

Bringing Together Engineering, Architecture, and Art Students to Creatively Solve Community Design Issues

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Abstract

The University of Hartford established the Center for Integrated Design (CID) to bring together faculty and students from engineering, architecture, art, and business to work on issues facing the University's neighboring communities. Service learning projects have been an integral part of the course work in each of these disciplines, but outcomes of these discipline specific projects were not coordinated to solve the larger problems facing the communities. Also, students did not gain any experience working with other disciplines and learning how to communicate with both technical and non-technical team members. One successful project that was recently completed by the CID was for the town of Bloomfield, Connecticut. The goal of this project was to provide short and long-term recommendations for enhancing the center of town. The project consisted of three phases. In phase one, students from engineering, architecture, and art worked together during the summer as paid interns. They reviewed town records; collected data on items such as architectural styles, sidewalk conditions, lighting conditions, and signage; and performed traffic and pedestrian counts. In phase two, course projects in the three disciplines were conducted using the data collected in phase one. For example, a team of senior civil engineering students worked under the guidance of Bloomfield's Town Engineer and Connecticut Light and Power (CL&P) engineers to design the layout of ornamental street and parking lot lights. Other course projects were a water quality study, town center threshold study, town center redevelopment study, and town center wayfinding project. In addition, students involved in these projects participated in a focus group meeting where town officials and residents were interviewed to get their perception of the existing town center and their vision of an ideal town center. In the final phase of the project, the student interns and faculty developed a list of recommendations that were then presented to Bloomfield's Town Council. Assessment of the project by faculty, students, and town officials indicated that there was excellent integration of the student interns from the three disciplines and that the students benefited by being involved in a multidiscipline project. An area of improvement that was identified was to incorporate a multidiscipline team approach into the course projects themselves.

Introduction

The University of Hartford's mission statement emphasizes that taking an active role in the community is an important element of a student's preparation for a lifetime of learning and personal and professional success. This element of a student's education has been incorporated into the civil engineering curriculum through service learning projects that both support the course outcomes and benefit the community. Assessment of the service learning projects by community sponsors, faculty, alumni, and students has been very positive, but one short-coming is that the projects are not interdisciplinary and are focused on just the engineering component of an issue. To provide an opportunity for civil engineering students to work with other disciplines and for the projects to more completely solve community design issues, the University of Hartford established the Center for Integrated Design (CID) in 2003. The center provides a place for faculty and students of various disciplines to work together. The first project completed by the CID was for the enhancement of the town center in Bloomfield, CT. For this project, engineering, architecture, and art students worked together in collecting data, performing design studies, and developing short- and long-term recommendations for the town. This paper describes how faculty and undergraduate students from different departments and colleges worked together on the Bloomfield Center Study and discusses the challenges in sustaining the CID so it can be both a positive learning experience for students and also make a positive contribution to the greater Hartford community.

Bloomfield Center Study

In early 2003, the Town of Bloomfield Board of Selectman directed the Town Planner to investigate the requirements for and the opportunities available to ensure that the Town Center remained as the cultural hub of Bloomfield. Having previously worked with the University on several small projects, the Town Planner asked John Carson (Senior Advisor, Corporate and Community Relations, University of Hartford) about the possibility of having faculty and students work on the Bloomfield Center Study. Because of the diverse needs of the project, Carson brought together faculty from architecture, art, and engineering that are active in doing service learning projects to learn more about the requirements of the Bloomfield Center Study. This meeting led to the authors writing a proposal that was funded by the Town of Bloomfield in spring 2003.

The project was started in June 2003 and consisted of three phases. The first phase was to gather data on existing conditions such as architectural styles, lighting, signage, parking areas, sidewalks, walkability, and traffic. In addition, a focus group meeting was conducted with Town Officials and residents to have a baseline understanding of their impression of the Center of Town and the elements that they felt were needed to increase the activity and vitality of the center. The second phase consisted of analyzing the data and performing several design studies. These studies were performed by architecture, art, and engineering students enrolled in Architectural Design II, Site Planning, Design Systems, Water Quality Engineering, and Civil Engineering Senior Design Project. The final phase consisted of developing recommendations based on analysis of the data gathered in phase 1 and the design studies conducted in phase 2.

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Phase 1 – Existing Conditions and Focus Group Study

One student each from engineering, architecture, and art were hired as interns to work for the summer to collect data on the existing conditions of the town center. The students worked together as a team, but each student was responsible for collecting data in their area of study. For example, the engineering student was responsible for collecting data on roadway characteristics, traffic counts, condition and location of sidewalks, drainage, and location of street lights. In addition, the group worked together in performing a walkability study to determine residential and commercial locations within a 5, 10, 15, and 20 minute walk of the Town Green and a pedestrian study to determine how many people are either walking or biking in the Town Center.

The second element of the first phase was a Focus Group meeting that was attended by three town officials (mayor and two councilmen) and twelve residents. The student interns, students in the enrolled in the Department of Architecture Site Planning and Development course, and faculty worked in groups of two interviewing each resident and town official. One person from each group was responsible for asking the questions and summarizing their responses while the other person was making a sketch of their responses. This was an effective way to utilize the talents of the engineering and art/architecture students and faculty in understanding the focus groups' perception of the existing town center and the vision for a more vibrant and active center.

Phase 2 – Course Design Projects and Studies

Six design projects were performed to address specific issues related to improving Bloomfield Town Center and providing elements that are necessary for transforming the Center into a Central Community District. The course design projects and studies are listed in Table 1. The projects consisted both of full semester projects (e.g., Civil Engineering Design Project) or shorter two-week to half-semester projects.

Two of the six design projects were done by civil engineering students. In the Civil Engineering Design Project course (i.e., Senior Design Capstone Course), each student team works on a different project for the entire semester under the supervision of a practicing, professional engineer. Therefore, it was easy to integrate a design project that supported the Bloomfield Town Center into the Senior Design Project course. From the data gathering and focus group meeting, it was determined that replacing the existing street lights that are cobra head light fixtures with sodium lamps on 20 -25 foot concrete poles with 14-foot ornamental lights with full-cutoff metal halide lamps is a priority for the town. Under the supervision of the Town Engineer and a Connecticut Light and Power engineer, the student team measured the light intensity at different locations of a central business district that had ornamental lights to have a better feel for various light intensities, reviewed current lighting in Bloomfield Center, and then designed street and town parking lighting layouts for three ornamental light fixtures selected by the Town Planner using AGI32-EDU software. The final part of the project was for the students to develop a cost estimate for the capital and annual operating expense for the installation of the ornamental lights.

Table 1. Course Design Projects and Studies to Support Bloomfield Center Study

Project	Course	Department
Bloomfield Center Lighting Design	Civil Engineering Design Project	Civil Engineering
Filley Park Pond Water Quality Study	Water Quality Engineering	Civil Engineering
Bloomfield Town Center Threshold Project	Site Planning & Development	Architecture
Bloomfield Town Center Redevelopment Project	Site Planning & Development	Architecture
Pritzker Museum in Bloomfield Center	Architectural Design II	Architecture
Bloomfield Town Center Wayfinding Project	Design Systems	Visual Communications

The other civil engineering course project that supported the Bloomfield Center study was done by a group of four students as part of their Water Quality Engineering course. This is a fall senior level 4-credit course that has a 3-credit lecture and a 1-credit lab. Unlike traditional labs where students read a laboratory manual and perform a number of experiments during the semester, the Water Quality Engineering laboratory is a semester long group project that is sponsored by a town or water utility. Because a service learning project was already part of the course curriculum, it was easy to integrate the Bloomfield Center Study into the Water Quality Engineering course. The project selected was a water quality study of Filley Park Pond. Filley Park is a place where residents and employees who work in Bloomfield Center can picnic during the warm weather months and is also used for skating during the winter. The park has the potential of being an integral part of the Town Center, but is currently not being used to its full advantage. While some visitors enjoy feeding the ducks and geese, this likely leads to undesirable amount of algal growth that detracts from the beauty of the pond. Thin ice conditions have also limited the use of the pond for ice skating. The objective of the student's study was to develop recommendations for improving water quality and ice skating conditions. This was accomplished by the students performing a bathymetric study and comparing current depths to depths measured in 1980, measuring current water patterns through the pond, observing the condition of the diversion wall, and collecting and analyzing water samples for determining the trophic status of the pond.

At the conclusion of each of the engineering course projects, the students presented their results to the Town Engineer and Town Planner. In addition, the findings of each project were summarized in the Bloomfield Center Study Final report and the student's written report was included in the appendix.

Phase 3 – Recommendations

Using the data collected on the existing conditions, results from the focus group meeting, and findings from the course projects, the faculty and student interns developed a list of recommendations for the Town Council. These recommendations included creating diverse destinations, encouraging more special events on the Town Green, establishing gateways to welcome visitors to the center of town, establishing consistent architectural style standards, adding ornamental light fixtures along the roads and parking lots while keeping the higher cobra lighting at intersections and major driveways to provide adequate lighting, adding and improving existing sidewalks, developing private parking standards, developing curb standards, developing consistent signage standards, adding benches, soliciting landlord cooperation, reporting to residents and retailers the accomplishments made to achieve the goals of the project, and listing opportunities available to obtain funding to implement these improvements.

The student interns and faculty wrote the final report that was submitted to the Town Council in June 2004. A presentation was then made to the Town Council in September 2004 followed by questions. Because the presentation could not be scheduled until the next academic year, it was not possible to have the student interns or students involved in the course projects be part of the presentation to the town council.

Assessment of the Bloomfield Town Center Study

Assessment of the multidiscipline Bloomfield Town Center Study was done by the student interns, engineering students who were involved in the course projects, faculty, town engineer, civil engineering advisory board members, and town officials. The student interns developed a close working relationship with each other over the summer and their experience was well summarized by Mike Opuszynski (Engineering Student).

"I had friends from the art school and architecture program before I met Lisa Cennotti and Lisa Roden, and we all would come up with competing stories about how one major was better than the other. But working with Lisa and Lisa was not like that at all. There was a mutual appreciation for each other's abilities and the different qualities each person brought to the group. Working with them was definitely one of the most enlightening experiences I have had with students outside of the School of Engineering."

One of the results of their involvement in the project was that the student interns were selected to present their work at the University's Undergraduate Research and Creativity Colloquium. The Colloquium is a forum for students to present outstanding scholarly and creative work to their peers, faculty, administrators, and other guests.

From student evaluations of the civil engineering courses and senior exit survey, a majority of the civil engineering students feel that working on “real world” projects was one of their best learning experiences at the University of Hartford. Typical responses on the major strength of the Senior Design course are “its good to work with a practicing engineer” and “being able to work with people in the field.” Furthermore, most students responded that they strongly agree with the statement that the senior design project provides students with contemporary problems which they, as future engineers, may have to face (4.9 out of 5 with 1 being strongly disagree and 5 being strongly agree). These responses were consistent with the students involved in the Filley Pond Water Quality Study and Bloomfield Center Lighting project. The seven students involved in both of these projects also noted that they were motivated by knowing that the results of their project were going to be used by the town and felt a responsibility to do a professional job. In the case of the Bloomfield Center Lighting project, they also stated that they benefited by the design experience of the Connecticut Light & Power engineer who was one of their technical mentors on the project.

A questionnaire was given to the mentor of the Bloomfield Lighting Center project to evaluate the quality of the student’s work. The mentor responded that he strongly agreed that the project team conducted themselves in a professional manner; arrived for scheduled meetings on time and were well prepared; verbal and written communications between the project team and site personnel were professional and appropriate; demonstrated a good understanding of the problem; solicited information and input from site personnel, used appropriate theories and techniques for solving the problem, kept site personnel informed of their progress, responded well to input and constructive criticism, completed the assigned project to satisfaction, communicated their results and findings in a clear and helpful manner, and appeared genuinely interested in the client’s problem.

Members of the civil engineering external advisory board who attended the Bloomfield Lighting Center presentation were also asked to assess the student’s performance by filling out a questionnaire on the content of the project and the organization and delivery of the presentation. Eighty-nine percent of the board members’ responses were that they strongly agreed and 11% of the responses were that they agreed that the student’s achieved the expected outcomes of the project. One comment that summarized the board’s overall evaluation was that “the project was extremely well presented and gave a good education of lighting design requirements.”

The assessment of the project by Bloomfield town officials was through their comments after the faculty presentation on the study’s findings to the Town Council. The mayor and other councilman congratulated the students and faculty on their work and the thoroughness of the study. For example, one finding that they found very intriguing was that the town’s perception about the center being “dead” was not substantiated by the data collected by the student interns in the summer of 2003. Pedestrian count data showed that there were a substantial number of people walking in the center of town and traffic count data indicated that there was a significant amount of local traffic.

From the faculty’s perspective, the multidiscipline project was a success but that there are areas for improvement. On a professional level, working together with faculty from other

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departments and colleges was a very rewarding experience. This opportunity provided each of the faculty a chance to observe how architects, artists, and engineers use their own creative skills to solve problems and work together as a team. By having an adjunct intimately involved in the project whom is a principal of a land planning firm, it provided the important perspective of having a practicing professional as part of the design team. For this particular study, one area of expertise the design team lacked was a better understanding of the retail and business needs of Bloomfield Center. For future projects, this has been solved by the addition of two University of Hartford Barney School of Business faculty members to the Center of Integrated Design. As other areas of expertise are needed for other community design projects, it is hoped that other faculty would be interested in joining the CID team. The support of the administration, the publicity that the CID has received, and the assistance to faculty in finding funded research are the steps being used to achieve the goal of having a diversified and committed faculty involved in the CID.

On the educational side, it was easy to integrate the course projects into our classes because of our previous commitment to include service learning as part of the curriculum. The service learning projects also provide the students an appreciation for the importance of being part of their community, which they will hopefully continue throughout their professional careers. However, except for the student interns, one shortcoming was that the course projects were not done by multidiscipline teams. Each project was worked on either by art, architect, or engineering students who were enrolled in that particular class. These projects were done in parallel with very little integration. The only integration was when the art and architecture students met together and the student interns presented both classes background information on the Bloomfield Center study and explained how their specific course projects were part of the larger project. For the students doing the course projects to have a similar experience to that of student intern Mike Opuszynski, each of the programs must review their curriculums to see how a multidiscipline project can be integrated into the existing programs. This is a challenging proposition because each of the programs already has many competing areas of study that some feel are not adequately covered.

Building on and Sustaining the Success of the Center for Integrated Design

The CID has been successful in finding solutions to local community design issues and for providing an opportunity for University of Hartford students to apply the skills they are learning in a classroom. Several steps are needed to build upon this initial success and for achieving the goal of having student and faculty working together on multidiscipline teams. At this time, the core faculty who started the CID is responsible for obtaining funding for future projects. Because of the time constraints on each of the faculty, it was not possible to find a follow-on project while still working on the Bloomfield Center Study project. Therefore, the CID currently operates by completing one project before concentrating on finding a new funded project that meets both the goals of the town and the educational requirements of our students. To streamline this process, foundation-funding opportunities are being investigated that would support a CID director. The major responsibilities of the director will be to: (1) work closely with the neighboring cities and towns and community groups to identify potential projects; (2) work with faculty to write proposals to obtain funding for these projects; (3) manage the financial aspects of

the current projects, and (4) publicize the accomplishments of the CID to the University community, greater Hartford area, and other academic institutions that are pursuing similar goals.

Assessment of the Bloomfield Center Study found that the student interns gained a lot by having a multidiscipline project experience, but that the course projects were not integrated design experiences. Because of the curriculum issues that must first be resolved and the new cross listed courses that need to be created, foundation funding opportunities are also being investigated to fund the curriculum development needed to bring the multidiscipline design experience into the classroom. Having already brought service learning into the classroom, the next goal is to have multidiscipline design projects as part of the curriculum.

The final step is to establish an office environment where students and faculty can work together on CID projects. The space would have the resources needed to complete the projects (computers, printers, plotters, etc), have a director's office, hold project meetings, and make presentations to project sponsors. This professional environment would further motivate students and faculty to want to be involved in the CID and the importance of their work in helping the local communities solve complex design issues.

Conclusions

The importance of students taking an active role in the community is a key part of the University of Hartford's mission statement. In most cases, this has been accomplished by individual departments incorporating service learning projects into their curriculum. However, many community issues require a multidiscipline approach to solving their complex issues, which can only be accomplished by multidisciplinary teams. To meet this challenge, the University of Hartford has established the Center for Integrated Design. In the first project the center completed, architect, art, and engineer students and faculty worked together to develop recommendations for improving the vibrancy of Bloomfield's town center. The success of the project was highlighted by the very positive comments made by the Mayor and Town Council and interaction between student interns and faculty from engineering, architecture, and the art school. Assessment of the project indicated that areas that needed improvement was to further integrate the course projects so that they are also multidiscipline efforts and the need to bring in other disciplines such as business into the CID. Improvement in these areas is currently being addressed so that the CID can build upon its initial successes.

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