The Green Building Project: Promoting Political Science Learning through a Collaborative Research Approach

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Introduction

Political science faculty members often seek innovative ways to promote civic participation and encourage students to connect theory with practice. In this paper, we review and analyze one such approach to teaching political science concepts while promoting community service. This method uses Dewey's concept of civic participation—"learning how a community works and how to help it work better" (Dewey in Ehrlich 1999, 246)—in applying principles of sustainability [e.g., "meets the needs of the present without comprising the ability of future generations to meet their own needs" (World Commission on Environment and Development in Rosenbaum 2002, 372)] to a local problem.

For this project, a political science faculty member organized a graduate and undergraduate student research team to conduct service-learning activities to address community needs and to conduct campus and community outreach. Additionally, the two graduate and four undergraduate team members pursued collective and individual independent research projects. The service-learning and research team improved their campus and larger community by providing a model of how to approach the prevalent and often neglected issue of achieving a sustainable community, while individual team members gained necessary expertise for their future professional and civic participation.

The historic peninsular city of Charleston, South Carolina has many aging buildings and homes that are neither resource efficient nor have occupant-healthy environments. Unlike aging buildings in other cities, local historic preservation laws that require maintenance of the historical integrity and appearance of structures challenge the Charleston community in making buildings more energy efficient. Situated in the heart of the Charleston peninsula is the College of Charleston. As the College has expanded, it has utilized historic buildings by remodeling them into campus department offices. In this way, the buildings of the College of Charleston serve as a microcosm for those of the city. Our goals were to find and demonstrate inexpensive methods to increase energy efficiency and improve indoor building and occupant health while balancing historic preservation concerns.

The team renovated a 200-year-old building at the College using the principles of sustainability and community participation. We successfully renovated the building through coordinating individual skills and roles within a team environment. Our team met its goals by integrating interdisciplinary subject matter, collaborative instruction and cooperative learning, and independent and participatory active problem solving (Benjamin and Hanes 2000). This learning approach provides students with better preparation to address real world, public policy problems than traditional teaching methods alone (Benjamin and Hanes 2000). Combined with civic education, service-learning and research emerge as truly powerful teaching tools.

Traditional Political Science Teaching Methods

A major goal of political science pedagogy is to prepare students to recognize and solve problems (Ehrlich referencing Dewey 1999). Political science teaching methods usually do not attempt to blend subject matter, theory, and practice in traditional classroom settings. To provide students a better opportunity to understand and apply theory, instructors must take learning beyond the normal confines of the classroom. The learning environment is dramatically enhanced when students apply classroom learning to solve community problems. This strategy may help develop students into better citizens (Bennett 2002).

By exploring community problems students and instructors often uncover solutions that cross many disciplines and force a look beyond the narrow disciplinary approach that is predominantly the venue of classroom-based instruction. Community projects encourage dialogue between discipline specialists to address an issue and solve a problem (Hauss, Miller, and Samuel 2002). Through multidisciplinary dialogue, students are able to understand participants' similarities and differences and hopefully find common ground between

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conflicting interests in an attempt to solve a community problem (Hauss et al. 2002). Moreover, multidisciplinary approaches to political problem solving helps bind the social sciences to other academic disciplines, reinforcing the relevance of political science in student civil life (Bennett 2002). Many community problems require science and policy interactions; teams of students representing either field will thrive in an environment that draws on collective expertise and experiences to address these problems (Schlosberg and Sisk 2000). Students have various areas of expertise, combining these areas to problem-solve helps participants seek creative solutions that are outside a single discipline, thus mirroring the reality of actual public policy decisions (Mayer 2002). In addition, academic problem solving demands interaction with the real world. This can be achieved through not only a multidisciplinary approach, but also by crossing boundaries separating academia and the rest of the world. University policy and maintenance, which this project seeks to influence, is a part of this real world. Incorporating reality strengthens students' quest to solve these problems practically.

The green building problem-based, collaborative service-learning project encompasses many of the best practices that enhance student learning. Furthermore, the elements of this environmental-based learning experience are similar to those of other successful programs (Benjamin and Hanes 2000). The common features that Benjamin and Hanes found in successful learning projects include: interdisciplinary integration of subject matter; collaborative instruction; emphasis on problem solving and projects; combinations of independent and cooperative learning; learner-centered approaches—active participation (2000, 177). We find all of Benjamin and Hanes' components in our approach to the Green Building Renovation Project. In the following sections we describe how the Green Building Renovation Project exhibits all five characteristics of Benjamin and Hanes' definition of a successful integrated learning experience (2000). In addition, we discuss how our project provides a civic education, yielding a truly powerful teaching tool.

Project Scope and Methods

Green building practices are increasingly utilized on college campuses across the country to promote sustainability (e.g., Smith 1993). Before this project, no College of Charleston structures incorporated significant green building technology. Green building can be defined as a collection of land-use, building design, and construction strategies that reduce negative environmental impacts and increase sustainability. Benefits of building green include energy efficiency, protection of ecosystems, increased profitability, and improved occupant health (U.S. Green Building Council 2003). Green building is closely associated with the concept of sustainability. Sustainability has many definitions and often integrates three primary concepts: environment, economy, and social equity (Wheeler 2000). One commonly utilized definition, and the one we subscribe to here, is the Brundtland Commission's definition of sustainability—meeting today's needs while considering future needs (in Rosenbaum 2002, 372).

Case Location

Team participants spent summer 2002 renovating a 200-year-old campus building located at 114 Wentworth Street in Charleston, South Carolina with the goal of making the building as "green" or sustainable as possible. The service-learning and research team regards sustainability as increasing resource and energy efficiency while improving air and water quality in an economically viable way.

The City of Charleston, similar to many Atlantic seaboard communities, has a substantial number of historic structures built and renovated prior to the use of green building techniques. Thus, both the College and the city share similar building rehabilitation dilemmas. These problems are particularly acute in the low-income areas near the College of Charleston. The long-term goal of this service-learning research project is to demonstrate how green building techniques can be affordably introduced into historic homes, making it cost-effective for low-income families to enhance the quality and efficiency of their living space. This combination of concerns—energy efficiency and historic preservation—is associated with the majority of buildings on the peninsula. Finding inexpensive methods to increase efficiency addresses community concerns to conserve resources and live in a healthy, affordable habitat.

This project targets two primary communities: the City of Charleston and the College's centrally located, municipal campus. The Charleston Peninsula has experienced a resurgence of home ownership and renovation during the past few decades. At the southern end, near Charleston Harbor and the Battery, homes date from the late 1700s and act as attractive historic structures—beneficial for aesthetics, but antiquated in energy efficiency. In the center of the peninsula are several neighborhoods as well as public housing projects. Toward the northern end, near Interstate 26, are more housing projects and condensed communities requiring substantial renovations. Thus, the peninsula hosts many different socio-economic groups that can benefit from sustainable building techniques. Approximately $24,250 was spent in renovating the campus building.[1] This sum is not a large one considering the building's size (4,500 square feet). The faculty-student research team outlined renovation retrofits that range from low or no-cost to expensive (no activity's cost was greater than $2,500 in materials and labor). Therefore, a community member representing any of the aforementioned neighborhoods could utilize the model and combine techniques to fit their budget.

This project attracted community, faculty, and student volunteers to work on the renovation activities; in addition, the six service-learning and research team members each worked an average of 45 hours per week for the entirety of the summer and 20 hours per week during the academic year. These hours were largely volunteered. To date, over 7,000 hours (again, mostly volunteered) have been contributed to the project.

Team Research and Service Approach

The project faculty instructor selected the six-person team through a competitive interview process. The selected students included two graduate and four undergraduate members; three of these students were women and three were men. Students ranged in age from 20 to 31. The undergraduates were seniors who began the project the summer prior to their final academic year. One of the graduate students was a second year and the other a first year. All students on the team were Caucasian; each worked full time jobs (outside of the green project).

After the supervising faculty member selected the team's diverse members, each student constructed a list of possible changes to include in the green retrofit. These lists were compiled and discussed, providing the team a hands-on opportunity to practice democratic concepts through collaboratively prioritizing green goals and jointly determining how to best spend $10,000

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'Green Team' on Site. Pictured from left to right: Undergraduate students Rick Vaughn and Bryan Cordell; graduate students Katherine Zimmerman and Katharine Owens; Dr. Angela Halfacre. Not pictured (team members who left the area after graduation): Undergraduates Jackson Ewing and Rebecca Inman.

(Sustainable Universities Initiative Mini-Grant Funds) to transform the historic building. The team designated a three-step plan: 1) determine the most cost-effective techniques; 2) measure the before and after effects of the retrofit; and 3) promote the use of this model building in teaching, outreach, and research activities.

The participating team members conducted an initial audit of the building, which included measuring energy consumption, waste production, and drinking water quality. The students used the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) system to rate the building before, during, and after refurbishment (U.S. Green Building Council 2003). Faculty members working in the building were interviewed before changes were implemented and were interviewed again after one year. In addition, team members were asked to keep journals throughout the project and were interviewed after completion of the renovation. The Green Building Renovation Project was consistently updated on the project web site: www.cofc.edu/~greenbuilding.

Implementation of Retrofit

After careful review of possible techniques, in summer and fall 2002 the students arranged for, conducted, and monitored the installation of the chosen renovations. The building faculty and the physical plant reviewed all changes. The physical plant required its staff to conduct all electrical work and provided clear guidelines about what types of work the students were allowed to implement on their own (to avoid any liability concerns and to ensure student safety). Prior to beginning any work, the faculty supervisor required the students to research and pinpoint the necessary safety precautions and equipment to implement the changes. For example, installation of insulation required masks, safety glasses, protective clothing, talcum powder (to protect from fiberglass slivers), etc. Some improvements were both simple and inexpensive, such as insulating the hot water heater, checking for leaky pipes, and replacing incandescent bulbs with long-lasting, efficient compact fluorescent lighting. More expensive and/or labor-intensive improvements included installing insulation, repainting the interior with paint lacking Volatile Organic Compounds (VOCs), and installing interior storm windows. After refurbishment of the building was complete, the students were responsible for monitoring changes in energy consumption and reductions in expenditures.

Outreach

The College of Charleston's highly visible presence and impact on the city gives the campus a leadership role and a responsibility to the surrounding community to promote sustainability by serving as a role model for environmental awareness. As with the various campus facilities, the techniques used within the model building can serve as an example for the many historic structures on the Charleston Peninsula. By offering tours for local residents and government officials, the demonstration is a case study for educating the public on the ideas of sustainability. The research team continues to conduct extensive outreach and educational opportunities.

Results

Using Benjamin and Hanes' (2000) common features (discussed above) of successful learning projects, we evaluated the effectiveness of the green building project. To assess the presence of Benjamin and Hanes' (2000) common features, a graduate student not involved with the Green Building project interviewed all research and service-learning team members. To analyze the semi-standardized interview data, the interviewer used content analysis (a technique to objectively analyze text; outlined by Berg 2001).

The interviewer identified various themes expressed and lessons learned by members of the team after completion of the project. These thoughts can then be made available to others in the hopes that similar future undertakings will build on predecessors' efforts. As with most group efforts, the Green Building Team experienced internal conflict and various external pressures as well as great successes. Opinions expressed in the interviews with each of the team members summarize these conflicts and pressures and may provide valuable insight on team dynamics and other areas for future team efforts. Throughout our discussion below we incorporate the findings of this analysis. *Interdisciplinary Integration of Subject Matter.* The team members' diversity allowed input from many disciplines while team discussions challenged ideas and perceptions among its members. By combining students of various disciplines, ideologies, and goals, no student involved in this project risked the "debilitating" problem of overspecialization (Orr 1992, 129). The students had thorough backgrounds in their chosen areas of study, yet this specialization did not allow ignorance of more holistic analysis of issues. Instead, we embraced a whole-systems view of our problem and utilized individuals with differing areas of expertise. The Green Building Renovation Project combined the efforts of four undergraduate and two graduate students with majors and

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minors in political science, environmental studies, biology, English literature, anthropology, and studio art.

Collaborative Instruction

Collaborative instruction among students, faculty, and community members allows the exchange of information and learning to be an experience without boundaries. Accordingly, this type of learning not only teaches students to be productive team members, but also is important in the understanding and practicing of democratic ideas. Collaborative instruction helps students appreciate the complex nature of communities (Ehrlich 1999). Students involved in this project learned about sustainability techniques by touring Blackbaud Corporation (for green management ideas), Dewees Island (for sustainable community design), The Center for Sustainable Living, and The Sustainability Institute (for green building/renovation techniques). Collaborative learning expands the experience of the individual, forming a collective, interactive knowledge base. Everyone involved with the project experienced both teaching and learning roles. All team members were assigned specific technologies to research, and in turn informed other team members about the positive and negative aspects of each technology. Some community members offered expertise regarding heating, ventilation, and air-conditioning systems, while others became informed about technologies like waterless urinals through team discussions. Building faculty offered advice and information on topics including, but not limited to, thermostats, ceiling fans, and insulation. In turn, political science building members were exposed to dozens of sustainable or environmentally friendly concepts and technologies over the course of the project.

This flow of information between team members allowed ideas to be more completely developed and evaluated—an example of democratic concepts in action. The diverse team environment encouraged students to evaluate opinions from contrasting perspectives, which enhanced students' reasoning (Jurkiewicz 2002). This reassessment required individual student team members to reevaluate their own priorities to meet the team's collective goals. For example, group discussion involved evaluating positive and negative aspects of insulation types. Students had to weigh the benefits and risks of fiberglass insulation versus recycled cellulose insulation, including energy use reduction, indoor air quality, economic cost, and occupant health. Team members balanced personal beliefs with a risk-benefit analysis to determine an appropriate compromise when selecting the insulation. This decision-making process improved the student's mediation skills (Jurkiewicz 2002). In particular, debates within the team addressing issues of concern helped develop communication skills with outside collaborators, educational departments, college staff, and building inhabitants. The mediation and communication skills gained—learning to be a part of a team—will benefit the professional life of each student team member.

Problem Solving

Problem solving, teamwork, and self-reliance were emphasized in every facet of the Green Building Renovation. Students managed time schedules, budgets, data collection schedules, and web site development. The team reduced costs by implementing many projects themselves, such as painting and insulation. The student team and faculty advisor finalized all decisions about the scope and approach of the project. Finally, the team continues to monitor the building daily. Throughout this project, the team struggled with internal problems like variation in commitment levels of members and discussion over what some members viewed as unnecessary designation of leadership roles.

Independent and Cooperative Learning

Through collaborative service learning, Green Building Team members built upon a number of pre-existing research interests including historical restoration, green building, sustainability, and environmental communications and policy. Additionally, some team members identified new research interests that were spurred primarily through project activities. Examples include corporate and government organization, green technology, household toxicity, and environmental product markets. In many instances, research interests were reinforced through the team atmosphere of the Green Building Project.

Active Participation

An active learning approach encourages attentiveness, increases information retention, and enhances the development of critical thinking skills (Smith and Boyer 1996). Benjamin and Hanes assert that active learning positively advances student classroom achievement (2000). Combining classroom pragmatism with a holistic approach beyond the narrow focus of specific disciplines enhances learning and works to solve the true problems of resource inefficiency (Nash 1989; Orr 1992; Wheeler 2000). The team's involvement with the community engaged the students in local problems and helped them become more involved citizens. This level of community involvement helps to foster lifelong community stewardship (Ehrlich 1999).

Most members of the Green Building Team felt that community outreach was an especially successful component of the project. Some members expressed that the community outreach aspect of the project is still a work in progress, but most were happy with the level of project awareness and recognition in the College and surrounding community. Although most team members also viewed the physical changes to the building as successful, many would have made different building alterations in retrospect, preferring to more efficiently stretch funding and provide for a "greener" model of renovation. The Green Building Team generally felt pressured by time and budgetary constraints, and several would have liked more time for preparatory work and baseline data collection.

Team members identified several specific project activities that were especially helpful in building their sense of team. The most often identified of those activities was socialization outside the project. Informal interaction with one another opened communication channels and made certain team members more comfortable and open with one another. Additionally, time-consuming and labor-intensive renovation activities like interior painting and insulation had a team-building effect. Group interaction during these activities made the tedium and long hours more tolerable and offered team members great opportunity to develop personal relationships. Team members also identified weekly meetings during the planning phase of the project as initially helpful in team building.

When team members became frustrated or exhausted with the project, they most often expressed these sentiments to other highly involved team members. Several students vented to friends outside the project. Team members demonstrated varying levels of commitment and involvement; one was viewed as largely absent from the latter stages of the project, and two others were at different times demanded by other responsibilities.

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The often-unequal distribution of project work at times caused turmoil within the team. Team dynamics were allowed to play out, however, as the project faculty advisor maintained a non-authoritative, advisory role. For example, the instructor met regularly with the team as whole as well as individually with members. At these meetings, she would encourage discussion about issues of inequities and other concerns, ask students to be direct in their assessments of the workload distribution, and encourage problem solving and taking individual responsibility for the team goals (versus wasting energy on complaints that were not productive). She often discussed her own experiences and how she approached real-world workplace inequities that echoed the team's experiences. Further, she would—after participating in team meetings—leave the room to allow the student team members to address their concerns and determine workable solutions.

The outreach efforts also aided student communication abilities, fostering "speaking and presentation skills" (Smith and Boyer 1996, 690). Team members' journal entries attest that presentations and tours of the Green Building have improved personal public speaking abilities and comfort levels in front of audiences.

Discussion

The College of Charleston Green Building Renovation Project allowed our research team direct involvement in solving an environmental problem in the Charleston community and at the College of Charleston: making buildings energy efficient while maintaining a building's historical integrity.[2] The problem-based, collaborative service-learning approach enhanced the political science learning process by addressing real world, public policy problems. The need to solve a community-based problem required a multidisciplinary approach. The interdisciplinary student team's active learning constituted a powerful learning and problem-solving tool. This approach enabled students to transform abstract theories into realistic solutions and enriches the student educational experience and professional development. In addition, direct involvement in solving a community problem cultivated a stronger sense of community. The barrier between college and surrounding town disintegrated as the students became a part of the community problem-solving initiative.

The project continues to spur other research among the team members, as well as with independent student researchers. For example, two students are currently seeking funding to develop a native species garden on the grounds of the political science building. This is the first step in a multi-phase plan emphasizing native plants in campus green space, pea-patch gardening, community gardens, and seed banks. Another group of students has partnered with the mayor of the City of Charleston to conduct a citywide green house gas assessment through the Cities for Climate Protection Campaign (CCPC). The assessment will be used to produce a citywide greenhouse gas emission reduction plan. A third group is currently developing criteria for area businesses to competitively seek a "Sustainable Charleston Business" designation, hoping to foster awareness throughout the local business community regarding green or sustainable purchasing and operation options. Additionally, individual research and thesis projects have stemmed from the Green Building model. Two thesis projects and one bachelor's essay focus on community and campus participation, awareness, and support of sustainable enterprises.

The Green Building Renovation Project is a model for addressing the eminent issue of sustainable development and garnering active participation among community members, students, and faculty. In addition to being a powerful method of integrating environment with learning, we argue, as does Nash (1989) and others, that active participation also fosters a sense of community among participants. When students are encouraged to integrate their studies to solve community problems, political science learning is enhanced. The Green Building Renovation Project links civic learning with service-learning: two powerful pedagogical approaches to prompt learning and civil responsibility (Ehrlich 1999). In the early 1900s, Dewey emphasized that "civic learning—in the sense of learning how a community works and how to help it work better—and academic learning should be mutually reinforcing" (in Ehrlich 1999, 246). The Green Building Renovation Project prompted the student's active community involvement and forced them to forge alliances with various types of people. The group recognized the need to address varying economic levels in the community, as well as the importance of improving quality of life. Achieving a civil society requires citizens and scholars to acknowledge the plethora of issues integrating with the real world.

Notes

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1. The primary funding source for the project was the Sustainable Universities Initiative (SUI) Mini-Grant Program ($10,000). These funds were used for materials and outreach. The College of Charleston department of political science provided summer research stipends for three of the undergraduate participants in the total amount of $1,400. The College's Environmental Studies Minor provided one summer research stipend for the other undergraduate in the amount of $450. The College of Charleston Master of Environmental Studies Program provided two academic year half-time assistantships to support the graduate students ($4,500 for each student) and outreach material funds ($500). The College Committee on Environmental Responsibility and Recycling provided $1,400 for energy monitoring equipment. Further, local community businesses donated supplies or provided materials at reduced cost. These items were valued at approximately $1,500.

2. Since its start in April 2002, the project has made significant progress in implementing energy efficient technologies in the historic building on campus. After an initial average energy consumption spike in July and August 2002 (due in part to the major construction phase of the project), the researchers found the average energy consumption rate fell by .8 KWh for September, October, and November 2002. These months are .35 KWh below baseline averages when compared to the baseline data from May and June. If this trend continues the research team estimates a $1.50 savings per day attributed to sustainable technologies for the 4,500 square foot building. This could mean a $547.50 energy savings for the year. If these savings remain constant, the other 64 historic buildings on campus were of equal size, and each of these buildings achieves the same amount of energy savings, projected savings campus wide would be approximately $35,000 per year.

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