can work on, the faculty include it in their curriculum and the administrators and employees support the project with time, talent and budget. It is very important to document the projects and write the "story". The faculty, students and employees will leave the college. Communication of the project needs to tell the story of why, who, when and how it was done, and more importantly must involve students in the communication. Students' communication is featured across social media, campus newspapers, college websites, and eventually listed in they feel proud of the projects and include on their resume.

North Lake College (NLC): Pin Man's Influence on Resource Communication and Resource Conservation

North Lake College has four campuses: Central Campus, North Campus, South Campus, and West Campus. Central Campus, North Campus and South Campus serve as outdoor education lab sites to all age groups in primary, secondary, post-secondary and lifelong education. Topics covered include concepts of air quality, biodiversity, sustainable design, natives, landscapes, and water conservation. More than 1,500 students from primary and secondary schools , and more than 10,000 students from college programs utilize the campus as a living lab each year for environmental, STEM and sustainability education programs.

The Central Campus is a Tree Campus USA with more than 20 native Texas species on 200 acres in the urban region of Las Colinas, Irving, and is home to the Living Learning Garden, an area located in a flood zone with old growth trees mostly Texas post oaks (Quercus stellata) and Texas live oaks (Quercus fusiformis). Adjacent to the Central Campus is the Cottonwood Branch Creek, a tributary of the Elm Fork of the Trinity River and a footbridge that students and workshop participants to walk over the 22 acre Irving ISD Elise Walker Outdoor Learning Center. The North Lake College Green Club monitors water quality every month of the Cottonwood Branch Creek as part of the Texas Stream Team Program. The North Lake College South Campus is located in south Irving and also includes a greenbelt and park with a small campus creek provided with runoff stormwater flow from nearby neighborhoods of Bear Creek

and Sherwood Forest. All three campuses provide a place-based education approach to teaching biology, ecology, geology, and plant sciences. To support the campus as lab concept, the Texas Parks and Wildlife Department Urban Biologist Mr. Sam Kieschnick helped create a standing observations page on the iNaturalist platform for all three campuses. iNaturalist is a non-profit organization facilitating a global social network of more than 750,000 professional scientists and citizen scientists with a mobile App and online database of photographed observations of plants and animals. An observation is uploaded and verified by members of this global community. Participants's observations get ranked from entry-level to research-level. Species identification of the trees across the campus using iNaturalist App include providing program support to the Tree Campus USA program, which involves students in service learning volunteer projects supervised by facilities staff and biology faculty.

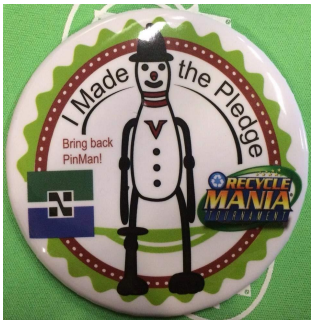


North Lake College offers Academic Field Studies in Hawaii and the Texas Gulf Coast, where students can earn 8 to 16 credit hours in biology, botany, environment, geology, photography and/or hiking. Prior to traveling to the field studies sites, faculty lead students on field studies practice assessments on North Lake College campus, a Tree Campus USA with more than 20 native species on 200 acres, at the Irving ISD Outdoor Learning Center adjacent to campus by footbridge with 22 acres of trails and blackland prairie restoration site and pollinator gardens, and wetlands study area. North Lake College Field Studies students also visit various other local nature areas and parks in the greater Texas and Oklahoma region such as Coppell Nature Park, Cedar Ridge Preserve, and the Arbuckle Mountains.

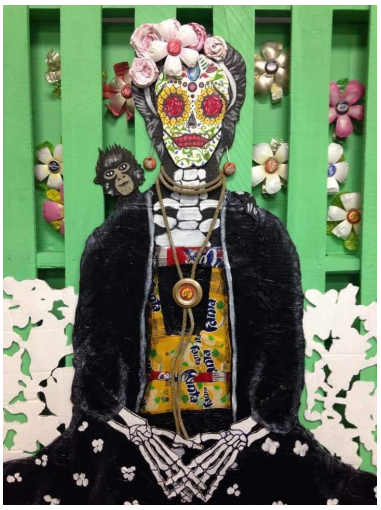
All the Field Studies courses are also part of the SAGE Scholars Program (Sustainability Awareness and Global Education). The SAGE Scholars Program is a sustainability-across-the-curriculum program that includes more than 70 faculty from 25 disciplines teaching more than 80 courses in every discipline at North Lake College. Faculty participants incorporate at least one global sustainability assignment for a grade. Courses range in being sustainability-focused from 5% of the overall course grade to 70% of the overall course grade. Students wanting to become a SAGE Scholars are recognized with a Green Cord for graduation regalia by completing four courses designated as SAGE, completing 15 hours of volunteer service learning, and any associate degree. The SAGE Scholars program is the flagship interdisciplinary program that involves the most recognized faculty of the college. The most popular student majors include healthcare, nursing, biology, computer science, construction management, and fine arts. The program learning outcomes for the SAGE

Scholars program include Personal Responsibility and Social Responsibility, aligning with overall college sustainability vision statement that focuses on transforming learning into action as a model for the community.

Of the more than 80 courses offering sustainability assignments through classroom instructions and living labs, perhaps is the most unique is Business Management (BMGT)-2383 Cooperative Internship Business Management. This is a required course for several Associate of Applied Science degree programs at North Lake College, such as Business, Logistics Management, Business Management, and Office Administration. Students work with the sustainability officer and their professor to identify a project, set goals and meeting schedule, and at end of course receive an evaluation on their workplace skills (communication, professionalism, punctuality, integrity) as well as evaluation on meeting goals for their specific cooperative project. Cooperative student intern projects have included a Recyclemania Data Report, a Greenhouse Gas Inventory of FedEx Deliveries to Campus, a Transportation Logistics Assessment between Campuses, and a College Newsletter. Some projects require the student to meet with other college staff to accomplish the project goals, such as meeting with shipping and receiving staff to obtain delivery logs and discussion to identify actions that support the efficiency needs.



Each spring, the SAGE Scholars faculty rally their students to get involved in the annual recycling competition called RecycleMania by taking the PinMan Pledge. With this support, in addition to support from upper administration and facilities director, North Lake College has won the waste minimization category seven times in the last decade. The annual award for this category is called the Pin Man, a bowling pin sculpture made from recycled materials that travels to the winning college or university. In 2014, the North Lake College Department of Marketing and Public Relations was recognized for their animated video series about Pin Man. Students participate in garbology exercises guided by biology faculty and facilities staff to calculate a volume-to-weight conversion ratio that is required to report on metrics for the competition. Students utilize analog and digital scales provided by the biology laboratory manager and sort through bags of trash and recycling in gondolas provided by the facilities department. North Lake College has also received two Case Study Awards recognizing the unique living labs focused on combining arts and sciences. The arts component of the case study included collecting waste from campus events such as chip bags and leftover newspapers from campus publications. The assignment from Art (ARTS) 1311: Introduction to 2-Dimensional Design requires students to utilize secondary materials from campus uses to recreate a famous art masterpiece. The chip bags were donated by local community business, the Frito Lay packaging center, that is an annual donor of the campus Earth Day celebration.



The combined efforts across campus departments supporting living labs for resource conservation has become a model for resource communication. The SAGE Scholars Program,

iNaturalist Citizen Science Program, and RecycleMania Competition provide a connectivity of communication around common themes that contribute to academic learning goals and public involvement for community sustainability. Communicating science is perhaps one of the most important efforts of the 21st century, requiring activity leaders to provide activity participants with essential science knowledge even if they're non-science majors. Science communicators have a responsibility to communicate all facts, even if politically controversial, which can make being an educator quite challenging.

Richland College: Turning Rubbish into Research and Beyond

Richland College (RLC) is located in Dallas, Texas, and is the largest college of the Dallas County Community College District with more than 22,000 students. The sustainability program is led by the Facilities Department, specializing in offering volunteer service learning opportunities with guided talks and tours for students across all majors called the Living Labs Initiative. The department invites students to their conference room within the facilities department's building to give an overview of energy usage, greenhouse gas emissions and environmental sustainability efforts associated with operating buildings at the college. The conference room workshop talk is then followed by a guided service learning volunteer activity co-supervised by facilities staff and one or more academic instructors, providing the students opportunity to observe or take action directly related to what they just learned in the conference room.

Facilities staff coordinated with academic instructors from disciplines of Anthropology, Art, Astronomy, Biology, Ecology, Environmental Science, Geology, Engineering, and Languages. Living lab projects focus on tree planting, energy management, waste management and recycling. The living labs projects focus on critical real-world, hands-on activities that help prepare students for diverse workforce needs such as communication, teamwork, data analysis, problem solving, and public relations. Community organizations also support the living labs, and include both in-kind and financial contributions from Texas Trees Foundation, Texas Parks & Wildlife, U.S. Fish and Wildlife (Urban Fish, Government Pathways and Land Divisions), City of Dallas Zero Waste Management and Mayor's Intern Fellows Program, Texas A&M Forest Service, World Wear Project, Texas A&M University Commerce Office of Sustainability, UT Dallas and Recycle A-Textbook Richland College is a national champion of the RecycleMania competition and a X-time certified Tree Campus USA and home to the regional tree farm managed by the Texas Trees Foundation.

Photo (from left): Misael Sandoval, Iris Gomez, Elliot Stapleton, and Professor Lesley Daspit sort trash.

The RecycleMania award recognized Richland students and employees effort for recycling the highest pounds per person than any other college or university in the United States. The campus culture of recycling originates from an Introduction to Archeology class student project guided by Dr. Lesley Daspit called the "Garbology Research Project" in spring 2013, utilizing anthropological framework for studying artifacts and possible points of origin. The student garbology team launched the project by surveying 88 students across the college about their recycling practices on campus and at home, 47% responded they recycled at home while 77% responded they recycle on campus.

Dr. Daspit's students, referred to as 'garbologists', uncovered patterns of recycling behaviors across the campus by sorting through 600 pounds of trash from 18 different locations and observing 79 different student's disposal behavior at six locations totaling eight hours of observation. Students observations concluded that 52% of the students observed discarded recyclable items in the trash bin instead of the recycle bin. From the waste audit, students discovered that the rubbish discarded directly represented the diverse, international student body. Artifacts observed included Gatorade plastic bottle, chip bag from Korea, soymilk carton from Malaysia, fruit drinks from Mexico and Belgium, dates from China, a natural toothbrush from Pakistan and a calling card to call Ethiopia.

The students sorted out 1,368 items that could have been recycled. The majority of the recyclables found were plastic bottles (56%), followed by plastic bags (27%t), cans (12%) and glass items (5%). This project provided staff and administration with valuable insight to enhance overall waste management, such as locating new recycling bins in the parking lots and athletic fields. "It was a dirty job," Dr. Daspit said with a smile. "I am very proud of my students; they have worked hard on this research project." Gigi Lofland, archeology student said "We learned about trash middens, or trash heaps. Archeologists have been learning about societies and understanding cultures through middens for years." One then might conclude that modern day waste auditors are building on centuries of archeological work. The results of their work are shown in Figure 1.

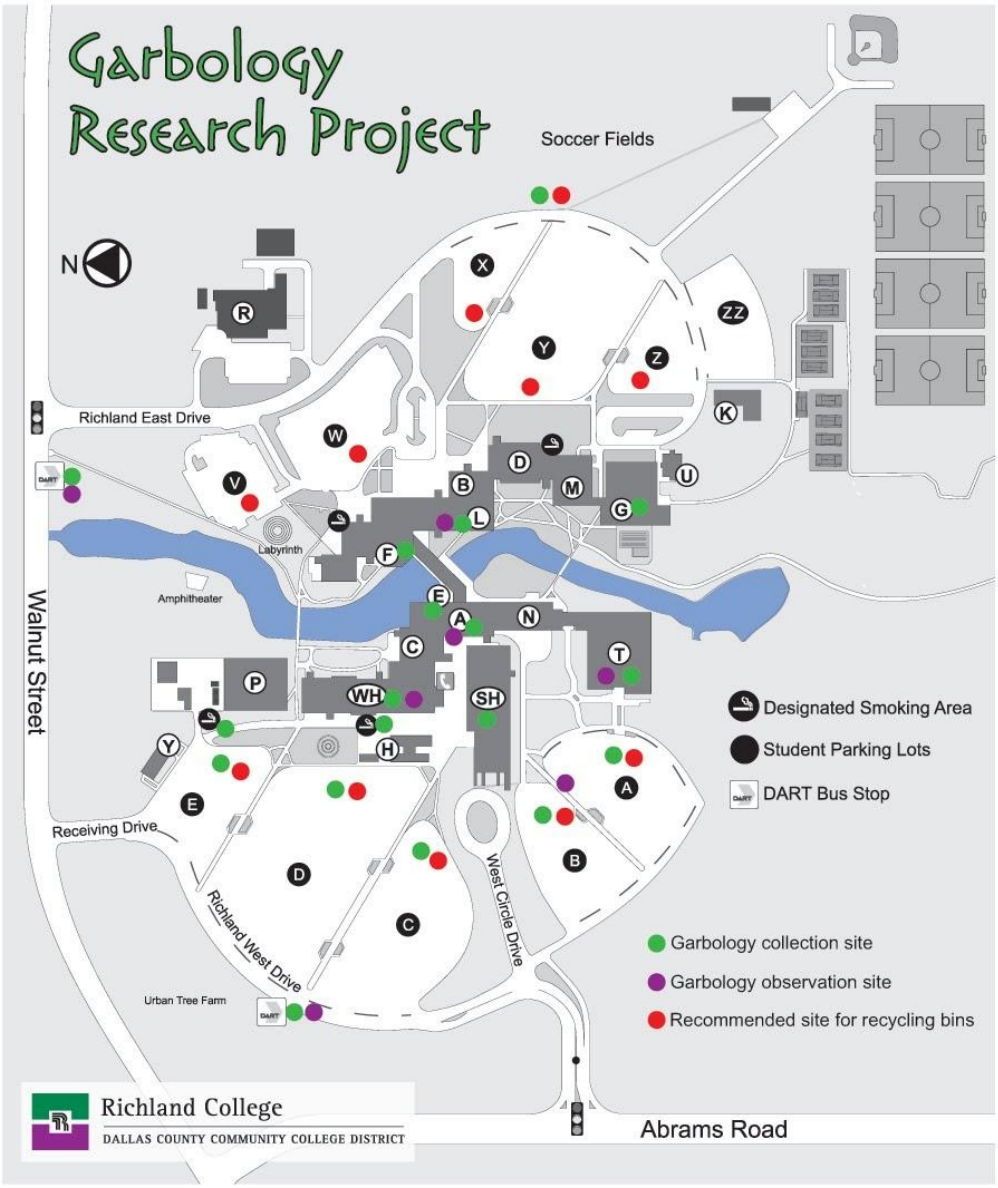


Figure 1. Garbology Research Project results map showing collection sites (green), observation sites (purple), and recommended sites for new recycling containers (red).

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Thank you for reading this chapter of the NCSE Community College Handbook for Sustainability Education and Operations.

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NCSE will review your case study and an NCSE team member will reach out to you for additional information. The case study may be included in the NCSE Community College Handbook for Sustainability Education and Operations.