Service Learning In Architectural Technology: A Habitat for Learning

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Abstract

This paper describes implementation of service-based learning strategies within an undergraduate architectural engineering technology program. The class design, a studio class for teaching architectural design, building assembly and drafting, combines formal instruction, team-based problem solving, and just-in-time delivery of instructional content. Unlike other approaches to problem solving based instruction, the method suggested here employs a mix of traditional instruction and on-going development of drawing and computer aided drafting skills in an organizational structure similar to that found in a small consulting firm.

Course organization is facilitated by a scheme that provides classroom/lab based instruction totaling six hours per week within a studio environment. Assignments are presented to teams in the form of an architectural program. Architectural assignments vary in focus, introducing a real client and project, and emphasizing programmatic function, code compliance, building assembly, and graphic communication techniques appropriate for portrayal of construction principles. Projects are typically residential in nature, often forming an association with the local group of Habitat for Humanity, and may extend to commercial projects as are deemed appropriate. Assignments are coupled with site visits of similar structures and are accompanied by photographic documentation of construction at various levels of completion, exposure to construction documents of built projects, and discussion from professionals. Student teams respond by way of sketches, board and computer aided drafting, and verbal presentations of architectural solutions to classmates, professors and ultimately, their client.

Five years of experience with the instructional format described above reveals a number of insights useful in planning similar courses. The course structure has a definite role in helping students to organize learning. The introduction of outside professionals provide contact to alternative career opportunities and motivation as well as instruction and should be an integral part of this type of teaching. The importance of tutorial assistance and careful monitoring of team interaction helps ensure that each team member both participates in and understands the problem. A byproduct of the course structure shifts the responsibility for learning to the student. Beneficial of these methods is the development of student confidence and pride fundamental to success both in college and in the workforce.

Introduction

Evidence of the failures of traditional lecture format instruction is particularly alarming. "…While teachers are lecturing, students are not attending to what is being said 40 percent of the time. In the first ten minutes of a lecture, students retain 70 percent of the information; in the last ten minutes, 20 percent. Students loose their initial interest, and attention levels continue to drop as a lecture proceeds. Four months after taking an introductory psychology course, students knew only 8 percent more than a control group who had never taken the course" [1]. In the present age where delivery of information is bulleted into sound-bytes, it is no wonder that students encounter difficulty retaining information delivered via lecture format.

With the pedagogical challenge of addressing various learning styles among students, and scholarship goals of discovery, integration, application and teaching, faculty are oftentimes attracted to the application of service learning in the classroom. These goals, coupled with the charge for university and civic engagement, the adoption and implementation of service learning might be an assumed confidence builder for a curriculum, but prior to the implementation of service learning in a technology program, careful consideration should be given to such basic issues as shifts in faculty responsibilities, possible downfalls of service learning from a students perspective, and the potential for disappointment from the civic community being served with less than satisfactory design solutions. As it is generally assumed that an architectural project might result in a built solution, anything less might be perceived as a failure from the community. [2]

In the history of architectural education the employment of problem based methodology under the guise of tutelage and apprenticeship occurs as early as 1860. This method holds true in contemporary design education with use of the "Charrette", which is almost universally employed by architectural design programs. Use of the term "Charrette", originated with the E'cole des Beaux-Arts in Paris between 1860 and 1930. For the student, the charrette was a cart, which held the drawings and supplies in the professor's workshop. The term "charrette" was coined to identify the time when proctors circulated a cart, or charrette, to collect final drawings while students frantically put finishing touches on their work. Characteristic of the "charrette" was an assigned project, oftentimes hypothetical, for which the student was to design a solution in graphic form within a given time frame. The replication of an office environment in the classroom was characteristic of Beaux-Arts education where, under the direction and tutelage of an instructor, students were assigned a project with a program and site, with ample time for execution of a design project via drawings and graphic images. [3] Until 1996 the "design charrette" formed the basis of the twelve hour design examination of the national Architectural Registration Examination. [4] The process is typical of a designers' approach to problem solving and is also typical of basic instructional methods of problem based learning.

The application of problem based learning has become basic to many curricula among many different areas of study. In the study of other disciplines, PBL appears to have finally come into vogue during the late sixties. In 1969, the McMaster University Faculty of Health Sciences in Hamilton, Ontario established a new medical school with an innovative educational approach

which was to be employed throughout its entire three-year program. The McMaster model defines PBL with the following characteristics:

- Learning is Student-Centered
- Learning Occurs in Small Student Groups
- Teachers Are Facilitators or Guides
- Problems Form the Organizing Focus and Stimulus for Learning
- Problems Are a Vehicle for the Development of Clinical Problem Solving Skills
- New Information is Acquired Through Self-Directed Learning [5]

This model now appears as the generic basis of many, if not most models of PBL. More recently, needs of industry have come to play an important role in the development of curriculum, and many colleges and universities are addressing those needs through technology education. Task forces, professional associations and others have recommended educational changes designed to better prepare students to participate fully and productively in today's technology based work-place. Now with the common adoption of computers in the classroom, the emergence of a competitive global market, and with considerations of the potential of serious ecological damage caused by industry, technology educational goals have evolved based on the need for various skill sets among prospective employees. Needed are critical thinking and problem-solving skills, the ability to work as a team, verbal and written communication skills, the ability to perform research, the ability to multitask, and the ability to process and organize information. All of these criteria form the basis of PBL, and are worthy goals for student projects in the classroom. To achieve this, several learning strategies need to occur through the employment of talking and listening, writing (and drawing), reading, and reflecting. [1] The successful accomplishment of these strategies occurs as an outgrowth of the methods of PBL. By presenting a problem to students and encouraging a team approach to problem solving, students talk and listen more readily due to their involvement and ownership of the project, and therefore clarify their thinking. Research is required for a student to arrive at a tangible solution to the problem, and therefore reading enters as a primary component of problem solving. "Reading requires students to think in a different manner, with the objective of understanding what others think. Reading involves students with techniques such as scanning, identifying, sorting and prioritizing information, and calls for higher level thinking skills such as connecting ideas and sorting information, spotting faulty logic in argumentation, recognizing bias or hidden agendas, identifying unsupported ideas, understanding metaphorical levels of meaning, and entertaining other perspectives and points of view on a subject." [1] Because ideas are challenged, reflection is needed to process and integrate new ideas into one's thought. New ideas present a state of disequilibrium to the student, causing them to either incorporate the new information or to construct a new mental structure. Finally, because of the three dimensionality of the problem solution, drawing (supported by writing) is the direct and primary goal of the project. Like talking, writing and drawing clarify student thinking. They *see* the result of their solution, and are in a better position to judge the results.

So, generically, how does this process work? Unlike problem based learning, service learning allows teachers to challenge students with real problems. The natural occurrence is for students to develop a sense of ownership of the solution, and suddenly students relate to projects in a different way. By observing the usefulness of the problem solving process coupled with interaction with actual clients and the challenge of satisfying client needs, students are motivated to engage the problem, to research possible solutions for the problem, and finally to recommend a solution for the problem. Oftentimes more that one solution exists for a problem, thereby encouraging creativity from the student. During the project, a shift occurs whereby the instructor becomes the project facilitator and mentor. Instead of actively providing and delivering information, students take on the role of researcher, working together with peers and mentors in a student-centered environment where learners are encouraged to explore various topics of interest. Ideally, projects should be multidimensional and have depth, and be of duration to allow students to become motivated toward gathering information to arrive at a solution. The process tends to increase the student's feeling of responsibility for, and control over their own learning, developing a sense of self-regulation. A sense of ownership occurs for the solution of the problem that excites learners and often increases the effort they are willing to put forth in their education. When intrinsically motivated, students tend to employ strategies that demand more effort and that enable them to process information more deeply. They tend to employ more logical information-gathering and decision-making strategies, and to enjoy tasks which are more challenging. To facilitate this, students must be made to feel the classroom is a comfortable and supportive place where there is a sense of belonging and respect. [1]

The Department of Industrial Engineering Technology at Murray State University holds the areas degree of Civil Engineering Technology, Architectural Option and Interior Design, both culminating in a B.S. The architectural technology program has approximately 30-35 students, while the interior design program has approximately 55 students. In an effort to offer better instruction, we implemented methods of problem based learning to students to facilitate active research and problem solving. Having observed first hand the effectiveness of PBL through undergraduate and graduate design projects, it seemed a natural "next step" transition to engage students in a civic project through the adoption of service learning strategy. To make this happen, we first needed an actual client with real architectural needs. The criteria developed for client selection is that they have an existing building near the university to which they plan an for an addition, adaptive reuse of, or for new construction for Habitat for Humanity projects. Of all projects attempted, the most productive became the Habitat for Humanity project, which involved a real site with a real client, the Murray Calloway County Chapter of Habitat for Humanity. Enabling students to meet with clients establishes a relationship, the outcome of which makes the problem become personal for students. An assignment of an Architectural Program is issued to clarify client needs. Site visits are conducted for students to fully understand the property, its context, and applicable zoning for the neighborhood. From this preliminary standing, design teams are formed. Students are grouped into production teams to "work" as interns with the task of designing the project and producing construction documents for building the project. As facilitator, the instructor's responsibility is to observe student progress, to encourage and make available critical information at times appropriate to the need. I employ a "just-in-time" delivery process for this. [6] Also, at critical times during projects,

outside speakers are invited to discuss pertinent issues regarding zoning, building code enforcement, and construction and mortgage financing for real estate.

Now holding the previous information, further questions might be imposed regarding the success of service learning projects versus risk involvement of faculty, of students and of the university with actual clients. Can service learning deliver on its promises of education coupled with civic engagement and responsibility? In spite of its allure, potential limitations do exist for all participants of service learning projects. For faculty, those lacking professional licensure must exercise caution when adopting projects. A commitment to service learning projects might imply liability of the architectural designer. Faculty should ask if their motivation is for teaching design, technology education, ethics, civic engagement and responsibility, or all of the above. An additional question might follow regarding limits of liability transference on to the university. Whether the university is a private entity or a public entity, the faculty member might well find the board of directors, or the state, as the responsible party with regard to building failure or accident, or they may be on their own. Such should be considered and researched with the individual institution regarding issues such as these. Further, in a failed exercise, the faculty should decide just how far they should take the problem toward a solution. Suddenly a shift occurs where the faculty member's responsibility extends beyond the classroom, where the faculty member's focus moves away from instruction and research and toward that of a design professional. For students, obvious challenges arise with regard to teamwork and leadership, motivation and compromise, and potentially working with others they don't like, including team members and clients. This in itself affords a plethora of learning and instructional opportunity. For the client, the down side might include a feeling of disappointment of the results of the exercise, feeling pressure to accept designs which might not be as accomplished as a design professional might provide or which they may not like. Projects occasionally raise false hopes toward a solution to real problems, partially due to a lack of financial support for completion of the project. Caution should be exercised on selection of clients and projects to avoid such outcomes. For those working in more lecture-based subject areas, service learning gives a number of educational benefits such as increased relevance of subject matter and linking theory to practice. [7]

My findings are that problem-based service learning is a vital discovery method for instructing and motivating students to become active and responsible learners. Assessment methods for the projects included consideration of issues regarding pedagogy and PBL. What role does a lecture component provide in the current instructional scheme? In responding, it is my conclusion that the primary function of the lecture component in the problem was that of providing a learning structure. In the exercises, students were able to build further learning on the basic structure provided by lecture without the need for additional lectures. It must also be recognized that the availability of the facilitator to respond to questions during the lab session, and the availability of additional instructional material provided alternatives to formal lecture-based instruction methods.

Another question posed by this research was: How do students perceive the use of just-in-time (JIT) delivery of instruction, particularly when guest instructors are employed? In general, I conclude that the students have responded well to JIT instruction based on their perceptions of being able to complete the work assigned. In these exercises, guest lecturers provided

significant and specific blocks of instruction. Hence, I conclude that this method of instruction were at least as effective as instruction provided by the facilitator. The students appeared to be comfortable with the guest lecturer based on the questions posed and the student-facilitator interaction that developed.

The final question posed by this research was: How might the course be modified further to enhance third and forth-year learning experience? Based on the research reported I have modified the two courses described above to further limit the amount of lecture while at the same time increasing the amount of individual effort required of students in the courses. Future goals include the expansion of supplemental material dispersion via a class web site accessible both on and off campus using the blackboard system. This would also enable refined record keeping of project results.

Sample Assignment:

Introduction

Founded in 1976, Habitat for Humanity provides valuable assistance to low income families for affordable housing. Your assignment is to design and produce design drawings for a three bedroom house totaling 1400 S.F. Beginning today, you should review the handout information accompanying this assignment and begin designing. This project is quick, and you are advised to carefully plan your production time to insure on time completion of this project. You are encouraged to limit the width of the residence to approximately 24 feet, and maintain a simple rectangular form to utilize trusses for roof construction, providing a roof with gables.

Architectural Program

Working in teams of three, design a one story, two bedroom, one bath residence with a single car garage for Habitat for Humanity of Murray, KY. The foundation should be a slab on grade. Your solution must include space for a hot water heater and an air conditioning system. Produce preliminary design work freehand. After approval of your design, you may progress to construction document production phase. Produce your work on "C" sized sheets using the AutoCAD template provided.

Required Drawings:

- ☐ Foundation Plan: Scale ¼" = 1'-0"
- ☐ Floor Plan: Scale ¼" = 1'-0" (Dimensioned, include room labels, door and window schedules)
- ☐ Electrical Plan: Scale ¼" = 1'-0"
- ☐ 4 Elevations (Front and Side): Scale ¼" = 1'-0"

☐ Building Section: Scale 1/8” = 1’-0”

☐ Details: ¾” = 1’-0” or ½” = 1’-0” (as is appropriate for your printing)

Your design may not deviate from the referenced square footage limit by more than 10%. Students are required to make full use of class time to develop and execute this project with instructor participation. Classes will be planned to cover design strategies and techniques, and methods for addressing this exercise. Projects will be formally presented in class on <DATE>.

Fig. 1: Habitat House Examples

Fig. 2: Habitat Houses During Construction

Fig. 3: Site Visit

Fig. 4: Students working

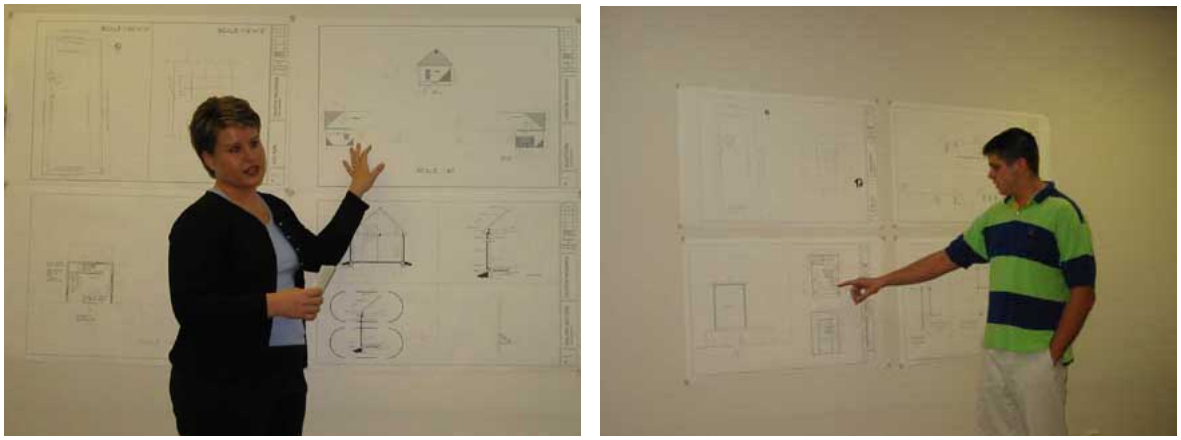

Fig. 5: Student Presentations and Projects

Conclusion

In conclusion, this research demonstrates to my satisfaction the importance of Problem-Based Learning as an important learning strategy. Probably PBL should not replace all pedagogy, but it should be considered as a viable teaching strategy in the development of critical thinking in students.

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Biography

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