The Eco-village Experience at California State University, Fresno: An Integrated Approach to Service Learning

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Abstract

Poverty has caused enormous pressures and urgent needs in the city of Fresno. In an effort to incorporate a deep awareness of social, cultural, and environmental needs of the Fresno area in engineering and design education, a pilot design-build program entitled Eco-village at California State University, Fresno, has been established. Students from two colleges (i.e., Lyles College of Engineering and the College of Arts and Humanities) are challenged to design and construct meaningful emergency housing after investigating various conditions harming the homeless population in Fresno and elsewhere around the world. This unique experiential program allows students the opportunity to develop the knowledge, skills, and attitudes necessary to gain social, cultural, and environmental consciousness in both their professional and personal lives. In the long term, the program is staged to design for the needs of a community it will serve. This paper presents the lessons learned from the program's first semester experience in the areas of integrated design and construction education, as well as the collaboration among students, faculty, practicing professionals, and the Fresno community.

The Construction Management program of the Lyles College of Engineering at California State University, Fresno, has a long history of integrating community projects with instruction to enrich students' learning experience and help improve the local community. Over the years, this service-learning teaching strategy has benefited both its students and the community tremendously. In spring 2010, the Construction Management program and the Department of Art and Design from the College of Arts and Humanities teamed with noted architect Arthur Dyson to design and build emergency housing for the homeless community in the Fresno area. The vision was to create an Eco-village for the homeless to have a safe and secure environment. In addition, the participants of the Eco-village would live in a communal environment with gardens for growing fruits and vegetables, thus developing work skills to help them gain self-sufficiency and prosper.

The Eco-village course in spring 2010 was considered as a pilot study for a two-semester design-build capstone course series the program aims to develop in the long term. Despite the compressed schedule, the class was carefully designed and structured

following the guidelines for a regular service-learning course. About fifty students from the two colleges worked in teams on design and construction of multiple proposed housing modules.

The Service-Learning Approach

In order to structure the course properly, the faculty of the Construction Management program attended several service learning course development seminars to gain a better understanding on the nature of service-learning programs and the key practices for an effective service-learning course.

What is Service Learning?

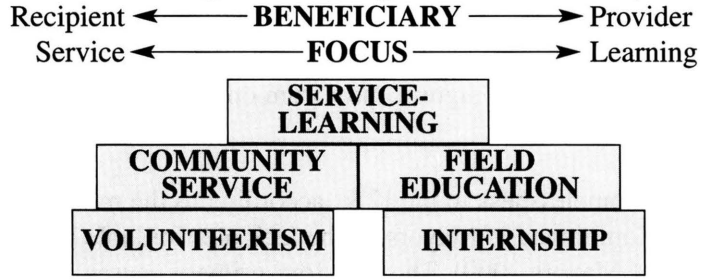
The Service-Learning Development Committee at California State University, Fresno has adopted the following definition for use on campus:

"Service-learning is a method where students learn by active participation in organized service that addresses community needs and is linked to academic study through structured reflection. The community needs may include direct service to people in need, improvement of community resources, applied research, community outreach and education, or policy analysis and advocacy. The academic study may be in any discipline or combination of fields." (CSU Fresno 2011).

Previous research has indicated that different types of service-oriented experiential education programs (e.g., volunteerism, community service, field education, internship, and service learning) share similarities in terms of providing learning opportunities and engaging students in community activities. However, each of these programs can also be distinguished by their primary intended purpose and focus. Furco used Figure 1 below to illustrate the distinctions among them and stated, "Each program type is defined by the intended beneficiary of the service activity and its degree of emphasis on service and/or learning" (Furco 1996, 2–6).

As the figure suggests, service-learning programs are distinguished from all other types of programs by the fact that their intention is to equally benefit both the provider and the recipient of the service, and thus ensure equal focus on the service and the academic learning occurring during the same time period.

Figure 1: Distinctions among service programs (Furco 1996, 2–6).



Key Practices Needed For an Effective Service Learning Program

A substantial number of previous studies have documented various positive impacts of service-learning on students' personal, social, and learning outcomes; their career development; and their relationship with the institution (Eyler et al. 2001, 1–5).

However, a successful service-learning program requires careful planning. After extensive literature review, researchers at California State University, Fresno, summarized a list of key practices that are consistently needed for an effective service-learning program. These practices include: (1) service that is connected to the curriculum; (2) service involving a specific action; (3) student reflection at the end of the service; (4) ongoing reflection throughout the course; (5) student's choice in selecting the service; (6) student training in the service area; (7) student involvement for a minimum of ten hours; (8) faculty training in the use of service-learning; (9) ongoing communication between the faculty member and the community service-learning partner; (10) assessment to determine if program outcomes were achieved; and (11) recognition of student contributions (Tannenbaum and Berrett 2005). This list provided the major guidelines for the instructors from the two colleges to design and develop the Eco-village course in spring 2010.

Project Background

The Homeless Reality in Fresno

The U.S. Department of Housing and Urban Development (HUD) defines the "homeless" or a "homeless individual or homeless person" as follows:

1. an individual who lacks a fixed, regular, and adequate nighttime residence; and
2. an individual who has a primary residence that is
   a. a supervised publicly or privately operated shelter designed to provide temporary living accommodations (including welfare hotels, congregate shelters, and transitional housing for the mentally ill);
   b. an institution that provides a temporary residence for individual intended to be institutionalized; or
   c. a public or private place not designed for, or ordinarily used as, a regular sleeping accommodation for human beings. (HUD 2011)

There are numerous contributing causes for one to become homeless. These include poverty, unemployment, war, mental or physical disability, domestic violence, and natural disaster. Sometimes it could also be a mix of several of the aforementioned causes. The main cause can vary significantly from one region to another, and from one country to another.

The main cause for homelessness in the U.S., according to the most recent report by The United States Conference of Mayors, is the lack of affordable housing (United States Conference of Mayors 2009). The next four primary causes are

- poverty
- domestic violence
- unemployment
- low-paying jobs

Fresno has been struggling under enormous pressures due to severe poverty. According to U.S. Census data in 2000, Fresno ranked number 4 among the 50 largest cities in the U.S. on its overall poverty rate, and number 1 on concentrated poverty, the degree to which its poor were clustered in high-poverty neighborhoods (Berube 2006). In addition to the high poverty level, other factors have put regular housing out of reach for many homeless individuals and families in Fresno, such as the declining wages and the consistently high unemployment rate. As of September 2010, the unemployment rate in Fresno was 15.1 percent, compared to 12.4 percent in the State of California and 9.6 percent for the national average (BLS 2010).

Without a better housing solution available, many of these homeless individuals and families end up living on the street, in tents, in shelters, in pickup trucks, or sometimes in motel rooms. Slowly they have become a hidden population living in a separate caste system and they face many challenges in regard to basic human needs and social disadvantages.

The Eco-village Concept

Based on the premise that each citizen should enjoy basic rights to peaceful sleep, dignity, health, and a chance for employment and productive work, the eco-village concept emerged. In essence, it promotes humane housing for those who have none: a peaceful, green, sustainable, small urban village for those who might otherwise inhabit trash enclosures, doorways, sidewalks, cardboard boxes, or any other available spot. It will provide a peaceful, healthful, uplifting environment; an employment center; and, above all, safety.

A widely accepted view of an eco-village is shown by Robert Gilman's definition of it as a "human-scale, full-featured settlement in which human activities are harmlessly integrated into the natural world in a way that is supportive of healthy human development and can be successfully continued into the indefinite future" (Gilman 1991)

The definition remains true even twenty years later during this economic downturn, when more and more Americans have found themselves on the streets. An innovative, humane and holistic approach is in need to address this dilemma. Our team views the eco-village as an approach to help redefine the future for many of our homeless neighbors with a safe, livable, and healthy community, and eventually resolve the issues of homelessness.

Strictly speaking, we face more of a social problem than an engineering problem. However, our goal is to deliver a thoughtful design with a deep understanding of the

context and ensure that an eco-village, once built, serves the following intended purposes:

- to cultivate health and emerging leadership in the homeless community
- to empower the homeless themselves to utilize their personal restoration as a catalyst for positive changes in their lives
- to create steady cultural adjustments that support sustainable, cooperative, and healthy societies

Ideally, an eco-village will be totally sustainable through alternative energy design and income generated by the particular economic component proposed for each village.

The theoretical underpinnings of the eco-village empowerment-based holistic model are that in order to achieve lasting social change, individuals must undergo transformation themselves, becoming healthy adults and ongoing learners, as well as excellent leaders. The theory of change is that those who transform themselves will subsequently initiate changes in others. Therefore the initial focus is on the underserved population facing complex and severe challenges, those who are potential change-makers in their families, social networks, and communities. The mission is to empower these individuals to uncover, rediscover, and reclaim their lives. It is only the beginning of a long and sustained journey.

The vision for the Eco-village project is to create humanistic communities that integrate beauty, infinite possibilities, heart, and spirit; a neighborhood surrounded by evergreen citrus trees, producing fruit while beautifying the area. Each village would incorporate a commercial enterprise such as an art studio and gallery for pottery, sculpture, and so forth; a furniture restoration shop and showroom; a bakery; and a bamboo outlet for living plants and bamboo products, all providing sustainable income for employees and teaching leadership and business skills. There would be a meandering pattern of small eco-structures veiled by the trees and incorporating solar and geothermal energy for living, all facing a large organic garden with abundant vegetables, herbs, and berries fed by a grey-water system and rainwater harvesting.

The Eco-village transformation would begin with a small single venture. Soon to follow could be a larger project, then, perhaps, a single block, and eventually the entire city, and it would ripple out everywhere.

The Eco-village Course Development

Pilot Course in Spring 2010

In fall 2009, the Lyles College of Engineering and College of Arts and Design presented to the provost the concept of Eco-village along with the collaboration opportunity for the two colleges. Upon approval, they then worked together throughout the spring semester in 2010 to design and construct shelter modules for the proposed Eco-village community. A total of 50 students from the Construction Management

program and the Department of Art and Design participated in the class and met once every week.

Two distinctive phases of collaborative study were identified at the beginning of the semester: (I) development of layout and structural designs, and (II) material procurement and construction of the structures.

During Phase (I), after an introduction to the scope and background of the problem, design teams were formed. Each team had a mix of students from both colleges. To help students visualize a solution to the problem, several field visits to the homeless community were made. A series of speakers were invited from the homeless community and the local professional industry. The topics included needs of the participants, benefits of layout, landscape and communal gardens, structural and infrastructure components, and so on. Invited participants from the homeless community shared their needs for survival with the students, who developed several conceptual designs of housing and sanitation structures. It was not easy deciding on the sizing of the structures and selection of materials. Responses from the homeless representatives indicated a need for a minimum of 80 to 100 square feet in size with a strong preference for utilizing recycled and sustainable construction materials. The materials selected by the students included wood pallets, PVC piping, fabric, straw-bales, railroad ties for foundations, and aluminum can lids and cardboard for siding. The original design concept was revised and expanded as a result from interviews with representatives of the homeless community.

Challenges also arose during this phase, when communication within the student teams broke down. Tension developed and needed to be addressed. Partnering was introduced at this time to encourage all members of a team to share ideas. The student teams evaluated the merits of the presented ideas and solutions and provided constructive feedback. Partnering on projects in the industry is a difficult concept to implement. However once it's in place and maintained properly, projects tend to have more successful turnout. As relationships within the student teams gradually improved over the semester, students learned to share and appreciate different ideas and solutions with openness and respect.

As the spring semester unfolded, new issues started to develop in Phase (II) regarding material acquisition, construction schedule, and the demonstration area for placement of the structures. The process for acquisition of supplementary materials was streamlined with the joint effort of both deans. Discussions with the Director of Plant Operations allowed an area to be secured for the demonstration. Construction of the modules occurred in the last two weeks of the spring semester. Despite the pressure of final exams, with great tenacity and perseverance the student teams completed their full-scale models in time for the scheduled open house. The response from the community on this project was positive and encouraging with opportunities for partnering with materials, labor, and expertise for future projects.

Planning for Future Eco-village Courses

Future plans for the course include developing a two-semester program. The first semester will focus on understanding the problem, conceptual design, material selection, and constructing a scale model. The second semester will move on to the remaining activities, such as material testing, systems analysis, and the construction of a full-scale model for the approved building design.

The curricular structure of Engineering Projects in Community Service (EPICS) was adopted for this long-term program. Five phases would be employed: establishing project partners, assembling a project team, developing a project proposal, design and development, and construction and support.

Phase 1: Establishing project partnerships

The university-community partnership is at the heart of any service-learning program. In the context of EPICS, this entails exploring the needs and aspirations of our customer.

The selection of community partners, designated Project Partners, will be based on four key criteria:

1. Significance—not all projects can be undertaken, so partners whose projects are most likely to provide the greatest benefit to the community are selected.
2. Level of technology—projects must be challenging to undergraduates, but within their capabilities.
3. Projects expected to span several semesters offer the greatest opportunity to provide extensive design experience on the academic side and to address problems of potentially high impact on the community side. It has also proven valuable to achieve a mix of short-term (one semester to one year) and long-term (multi-year) projects, in that the short-term projects build confidence and help establish the relationship between the student team and the community partner.
4. Project partner commitment—a crucial element of the program has been the commitment of individuals in the partner organizations to work with the students to identify projects, specify requirements, and provide ongoing critical feedback.

Phase 2: Assembling a project team

Through interviews, eight to twenty students are chosen for each project team, with the assignment of students managed by the Student Advisory Council, on which each team has a representative. Depending on the project's needs, a team may select students from multiple engineering disciplines and many non-engineering disciplines.

Vertical integration: a mix of freshmen, sophomores, juniors, and seniors-is also a factor in team assignments. Teams need both technically advanced members (typically juniors and seniors) to spearhead technical progress and (academically) younger

members who are learning about the project and will carry it into future semesters. The combination of a vertically integrated team and long-term student participation ensures continuity in projects from semester to semester and year to year. Projects can thus last many years as new students are recruited for the project to replace graduating seniors.

Involvement in the program will be encouraged for other academic majors, including mechanical and civil engineering, biomedical, sociology, anthropology, psychology, education, business, and management.

Phase 3: The project proposal

During the first semester of a project, the project team meets several times with its project partner and the team's advisor to define the project and determine its goals. During this phase, the project team learns about the problems, needs, and priorities of the project partner. A key aspect of this phase is identifying projects that satisfy three criteria: they are needed by the project partner, they require engineering design, and they are a reasonable match to the team's capabilities. This process of project definition culminates in a written proposal and presentation. The proposal must be approved by the advisor and accepted by the project partner.

Phase 4: System design and development

Following acceptance of the proposal, the project team's goal is to produce a prototype of the proposed system or project. Regular interaction with the project partner continues in order to ensure that the products being designed and developed are as desired. The formal portion of this interaction includes written progress reports, periodic design reviews, and presentations. A faculty advisor meets weekly with the team to provide technical supervision. This phase of a project lasts as many semesters as necessary for the team to complete the project to the satisfaction of the project partner.

Phase 5: System deployment and support

The ultimate goal of each project team is to deliver a product or service to their project partner. The team must train representatives of the partner, collect feedback, and make any reasonable changes requested by the partner. One of the hallmarks of the EPICS program is that the systems designed and built by the students are deployed in the field, where they provide real, needed benefits to the community. In past experience, after a team fields a project, the team and project partner work together to develop new project ideas in order to continue the relationship. The students on the team in future semesters assume responsibility for supporting and maintaining the fielded projects. This structure not only provides the local community with useful projects, but also provides long-term technical support resources for the local agencies and organizations.

Students will be asked to evaluate the learning experience during the weekly activities. Reflective writing enables the documentation of experiences, thoughts, questions, ideas and conclusions to develop successful outcomes. The following are some of the sample reflection questions:

- Did you consciously recognize it as a learning experience when it happened . . . or afterwards . . . or just now?
- Did you spend time thinking about the learning experience after it happened? Did you think about what you had learned from it or what implications it may have on your project?
- What did you do as a result of this experience? Did you research or read into the area concerned? Did you discuss it with your peers? Did you apply your learning elsewhere?

The experiential learning from a two-semester program will allow further development of research capabilities, as well as leadership and teamwork skills that allow for successful completion of the project.

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