Integrating LEED into Construction Education at Clemson University

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The notion of building in a sustainable or "green" manner is not new although the definition of what is meant by "green" has been somewhat uncertain. The advent of LEED (Leadership in Energy and Environmental Design) developed by the USGBC (United States Green Building Council), has provided a third party score sheet and rating system that can be applied to construction projects to determine if in fact a project could be considered "green", and as a further step, "just how green". Students of construction have the opportunity to learn a vocabulary and methodology that they should be able to use on the job as construction companies accept the need to provide green projects to a growing number of clients. At Clemson University, students, aided by faculty, drove the process of integrating LEED into the education program of our School of Building and Design. Students have become aware of LEED, the scoring philosophy, and implementation not only in design but on the construction site as well. This paper describes how LEED has become part of the education landscape at Clemson University.

Keywords: LEED, USGBC, green, environmental, design

The Green Evolution

The undergraduate Construction Science and Management (CSM) program at Clemson University prepares graduates to assume positions in the area of project management with a wide variety of construction firms. Most graduates think in terms of working within South Carolina . Some, who are more adventurous, look beyond the borders of the state to neighboring southeast regional employers. Still others, the distinct minority, seek national and global construction opportunities. Increasingly a tool they have been using to good effect in impressing potential employers with their acumen and ability to contribute to the enterprise is their knowledge of LEED.

Leadership in Energy and Environmental Design (LEED) is the scoring framework developed by the United States Green Building Council (USGBC), a non-governmental organization that brings together design and construction practitioners, to assess how the built environment can be expanded, modified, upgraded, and otherwise reshaped in a manner that will not have a negative effect on generations to come.

A major emphasis of the USGBC has been a rating system that awards points based on environmentally sound design and construction choices made by project owners. The initial scorecard developed under the LEED program addressed commercial projects. Points are awarded based on the owner employing sustainable strategies in six areas. These areas include: project site issues; efficient water use; energy and atmospheric pollution reduction; effective use of materials, including recycling; providing a healthful, comfortable indoor environment; and

employing innovative design and construction sustainable strategies. Since not all projects or sites lend themselves to a "one-size-fits-all" approach, levels of certification have been established. A "certified" project would have to earn 26 points (out of a maximum 69 possibly awarded), with silver, gold and platinum certification ratings being awarded as the project became more "green" as demonstrated by more points being earned.

A plan of proposed strategies is presented by the project team to the USGBC. The vehicle for seeking points is a series of LEED score sheets or templates used to organize narratives, calculations, and sketches, describing how the points are to be earned. The final certification is only awarded after the project has been completed and incorporation of the sustainable strategies is verified. The early work of the USGBC dealt primarily with commercial projects. As the success, and acceptance, of that effort has grown the organization has turned to other elements of the built environment and continues to develop score sheets that can be used in other types of projects, in building upgrades, in tenant improvements, and other areas, including the new LEED for Homes Program.

Over the past several decades "new ideas", specifically aimed at environmental issues, have come and gone with scarcely a ripple. LEED, however, has gained an audience that is growing. LEED provides a numerical grade that can be measured against a standard. It offers a variety of ratings from acknowledgement (certification) at the low end to kudos (platinum) at the high end, with a couple of stops in between. This has obviously proven attractive, particularly in a time of growing concern for the extent of the earth's resources and how those resources are to be utilized in the future.

Generally the early construction industry response to LEED was indifference soon replaced by hostility motivated by the notion that a LEED project had to be a costly project, and therefore more difficult to sell to clients. In fact some early attempts (ca. 2001) proved that to be the case, with a commonly held notion that a 15% premium had to be paid for a "green" project. The LEED initiative would not survive with that type of negative cost impact. Factors such as design firms gaining experience, more professionals becoming LEED accredited, "green" materials becoming available at competitive prices as more manufacturers offer environmentally acceptable material alternatives, a sensitivity on the part of the USGBC to reduce paperwork via electronic submissions, to name several, have worked to make sustainable construction competitive. The well conceived, well planned, and well executed project, implemented by companies that have paid the price for climbing the learning curve can be rewarded. We have found that these companies are seeking out and are ready to pay the price for graduates who have added LEED knowledge to the array of skills they acquire in a well founded construction science and management program.

The challenge we face is how to integrate LEED information into a college program composed of individual courses that span the full scope of construction project delivery? Is the answer another course? We have too many courses now, and are dropping or combining some of them in the interest of student retention and economics. Do we offer seminars to be taken outside of the mainstream of standard coursework? Not all students immersed in regular coursework, a full college social schedule, and part time jobs needed to finance life's amenities are looking for another use of their "spare" time. What follows is our approach here at Clemson University.

Bottom-Up Approach

At Clemson, as at other colleges and universities, faculty is encouraged to keep abreast of progress in their specialty fields. This occurs in a number of ways including through readings in current professional journals and trade publications, through experiences in consulting activities, by participation in technical society meetings and through research. Increasingly the notion of building green has grown in recent years and more professors of architecture and construction science have introduced it into their lectures, acknowledging that it is new, and different, and at times may be justified on a qualitative rather than quantitative basis. The range of areas addressed by the LEED scorecard offers the opportunity to address green issues in just about any course from materials and methods through building systems through estimating and management.

At Clemson an almost subliminal "build green" message combined with energy "crisis", combined with a scorecard that was gaining attention, combined with a growing "you can make a difference" refrain, and a call to students to differentiate themselves from the herd of graduates who would be seeking jobs, all worked together to motivate a student movement. Several students suggested to several faculty that LEED accreditation might be a desirable credential. When the response suggested that perhaps our current curriculum had more than enough "stuff" in it and a course dedicated to "sustainability" was probably not going to happen in the foreseeable future, the students pursued the possibility of independent study. They also suggested that an evening program, open to professionals as well as students, might draw a crowd. They went a step further and, in consultation with faculty, identified professionals with LEED accreditation who might be interested in working with Clemson, at nominal or no cost to develop a program. Another student group thought it might be possible to have a green expo, on campus, where vendors could display their solutions to a growing demand for green products. They investigated, and found, a venue on campus, where the expo could be held at little cost. This cost would be met by a modest vendor fee.

Students, local professionals (some associated with the local USGBC chapter) and faculty developed an eight week course and offered it to over 115 students and professionals one night a week. After the first weeks' meeting the college administration caught the fever and offered to underwrite the cost of the LEED AP exam for any student who took the exam and passed, achieving the rank of Accredited Professional. Meanwhile over 30 vendors (contractors, suppliers, and manufacturers) displayed their services and wares to over 250 interested Clemson students, faculty, and local designers and builders at Clemson's First Annual Green Expo.

As the spring 2006 semester drew to a close interest in LEED remained high. A number of graduating seniors reported back that their LEED experience was a topic of discussion in their job interviews. Several CSM students, upon their return in the fall from summer intern experiences indicated that their employers were monitoring the growth of LEED closely. The returning students were greeted with the opportunity to participate in a design-construction effort orchestrated by an enthusiastic group of student leaders, now formed into a fledgling student chapter of the USGBC, and supported by architects, contractors, vendors and interested faculty.

The opportunity was a student competition to design a LEED certified house for our local Habitat for Humanity organization. Could this be done?

Seven teams, totaling 49 architecture, landscape architecture and construction science students demonstrated that it could be done. Their entries were submitted in December 2006, and were judged by a panel having architectural, construction, faculty and client representation. All submissions met certification requirements of the LEED for Homes Rating Program, with three entries achieving a silver certification. All but one had met the $50,000 Habitat for Humanity budget. The winning entry will be built, by students on the Clemson campus, and then be moved to a site in the nearby city of Easley, SC. Each year a "standard" Habitat for Humanity Home has been built on campus in the fall and moved to a local site. This has been done for a number of years and the prospect of a spring "green" house being built and relocated is viewed as an exciting, though routine event. Incorporating LEED certification into this process has captured the imagination of many students.

Where to now?

Plans are unfolding for the Second Annual Green Expo at Clemson. Increasingly, faculty previously disinterested, or perhaps mildly intrigued, have begun to seriously view the green phenomenon. Student projects, typically integral to coursework, have taken on a green tint as faculty add a "sustainability" focus. We continue to see revised text books having highlight sections, or chapter inserts, that discuss green strategies. We may develop specific courses created to address this "new" methodology, but then again we may not. Frankly the integration of working green into the way we each do business, or into the courses we now teach, will be much more powerful than creating stand alone courses. When working green becomes the way we normally work, and is no longer called out as something new and different, and is no longer a cause to rally round, then we will have succeeded in effecting change.

And how was it done? At Clemson University it was done from the bottom up. Students and faculty recognized a good idea. They recognized that steering construction design and implementation toward a path that respects the environment and the needs of our future generations is the right thing to do. It is encouraging that students were sufficiently motivated to drive the process. The green evolution in South Carolina continues. Today's students are tomorrow's practitioners and the lessons these students taught themselves and learned from others with similar interests will become part of their lives and our society. And, to be frank, the skills our students absorbed have made them more employable in a world that increasingly recognizes that our resources are finite and are to be conserved.

References

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