Service Learning in the Introductory Statistics Course: A Primer for Engagement

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ABSTRACT

At the most basic level, service-learning is a form of experiential education that uses service as its medium. It is a powerful experience that can be used to increase student engagement in the first year business statistics course as well as enhance the learning experience (Root and Thorme, 2001).

INTRODUCTION

The use of service learning as a means to enhance student learning is becoming more widely accepted in classrooms across higher education. As a result, service-learning has spread rapidly throughout the higher education community over the past several years. In a recent survey of its member institutions, Campus Compact, a national service-learning organization, found that among the 349 campuses that responded to the survey,

712,000 students had participated in some form of service-learning

12.2 percent of faculty were offering service-learning courses

6,272 service-learning courses were taught

9 percent required service-learning courses for graduation

The recently issued report, entitled "Learning in Deed" from the National Commission on Service-Learning (Fiske, 2001) quoted National Center for Education Statistics (NCES) estimates that in the 2000-2001 academic year, more than 13 million school students were involved in service and service-learning. NCES also found that between 1984 and 1997, the proportion of high school students participating in service-learning grew from 2 percent to 25 percent. This has encouraged a great deal of experimentation, discovery and adaptation at the post-secondary level, but it has also proved a significant challenge.

Despite broad and developing interest in the area of service-learning, very little of the literature has been directed to the use of service-learning in the introductory business statistics course. The introductory statistics course lends itself nicely to service learning. And thankfully, there is no shortage in business, industry, or the non-profit sector of opportunities to engage students in meaningful service-learning activities.

Yet, many business faculty are still reluctant to take scarce class time from lectures to have students do "community service." How can faculty in business schools become convinced that there are worthwhile learning outcomes obtained through service learning and that service learning is not synonymous with community service? Can faculty be persuaded that community-based projects enhance student understanding, use and value of descriptive statistics and inferential statistics?

This paper attempts to answer these questions by advocating the inclusion of service leaning components within a traditional business statistics course. Also offered are suggestions for incorporating service-learning into the first-year statistics course.

SERVICE LEARNING PRIMER

The American Association for Higher Education defines service-learning as "a method

under which students learn and develop through thoughtfully organized service that is conducted in and meets the needs of the community...is coordinated with an institution of higher education and with the community...helps foster civic responsibility...is integrated into and enhances the academic curriculum of the students enrolled...and includes structured time for students to reflect on the service experience." (Zlotkowski, 1999).

In *Service Matters*, Campus Compact outlines three basic characteristics of service-learning: meets a community need incorporates reflection and academic learning contributes to students interest in and understanding of community life. (Rothman, 1998).

In a national study of nearly 25,000 undergraduates, Astin (2000) found that nearly thirty percent of the students participated in course-based community service (service learning) during college, and an additional 46 percent participated in some other form of community service. The remaining 24 percent did not participate in any community service during college. The impact of service learning and community service was assessed on 11 different dependent measures: academic outcomes (three measures), values (two measures), self-efficacy, leadership (three measures), career plans, and plans to participate in further service after college. Most of these outcomes were pre-tested when the students entered college as freshmen.

Other major research findings included: Student participation in service learning shows significant positive effects on all 11 outcome measures: academic performance (GPA, writing skills, critical thinking skills), values (commitment to activism and to promoting racial understanding), self-efficacy, leadership (leadership activities, self-rated leadership ability, interpersonal skills), choice of a service career, and plans to participate in service after college. These findings directly replicate a number of recent studies using different samples and methodologies.

Benefits associated with course-based service were strongest for the academic outcomes, especially writing skills.

Both the quantitative and qualitative results suggest that providing students with an opportunity to process the service experience with each other is a powerful component of both community service and service learning. Compared to community service, taking a service-learning course is much more likely to generate such student-to-student discussions.

Better than eighty percent of the students surveyed, indicated that their service learning experience "made a difference" and that they were learning from their experience.

The single most important factor associated with a positive service-learning experience appears to be the student's degree of interest in the subject matter. Subject-matter interest is an especially important determinant of the extent to which (a) the service experience enhances understanding of the "academic" course material, and (b) the service is viewed as a learning experience.

These findings provide strong support for the notion that service learning should be included in the student's major field.

The second most significant factor in a positive service-learning experience is whether or not the professor encourages class discussion.

The frequency with which professors connect the service experience to the course subject matter is an especially important determinant of whether the academic material enhances the service experience, and whether the service experience facilitates understanding of the academic material.

Both qualitative and quantitative results underscore, once again, the power of reflection as a means of connecting the service experience to the academic course material. The primary forms of reflection used were discussions among students, discussions with professors, and written reflection in the form of journals and papers.

Both the qualitative and quantitative findings provide strong support for the notion that

service learning courses should be specifically designed to assist students in making connections between the service experience and the academic material.

The National Commission on Service-Learning (NCSL) in its recently issued report entitled "Learning in Deed: The Power of Service-Learning for American Schools," offers a definition of service-learning that incorporated the most essential features common to service-learning across the country. According to the Commission, service-learning is different from volunteerism in that it is "a teaching and learning approach that integrates community service with academic study to enrich learning, teach civic responsibility, and strengthen communities" (NCSL, 2002).

According to the National Commission on Service learning, service-learning:
Links to academic content and standards
Involves young people in helping to determine and meet real, defined community needs.

Is reciprocal in nature, benefiting both the community and the service providers by combining a service experience with a learning experience
Can be used in any subject area so long as it is appropriate to learning goal
Service-learning is *not*:
An episodic volunteer program
An add-on to an existing departmental or college curriculum
Logging a set number of community service hours in order to graduate
Compensatory service assigned as a form of punishment by the courts or by school administrators
One-sided: benefiting only students or only the community
The distinctive element of service-learning is that it enhances the community through the service provided, but it also has powerful learning consequences for the students or others participating in providing a service. Service-learning is growing so rapidly because we can see it is having a powerful impact on young people and their development. According to Eyler and Giles, "In the process, students link personal and social development with academic and cognitive development." They summarize their observations by saying that in the service-learning model, "experience enhances understanding; understanding leads to more effective action" (Eyler and Giles, 1999).

In general, authentic service-learning experiences have some common characteristics: They are positive, meaningful and real to the participants. They involve cooperative rather than competitive experiences and thus promote skills associated with teamwork and community involvement and citizenship. They address complex problems in complex settings rather than simplified problems in isolation. They offer opportunities to engage in problem-solving by requiring participants to gain knowledge of the specific context of their service-learning activity and community challenges, rather than only to draw upon generalized or abstract knowledge such as might come from a textbook. As a result, service-learning offers powerful opportunities to acquire the habits of critical thinking; i.e. the ability to identify the most important questions or issues within a real-world situation.

They promote deeper learning because the results are immediate and uncontrived. There are no "right answers" in the back of the book.

As a consequence of this immediacy of experience, service-learning is more likely to be personally meaningful to participants and to generate emotional consequences, to challenge values as well as ideas, and hence to support social, emotional and cognitive learning and development.
Even though there are many different interpretations of service-learning as well as different objectives and contexts, we can say that there is a core concept upon which all seem to agree:
Service-learning combines service objectives with learning objectives with the intent that the activity change both the recipient and the provider of the service. This is accomplished by combining service tasks with structured opportunities that link the task to self-reflection,

self-discovery, and the acquisition and comprehension of values, skills, and knowledge content. (Ibid, pg. 61-62).

Because of its connection to content acquisition and student development, service-learning can be nicely linked to college courses, and inspires departments and institutions to build strong partnerships with community-based organizations. Service-learning can also be organized and offered by community organizations with learning objectives or structured reflection activities for their participants. Whatever the setting, the core element of service-learning is always the intent that both providers and recipients find the experience beneficial, even transforming.

Getting Started with Service Learning in Business Statistics

Service learning projects can enhance a problem-based learning experience, as found in Rick Gordon's *Problem Based Service Learning* (Gordon, 2000). With this model, students generally work in teams to solve a real community-based problem. Student learning outcomes are clearly defined, the community problem and partners clearly relate to the course, the students are challenged with an activity that directly relates to the learning outcomes and that results in a product for the community client partner, the students are prepared for the activity with appropriate training/skill building, and reflection is employed on an on-going basis. The problem is, where does the time come from to enable projects of this form to be undertaken?

Like all meaningful curricular enhancements, integrating service learning projects into the delivery of the introductory statistics course takes thought and time. As with other core business courses, statistics instructors are compelled to cover the required material so as to allow students to fulfill the prerequisite nature of the statistics course. Especially at institution that require only one business statistics course, class time is very valuable so any project must have significant meaning to all stakeholders.

PROJECT CHARACTERISTICS

So, what are the characteristics that a statistics instructor should look for in a project? First and foremost a project must be both meaningful and manageable. The project must involve a problem that has some significance, matched with a project that can be successfully managed in 8-10 weeks (assuming a 15 week semester). Students will need sufficient background, both in terms of the point to a service learning project and statistics, necessary for successful completion. The level of background needed will not be available until several weeks into the semester.

Second, a project must be sufficiently broad enough to hold the interest of students. The project needs to combine whatever statistics have been learned in the introductory stats course with a problem students can readily identify as important to solve. If students think the problem has been "created" the experience will be limited. Develop projects one semester in advance (planning is key) – make certain that project will contain data for meaningful and appropriate statistical analysis (first semester students are not going to be able to conduct multivariate regression, discriminate analysis, or other more robust and advanced statistical methods).

During the planning stages, have representatives from the involved business or community group meet with the students to explain the project and why it is important to the company. Have students provide those individuals with periodic written project "briefings". Students should be asked to present project findings to the business or group representative at the end of project period (formal presentation). This requirement will lend a sense of importance to the entire project.

At the end of the semester, debrief the service learning experiences with all parties involved. Critique the experience and assess the project learning outcomes. Ask student what they believe that they have learned from the project

as well as how they think the process could be improved.

Students may also use the project to reflect on their personal and career interests in economics, finance, marketing, accounting or other related business disciplines. In this way, all of the parties involved can see that service-learning combines *service* with *learning* in intentional ways.

Be sure to provide students with other illustrations of how the combination or service with learning is transforming to both community and students. This is not to say that volunteer activities without a learning component are less important than service-learning, but that the two approaches are fundamentally different activities with different objectives.

EXAMPLES OF SERVICE LEARNING PROJECTS WITH INTRODUCTORY STATISTICS

For a project in an economics course at the University of Kentucky, students were divided into small groups and each group was required to find some interesting question that could be answered with the aid of statistical tools presented during the semester. Each group had to determine a service-learning route which would provide answers meaningful to a particular non-profit organization in the Lexington community. One group analyzed the factors determining how much food in a given food pantry should allocate to different counties in Kentucky. Another group analyzed why charitable revenue generated by Big Brothers/Big Sisters of Kentucky varies sharply by county.

For projects in an introductory statistics course at the University of Southern Indiana, students have worked on a variety of projects for local business and industry, including:

* A rider satisfaction survey for the metropolitan transit

* A customer satisfaction survey for a local private dining club
* A study of personnel turnover in the local tool and die industry
* An analysis of local workforce development trends
* An economic impact study of the local zoo and botanic garden
* An economic impact study of the local children's museum

Benefits of Service Learning in Business Statistics

Service learning provides each stakeholder in the learning process with significant benefits. Business statistics students benefit from a service learning experience because service learning enriches student learning of course material by moving students from the margin of the classroom experience to the center. *"It brings statistics to life and life to statistics"* (Harrington, personal correspondence, 2003). Students come to see that statistics has an application beyond the text examples and they come to see the relevance and importance of statistical analysis in their real life experiences.

Because statistical service learning projects involve "real" community-based projects, the project enhances students' self esteem and sense of disciplinary competency by allowing them to "make a difference" through active and meaningful contribution to business and industry. Involvement in a reality-based project will broaden the student's perspectives and enhances critical thinking skills. And, because it engages the student with people outside the classroom, the service learning project improves interpersonal and human relation skills, which are increasingly viewed as the most important skills in achieving success in professional and personal spheres.

Business statistics faculty benefit because service learning enriches and enlivens the teaching of statistics. The service learning project *changes* the faculty's role from the 'expert on top to the expert on tap', and with that change, faculty can enjoy a new relationship with students and a new understanding of how learning occurs. And, as a result of the relationships necessary to

develop the project in the first place, faculty are forced to connect the business community with the curriculum, they become increasingly aware of current economic and business issues as they relate to academic areas of interest. Faculty can also identify new areas of research and publication, and thus increase opportunities for professional recognition and reward.

Local business, industry and community organizations also will benefit from service learning projects. Service Learning initiatives provide business, industry and community organizations with substantial human resources to meet its research, human, safety, and environmental needs. The talent, energy, and enthusiasm of college students are applied to meet these ever increasing needs. Service learning projects can also create a strong spirit of civic responsibility that replaces the current state of dependence on government economic and workforce development programs. Business, industry and community organizations also gain opportunities to participate in educational partnerships with the local university. These types of partnerships can pay significant future rewards beyond the initial involvement.

Service learning projects provide the university with better equipped graduates with core competencies for professional and social development. Better alumni make better employees for business thus enhancing the university's reputation. Improved university image can lead to further improvements in the quality of future applicants. Service learning also provides a mechanism for the college to provide service to business and industry in response to identified community needs. Projects can lead to true partnerships between business, industry, community groups and the university.

CONCLUSION

The integration of service learning as a pedagogical component in the introductory statistics course can yield significant and meaningful results for both student and instructor alike. If planned carefully, service learning experiences can provide students with opportunities to see the marriage between statistics theory and practice, strengthening the learning experience and deepening their understanding of and appreciate for statistics as a tool for informed decision making. The community, businesses, or industry are secondary, yet important beneficiaries of this approach to teaching. They are provided an opportunity to utilize the resident statistical expertise of college or university faculty, as well as to provide an important opportunity for students to see, first hand, their operations. Initial service learning experiences can provide suitable entry for future (and longer) internship and co-op experiences.

Incorporating service learning into the curriculum also ensures curricular currency and coherency, as students utilize the same statistical and data analysis tools used in business. Aligning the business statistics curriculum with the required current and emerging workforce statistical competencies will benefit institutional program graduates, many of whom will be entering the local workforce.

Finally service learning provides students with an all too raw a commodity in their education, the opportunity to think, to integrate, to reflect on their lives and the world around them. Higher education has embraced the concept of service learning in general. The business statistics classroom provides an exceptional opportunity for further expansion.

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