# Effectiveness of Community Service in Enhancing Student Learning and Development

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Abstract

Since 1996, the Department of Construction Technology, Purdue School of Engineering and Technology, IUPUI, has been involved in a University-Community partnership, through a structured participation of students with community housing projects. In four years since it's inception, the partnership has had a significant and lasting impact on the communities and the students engaged in providing service to these communities. This paper suggests that community service presents a powerful pedagogy for enhancing student learning and development. The paper will attempt make specific recommendations on integrating service-learning into engineering-technology courses.

## I. Introduction

There is presently a paradigm shift in engineering-technology undergraduate education. Citing modern trends, such as a new global economy, and growth of information technology, the Engineering Deans Council and Business Round Table[1] issued a report asking engineering-technology educators to "re-examine their curricula and programs to ensure they prepare students for the broadened world of engineering work". Engineering Criteria 2000, the accreditation criteria established by Accreditation Board for Engineering and Technology (ABET), formalizes this process by requiring that engineering-technology programs be able to demonstrate that their graduates have, among other capabilities, an ability to function on multi-disciplinary terms, an understanding of professional and ethical responsibility, an ability to communicate effectively, the broad education necessary to understand the impact of engineering solutions in a global/societal context, and a knowledge of contemporary issues.

It is in meeting these challenges that service-learning distinguishes itself from other forms of experimental learning in engineering. Service-learning offers engineering-technology students an opportunity to practice engineering design and apply technology by engaging students in "activities that address human and community needs" and in so doing, afford an opportunity to demonstrate "an understanding of professional and ethical responsibility" and gain a "broader appreciation of education and self".

For almost two-decades, education researchers and practitioners have struggled to determine how best to characterize service-based learning, or simply *service-learning*. In 1979, Robert Sigmon

defined service-learning as an experimental education approach that is premised on "reciprocal learning"[2]. He suggested that learning flows from the service activities, both those who provide service and those who receive it "learn" from the experience.

There is no universal definition of the term "service learning". Consequently the concept is often misunderstood and at times erroneously used to describe a wide variety of experimental education endeavors from volunteer and community service projects to field studies. At the Indiana University-Purdue University Indianapolis (IUPUI), a faculty-student workshop in 1995, offered an uniform, unambiguous and a succinct definition for service-learning - as integrating students' community service experience with academic study so that learning is enhanced and a recognized community need is met. The idea is simple, and hence compelling – improve the quality of teaching/learning environment while fostering and enhancing student's sense of civic responsibility.

## II. History of Service-Learning in the Engineering-Technology Curriculum

Any definition of engineering would include "service to society" and/or "meeting societal needs" as a mission of the profession. In the 21st century, the challenges to engineers in using technology to meet societal needs and human aspirations are formidable, and yet the acceptance of service-learning in engineering-technology has been slow to come by.

There are two main reasons for this. Firstly, service-learning is a faculty-driven activity and from what we know about faculty is that they work in a culture defined largely by their disciplines. Is that to say then that the "culture" in most engineering and technology programs is one that is not accepting of community involvement? The answer unfortunately is a resounding "yes". There are currently almost 600 institutions across the United States, offering 11,800 separate service-learning courses in various academic and professional disciplines, but less than 3% of these courses are directly or indirectly related to engineering and technology[3].

This is not to say that engineering-technology courses do not utilize experimental education to enhance student learning. In fact, most engineering and technology professors value experiential education where students learn through the experience of applying the theoretical knowledge and skills gained in the classroom. Experiential education in engineering and technology curriculum takes many different forms, ranging from formal Internship/Co-op experience, design contests, project based courses, to laboratory experiences and field trips. Thus the second reason for the lack of service-learning based courses in engineering-technology is that with the number of proven pedagogical tools already available and in-use, engineering and technology faculty are not yet ready to give serious consideration to implementing service-learning in their curriculum.

## III. Integrating Community Service in Construction Technology Curriculum at IUPUI

Service learning activities were first initiated in 1996, through the involvement of the students in the three credit hour, senior course, CET 484: Principles of Wood and Timber Design, in a rehabilitation project in partnership with the Concord Community Development Corporation.

The CET 484 course forms the last of a four course “Design Sequence” required of students in the Department of Construction Technology, Purdue School of Engineering and Technology, IUPUI. The specific learning objectives of this course are to introduce students to: building loads utilizing prevailing codes; engineering properties and construction applications of wood & lumber; and fundamentals of structural analysis & design of wood structures. The main general learning objective of the course is to serve as a “capstone design experience”. In the past this objective was fulfilled through having students work on a *Design Project*, usually one out of the text book or from plans and specifications provided by local architectural firms. Students were generally ambivalent about the "Design Projects". Although continuity was stressed in the course and class time set aside over the course of the semester to work on the project, students would typically end up doing 90% of the work in the final 2 weeks of class. One of the ways to over come student apathy and ambivalence, it was felt would be by assigning a more "meaningful" project. Thus was born the idea of community-based projects.

In 1996, the Department of Construction Technology, IUPUI; and the Concord Community Development Corporation (CCDC), teamed up for an innovative undertaking in community partnership. During the first week of classes in fall ‘96, the students were escorted on a "walking-tour" of the Concord neighborhood and shown various properties that were scheduled for construction and/or rehabilitation. The property located at 1121 S. Senate Drive was chosen as the class project since the seventy year old, three-room house was located on a quiet, tree lined street, and once rehabilitated had a good market potential. The final design plans and specifications were submitted in November 1996 to Concord Community Board and presented by the students during a special community meeting. Bids were entertained from three different contractors and construction contract awarded in December 1996. Construction was financed through a "zero-interest loan" from NBD Bank through their *Community Reinvestment Act (CRA)* charter. The project was completed in June 1997. The feedback from the *formal* course evaluation indicated that:

- Students felt motivated and took “ownership” of their community project,
- Students enjoyed doing things that “give something back to the community”, and
- Students were able to achieve the connection between “theory” and “practice”.

The community partners namely the Concord Community Development Corporation (CCDC) and NBD Bank, were overwhelmingly supportive of the effort and expressed a strong desire to see the relationship continue in the future.

To date three such projects have been completed and the experience has served the students wonderfully. Equally important is the fact that 3 families have now a low-priced home that they can call their own. The following are some of the pictures from the student project at 128 W. Wisconsin Avenue, Indianapolis, Indiana, completed in June 1998.

Bolstered by the positive results from the CET 484 community-based service experiment in 1996, it was decided in the following year to extend the concept to additional courses within the curriculum. It just so happened that and ideal candidate had just materialized.

The course CNT 105: Introduction to Construction Technology was developed in 1997 by Prof. Gokhale under the First-Year Development Grant funded by the Office of Faculty Development, IUPUI.


128 W. Wisconsin

The primary objective of this three-credit, lab-based course is to expose the first year students, to the world of construction through classroom lectures; field trips, videos, and guest speakers. Additionally, the course emphasizes communication, critical thinking, and problem solving.

It was felt that the students in this course would benefit from a "hands-on" project. Therefore, the following year each student in the course was required to spend 8 hours working on residential project for the *Habitat for Humanity of Greater Indianapolis* during the course of the semester. The selection of the Habitat for Humanity was in keeping with the fact that typical Habitat projects are “fast paced” and despite the very limited time a student spends on the project he or she is exposed to various facets of construction. The specific learning objectives in this course targeted by service activities were:

- Achieving “breadth” of knowledge in the field of construction,
- Developing skills to understand, accept, and relate to people of different background, and
- Ability to think rationally, form informed opinions, and comprehend new ideas.

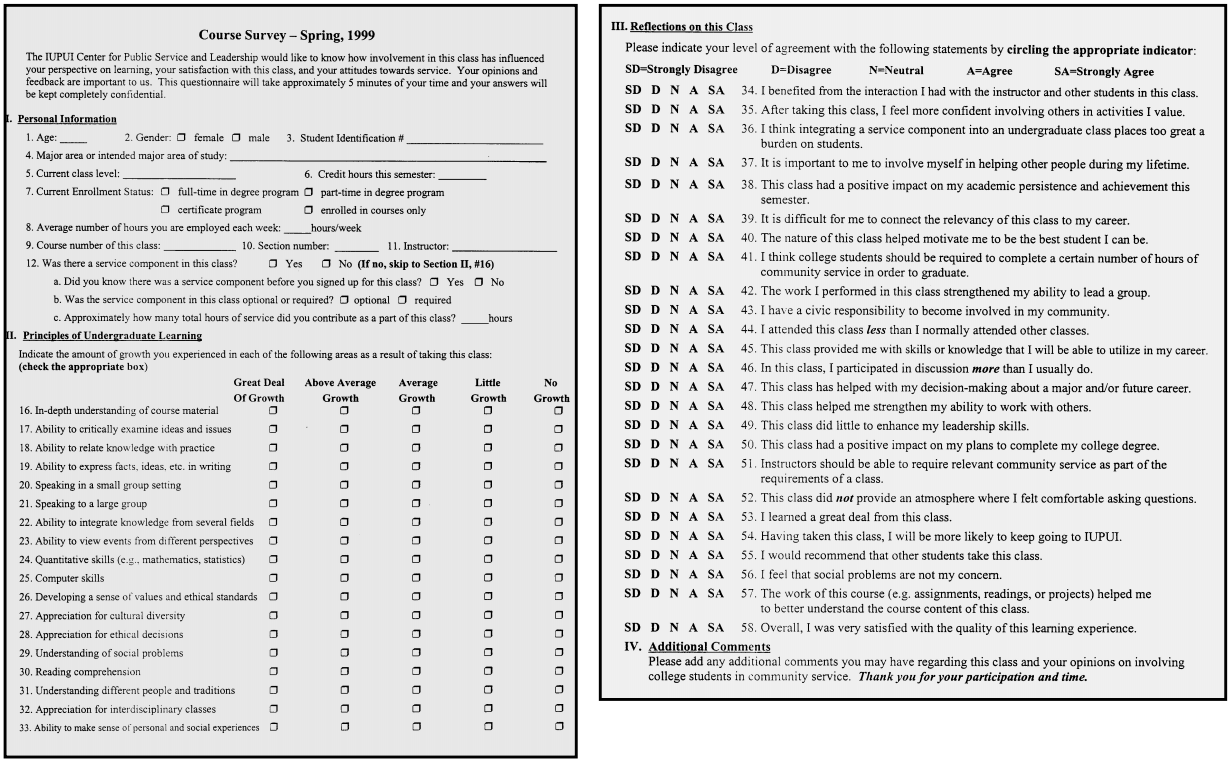
A particularly important aspect of any service learning course is the opportunity given to each student to “reflect” and thereby gain a significant understanding of the course content. Students in the CNT 105 course were required to submit a paper based on their experience. The paper asks the student to describe the activities they participated in, name and describe the backgrounds of the people they worked with, describe the problems they encountered, and to “reflect” on how they would go about “fixing” the problems. The following pictures are from a recent student project from the CNT 105 class.


Barrington Estates Project - Habitat for Humanity of Greater Indianapolis

IV. Assessment of Community-Based Service-Learning Activities

*CET 484: Principles of Wood & Timber Design* has been taught three years in a row since 1996. The semester-end evaluations consistently reflect that students are satisfied with the experience. However as to whether the experience resulted in "greater learning" or "better learning" is more difficult to ascertain. As to the students class performance or average grades, the difference between pre and post service-learning is so small as to be statistically insignificant. The true success of the course lies in the three completed projects now housing low-income families from the Concord Community.

With the *CNT 105: Introduction to Construction Technology* course a more concerned effort was made to document some of the benefits. In 1997 an attempt was made to assess the impact of service-learning on student "self-perception". Students were asked to fill out standardized tests to gauge self-esteem and self-confidence. The Office of Service Learning administered the following three standardized tests - Rosenberg, Texas Social Behavior Inventory and Self-Perceptions, to the students during the first class period and again in the fourteenth week (out of the sixteen week semester). In addition the students were required to fill out a comprehensive exit survey (shown below).



**Course Survey – Spring, 1999**

The IUPUI Center for Public Service and Leadership would like to know how involvement in this class has influenced your perspective on learning, your satisfaction with this class, and your attitudes towards service. Your opinions and feedback are important to us. This questionnaire will take approximately 5 minutes of your time and your answers will be kept completely confidential.

**I. Personal Information**

1. Age: _____ 2. Gender: ❒ female ❒ male 3. Student Identification # _____
4. Major area or intended major area of study: _____
5. Current class level: _____ 6. Credit hours this semester: _____
7. Current Enrollment Status: ❒ full-time in degree program ❒ part-time in degree program ❒ certificate program ❒ enrolled in courses only
8. Average number of hours you are employed each week: _____hours/week
9. Course number of this class: _____ 10. Section number: _____ 11. Instructor: _____
12. Was there a service component in this class? ❒ Yes ❒ No **(If no, skip to Section II, #16)**
   a. Did you know there was a service component before you signed up for this class? ❒ Yes ❒ No
   b. Was the service component in this class optional or required? ❒ optional ❒ required
   c. Approximately how many total hours of service did you contribute as a part of this class? _____hours

**II. Principles of Undergraduate Learning**

Indicate the amount of growth you experienced in each of the following areas as a result of taking this class: **(check the appropriate box)**

| | Great Deal Of Growth | Above Average Growth | Average Growth | Little Growth | No Growth |
|---|---|---|---|---|---|
| 16. In-depth understanding of course material | ❒ | ❒ | ❒ | ❒ | ❒ |
| 17. Ability to critically examine ideas and issues | ❒ | ❒ | ❒ | ❒ | ❒ |
| 18. Ability to relate knowledge with practice | ❒ | ❒ | ❒ | ❒ | ❒ |
| 19. Ability to express facts, ideas, etc. in writing | ❒ | ❒ | ❒ | ❒ | ❒ |
| 20. Speaking in a small group setting | ❒ | ❒ | ❒ | ❒ | ❒ |
| 21. Speaking to a large group | ❒ | ❒ | ❒ | ❒ | ❒ |
| 22. Ability to integrate knowledge from several fields | ❒ | ❒ | ❒ | ❒ | ❒ |
| 23. Ability to view events from different perspectives | ❒ | ❒ | ❒ | ❒ | ❒ |
| 24. Quantitative skills (e.g., mathematics, statistics) | ❒ | ❒ | ❒ | ❒ | ❒ |
| 25. Computer skills | ❒ | ❒ | ❒ | ❒ | ❒ |
| 26. Developing a sense of values and ethical standards | ❒ | ❒ | ❒ | ❒ | ❒ |
| 27. Appreciation for cultural diversity | ❒ | ❒ | ❒ | ❒ | ❒ |
| 28. Appreciation for ethical decisions | ❒ | ❒ | ❒ | ❒ | ❒ |
| 29. Understanding of social problems | ❒ | ❒ | ❒ | ❒ | ❒ |
| 30. Reading comprehension | ❒ | ❒ | ❒ | ❒ | ❒ |
| 31. Understanding different people and traditions | ❒ | ❒ | ❒ | ❒ | ❒ |
| 32. Appreciation for interdisciplinary classes | ❒ | ❒ | ❒ | ❒ | ❒ |
| 33. Ability to make sense of personal and social experiences | ❒ | ❒ | ❒ | ❒ | ❒ |

**III. Reflections on this Class**

Please indicate your level of agreement with the following statements by **circling the appropriate indicator**:

**SD=Strongly Disagree D=Disagree N=Neutral A=Agree SA=Strongly Agree**

**SD D N A SA** 34. I benefited from the interaction I had with the instructor and other students in this class.
**SD D N A SA** 35. After taking this class, I feel more confident involving others in activities I value.
**SD D N A SA** 36. I think integrating a service component into an undergraduate class places too great a burden on students.
**SD D N A SA** 37. It is important to me to involve myself in helping other people during my lifetime.
**SD D N A SA** 38. This class had a positive impact on my academic persistence and achievement this semester.
**SD D N A SA** 39. It is difficult for me to connect the relevancy of this class to my career.
**SD D N A SA** 40. The nature of this class helped motivate me to be the best student I can be.
**SD D N A SA** 41. I think college students should be required to complete a certain number of hours of community service in order to graduate.
**SD D N A SA** 42. The work I performed in this class strengthened my ability to lead a group.
**SD D N A SA** 43. I have a civic responsibility to become involved in my community.
**SD D N A SA** 44. I attended this class ***less*** than I normally attended other classes.
**SD D N A SA** 45. This class provided me with skills or knowledge that I will be able to utilize in my career.
**SD D N A SA** 46. In this class, I participated in discussion ***more*** than I usually do.
**SD D N A SA** 47. This class has helped with my decision-making about a major and/or future career.
**SD D N A SA** 48. This class helped me strengthen my ability to work with others.
**SD D N A SA** 49. This class did little to enhance my leadership skills.
**SD D N A SA** 50. This class had a positive impact on my plans to complete my college degree.
**SD D N A SA** 51. Instructors should be able to require relevant community service as part of the requirements of a class.
**SD D N A SA** 52. This class did ***not*** provide an atmosphere where I felt comfortable asking questions.
**SD D N A SA** 53. I learned a great deal from this class.
**SD D N A SA** 54. Having taken this class, I will be more likely to keep going to IUPUI.
**SD D N A SA** 55. I would recommend that other students take this class.
**SD D N A SA** 56. I feel that social problems are not my concern.
**SD D N A SA** 57. The work of this course (e.g. assignments, readings, or projects) helped me to better understand the course content of this class.
**SD D N A SA** 58. Overall, I was very satisfied with the quality of this learning experience.

**IV. Additional Comments**

Please add any additional comments you may have regarding this class and your opinions on involving college students in community service. ***Thank you for your participation and time.***

Student Survey Form - IUPUI Center for Public Service and Leadership

The scores were compared with other section of the same course, which did not utilize service-learning. The following scores were reported.

Table I
Test Scores of Students Pre-Service-Learning Experience

| PRE-Scores | Service-Learning | Non-Service |
|---|---|---|
| Rosenberg | 30.55 | 30.00 |
| Texas Social Beh. | 63.00 | 65.00 |
| Self-Perception | 90.00 | 91.50 |

Table II
Test Scores of Students Post-Service-Learning Experience

| POST-Scores | Service-Learning | Non-Service |
|---|---|---|
| Rosenberg | 35.72 | 31.00 |
| Texas Social Beh. | 71.20 | 67.00 |
| Self-Perception | 100.40 | 94.00 |

The maximum possible scores for the Rosenberg Self-esteem, Texas Social Behavior Inventory, and Self-Perceptions tests, are 40, 80, and 138 respectively. These scores are the clearest message thus far that "service-learning" has an impact on the self-confidence and self-esteem of the students engaged in service learning activities. The lingering question as to what impact, if any, does service learning have on "learning" remains unanswered.

In 1999, during the current offering of the course samples of student writing will be collected and analyzed to assess cognitive complexity and course performance on specific learning objectives. Course assignments on "Ethics" have been chosen for the purpose. A comparison of the scores from students in service-learning versus non-service learning will be discussed in a future report.

## V. A Blue-Print for Integrating the Pedagogy of Service-Learning

Some guiding principles can be useful as faculty consider adopting service-learning in their courses. Howard identifies 10 elements of best practices in service learning[4]. They are:

- Academic credit is for learning, not for service
- Do not compromise academic rigor
- Set learning goals for students
- Establish criteria for the selection of community service placements
- Provide educationally sound mechanism to harvest the community learning
- Minimize distinction between students' community learning role and classroom learning role
- Be prepared for uncertainty and variation in student learning outcomes
- Maximize community responsibility orientation of the course

Furthermore, in implementing service-learning into the engineering and technology curriculum one must consider the following steps[5]:

- Identify a community need that matches course learning objectives,
- Form partnerships
- Create and implement solutions
- Evaluate solutions for continuous improvement, and
- Encourage reflection.

Service learning offers engineering and technology professors a pedagogy that can help their students develop a sense of social awareness and citizenship to meet the challenges of the 21st Century. It is also a pedagogy that addresses a number of desired student learning outcomes described in the Engineering Criteria 2000. While service learning requires extra work on the part of the instructor, and the students, the rewards of seeing your students learn and develop civic awareness and a sense of citizenship while meeting real community needs are well worth the effort.

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