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Experiential Service Learning Using Real Client Projects in a Capstone IT Course

ABSTRACT

Senior students in an information technology (IT) program at a university in southeastern United States participate in a capstone project management course to graduate. Student teams develop and manage information technology-related service learning projects for community partners who have needs for IT products such as websites, databases, computer training, etc. In spring 2008, one capstone team initiated an innovative service learning project working with students from another IT training and development course to deliver PC training for senior residents of one community partner. This community partner was so impressed that they requested an ongoing training project rather than a single five-week course each semester. This paper reports on the results to date of an action research study to explore expanding the capstone projects using alternative service learning training scenarios, implementing increased experiential learning and reflective practices, and formally evaluating student learning outcomes.

Keywords

Capstone IT course, IT project management, service learning, experiential learning, real world IT issues, action research.

INTRODUCTION

Senior students in an information technology program at a university in southeastern United States must complete a capstone project management course for graduation. Student teams develop and manage information technology-related service learning projects for community partners who have needs for information technology products such as websites, databases, computer training, etc. We consider this capstone course to also be a service learning program because it gives our students the “opportunity to enhance and enrich” their educational objectives by “extending the learning environment and engaging the students in experiential learning” (Gale, Crews, and North, 2007, p. 1). Over the last four years, we’ve introduced service learning projects into four additional courses, which provide “experiential learning where students and faculty collaborate with communities to address problems and issues simultaneously gaining knowledge and skills and advancing personal development” (Bounous, 1997, p. 5). During this time, our service learning projects were course specific, although some of our projects included the same community partner.

In spring 2008, one capstone project team initiated an innovative service learning project working with students from another IT corporate training and development class to deliver PC training for senior residents of one community project partner. This student project team organized a five-week introductory PC training program for the senior residents that involved acquiring the computers, organizing and delivering the training, and involving students from the corporate training and development course to deliver and support the PC training. Our community partner’s long term goal for PC training was to build its residents’ knowledge and capabilities so that the senior residents could eventually take online courses. Our community partner was so impressed with the success of this collaborative student training project that they requested an ongoing training program rather than a single five-week course each semester.

At the time, our semester course structure did not allow us to satisfy our community partner’s longer-term needs. Therefore, during the summer and fall 2008 semesters, we initiated an action research project to explore alternative service learning approaches and expand on the experience of this collaborated approach with our capstone and training students as they continued participation in the joint project. The purpose of this research was to study the conditions and effects of these

alternative service learning approaches and to evaluate student learning outcomes and the satisfaction of the community partner from the expanded service learning approaches within the fall 2008 and spring 2009 collaborative capstone project.

This paper reports on the results to date from this research study. The first section of this paper provides a description of our IT program, the capstone IT project management course, and the IT corporate development and delivery training course. The next section describes the motivation for this study, which was to meet expanding community partner needs through alternative service learning practices and to evaluate the benefits of the collaborative service learning IT project on student learning outcomes. It describes the structure of the service learning activities and instructional strategies for implementing the service learning project under study as well as the individual course expected learning outcomes. The next section describes the action research method used to collect data and analyze the results of the project. Finally, we discuss the results to date including short term impacts on the students and community partner and long-term impacts and implications on our IT curriculum. We expect the findings from this action research project to contribute to the areas of business education, service learning, and capstone IT project management by linking experiential service learning and capstone IT project management courses, assessing a coordinated cross course collaborative model as another type of service learning project, and improving the course delivery and student learning outcomes.

BACKGROUND

The IT program at this southeastern United States university focuses on hands-on IT coursework to meet business needs. This section describes this program and includes details about the senior capstone project management course and the corporate development and training course. Students in this IT program receive in-depth background in five major IT areas. These areas include computer networking, database systems, web development and design, corporate training and development, and end-user support, plus work in project management. All IT students must complete a capstone project management course that incorporates all five core areas to maximize their learning experience. In this capstone course, student teams work with a real business or non-profit organization as a service learning community partner, solve actual business needs or issues, and design and implement the needed information technology systems or technology. The program places emphasis on technology-based decision making and information management skills in dynamic business environments.

Student research and leadership are incorporated into the capstone service learning IT projects when the students first learn and then apply the Project Management Institute's (PMI) *Project Management Body of Knowledge's (PMBOK® Guide, 2004)* standard practices for IT projects. Students also join the local chapter of PMI where they meet and work with professional IT project managers. Each team must solve the community partner's business problem by implementing either an existing or an emerging technology. They must research the available or potential technologies, select the best one that fits the problem, design, and then implement it.

Within the IT curriculum, the training sequence includes two courses. The first is a survey corporate training and development course in which students explore strategic training within organizations, review key adult learning and instructional design theories, and apply these theories to the needs assessment, design, delivery, and evaluation of technology-related training. The second course in the training systems sequence continues developing the core training and learning concepts. It also explores ways that students can demonstrate their skills and competencies in designing, implementing, and evaluating training and training systems.

MOTIVATION

Our IT faculty members collaborate with community partners to develop experiential service learning community-based opportunities for individual IT courses within the curriculum. Students gain knowledge and skills while addressing community partners' IT problems and issues. The service learning projects were course specific, however, although some of the projects included the same community partner. It became obvious from the success of the collaborative capstone student initiative to involve students from another IT course to participate in their project, that the potential benefits of structured and collaborative service learning projects would increase the community partner satisfaction, the student learning outcomes, and the potential success of the IT graduates. As a result, we realized that there was a need to determine if new service learning approaches within the capstone IT project could be improved by involving students from other courses. The issues included:

- Determining how to replicate the success of the collaborative approach during one semester project into the ongoing program.
- Explore alternative service learning scenarios to identify a range of service learning approaches that could be met within a semester-based project, when community partners had needs for ongoing programs rather than projects.

- Evaluate how service learning programs using real community partners and their specific IT business needs contribute to the learning outcomes of the students.

The following describes the concepts being explored and the potential impacts on our IT capstone project management course. A review of service learning literature included definitions, how service learning works, and the importance of student reflection. A review of the assessment and evaluation literature describes the reasons for doing assessment, benefits to the students, community, and university program, and development of the course programs.

Community Partners Gain from Service Learning Projects

Service learning is considered learning by doing where two sets of participants gain. Students gain by experiencing and then reflecting on that experience. The community partners gain because the students perform meaningful and authentic work is completed providing solutions and service meeting their needs. Berman (2006) explained that “students learn course content, processes, and skills, strengthening their thinking skills as they develop empathy, personal ethics, and the habit of helping their communities” (p. xxi). Success from the capstone projects led us to realize that perhaps alternative service learning approaches should be considered when our semester course structure did not allow us to satisfy our community partner’s longer-term needs for some form of ongoing senior PC training rather than a single five week workshop twice a year.

- Service learning is defined by the National and Community Service Act of 1990 (Waterman, 1997) as a method where:
- Students learn and develop through active participation in service experiences that meet real community needs, collaboratively coordinated with the community partner and the course professors.
- Students are provided structured time to think, talk, or write about what the student did and saw during the actual activity.
- Structured opportunities for community partnerships are integrated into students’ academic curriculum.
- Students have opportunities to use newly acquired skills and knowledge in real-life situations in their own communities.
- Classroom teachings enhance student learning beyond the classroom, while also developing a sense of caring for others.

Service learning projects tie academic content and theory in practical ways to the reality of life outside the classroom (Smith, B. H., Swick, K., Friend, C., Mason, J., Bolton, C., Heider, K., and Graybill, C. 2007). However, empirical evidence on the impact of service learning on projects and student learning is mixed or non-existent. While faculty and administrators are interested in the relationship between service learning and academic learning outcomes, little evidence that service learning enhances or furthers academic learning outcomes exists (Giles and Eyler, 1998). There is evidence that service learning does enhance students’ academic development, life skill development, and sense of civic responsibility and impacts students’ attitudes, values, skills, and they way they think about social issues (Eyler, Giles, and Braxton, 1997). Other researchers report on the beneficial effects of service-learning (Henson and Sutliff, 1998; Rhoads, 1998; Rice and Brown, 1998). The mixed results of existing studies indicate that more research is needed to determine best practices for integrating service learning activities into undergraduate curriculum.

One limited area in the literature is the use of capstone projects in service learning and especially IT projects. Wei, Siow, and Burley (2007) conducted a comprehensive literature review of service learning within IT projects. They identified only a few articles applying service learning concepts to IT education (Johnson and Johnson, 2005; Guthrie and Navarrete, 2004; Wilcox and Sigurs, 2003; and Lazar and Preece, 1999).

Expansion of Experiential Service Learning and Reflective Practices

In a study by Eyler and Giles (1999), they found that students describe a much richer learning experience when engaged in real world, service learning projects. Students say they learn more because they are more curious and more effectively engaged in the problems of the community. They remember more and can use the knowledge and skills more readily. Because the service learning experience is based on real, personal relationships where students are doing real work that can make a difference in people’s lives, they feel that doing real work is a powerful experience.

Reflection is a critical component in the success of service learning (Mintz and Hesser, 1996). When students are reflecting on the connections among their service learning activities, course content, and theoretical perspectives, they gain a greater

understanding of how to apply their new knowledge and skills in the real world (Eyler and Giles, 1999). Berman (2006) points out that opportunities for reflection allow students to revisit the service learning experiences, fit the various pieces of the project together, and identify areas for personal change and growth. Authentic situations, caring about others, and important work generate questions (Eyler and Giles, 1999). Reflective writing can help to generate these questions and bring them back into the classroom.

Assessment and Evaluation of the Program and Student Benefits

Berman (2006) explains the importance of developing a thorough evaluation plan in order to identify and demonstrate how the course helps the students and the community partner obtain the expected benefits. Shumer (1998) explained a number of reasons why an evaluation process is important to insure that the program is structured correctly. An effective assessment involves the students, community partner, as well as the university professors. For example, students evaluate the community impacts of their service activities and their own learning. Community partners evaluate the performance of the students and the impact of service on the community need. Professors evaluate if the students are learning the appropriate skills, information, and concepts from the service activity and if the service learning method as an instructional strategy is effective.

Berman (2006) described categories of benefits that occur including student content learning, personal development, and cognitive skill development. Students will also gain valuable community connections and life skills. Waterman (1997) defined four broad categories of benefits from student involvement in service learning:

1. Enhancement in the learning of material that is part of the traditional in-school curriculum,
2. Promoting personal development,
3. Fostering the development of civic responsibility and other values of citizenship, and
4. Benefits accruing to the community.

Research Question

The initiative taken by students during the spring 2008 semester started us on a path to learn why the spring project was so successful and how that success could be replicated in other service learning capstone projects. We also wanted to learn how we could improve our current program to meet the changing needs of existing and potential community partners. The following describes the research question we are exploring:

How will the introduction of alternative service learning approaches and reflective practices into the capstone project management course improve the experiential learning outcomes and satisfaction of the community partners?

ACTION RESEARCH METHOD

Buchen (1998) described an action research framework for constructing and evaluating projects such as the collaborative course service learning project for PC training for senior residential citizens. Action research as a discovery process was selected as the best approach to meet the initial goals of the study: (1) learning why the spring project was so successful and how that success could be replicated in other service learning capstone projects, and (2) determining how we could use that knowledge to improve our current program as well as to meet the changing needs of existing and potential community partners. The action research process includes developing the research topic, the research design, the data collection and analysis, the findings and conclusions, and communications and dissemination of the project findings (Buchen, 1998). The following describes the process used for this research study.

- *Research topic* – The purpose of this research is to study the potential benefits of a collaborative service learning project to meet the expanded needs of one community partner through alternative service learning practices, to improve the learning outcomes of our students, and to improve the academic aspects of the IT program's capstone and training systems courses.
- *Research design* – A baseline set of data was developed using project data from the capstone project management courses over the last four years and collecting specific student knowledge, skills, and attitudes from the two collaborative projects during spring 2008 and fall 2008. A pre-test, adapted from Eyler and Giles (1999), was given to students in both the project management and training systems courses to assess previous experiences and beliefs about service learning activities, beginning skills and abilities, and perceptions about self. The post-test, also adapted from Eyler and Giles (1999), was given at the end of both semesters to assess the current service learning

experience, including perceptions about what was learned, how learning occurred, the value of community-based service-learning, skills and abilities, and self. This before and after results of the survey for these two courses became the baseline measurement of expected learning outcomes. This cooperative joint project and data collection continues during the spring 2009 semester.

- *Data collection and analysis* – The study is using data collection techniques including interviews, observations, student status reports and logs, and questionnaires. At the end of the spring 2009 semester, we plan to add interviews of key individuals from our community partner including the senior residents who have received specific training in the past projects and during the current semester. We plan to systematically analyze the data using both statistical analysis and qualitative story-telling.
- *Findings and conclusions* – Because the action research method is an inquiry process, we plan to use the research findings and implications to develop future research questions. We also plan to use the study findings to continue to improve our IT program capstone and training systems courses as well as our technology curriculum by integrating a service learning element into all of the IT courses.
- *Communications and dissemination* – We expect to be able to report preliminary findings during the August presentation of this research. We eventually plan to publish the findings through related conference journals.

Project Objectives and Student Learning Outcomes

As mentioned earlier, the motivation for this study was to learn why the spring 2008 project was so successful and how that success could be replicated in other service learning capstone projects. It also was to determine how to use that knowledge to improve our current program as well as to meet the changing needs of existing and potential community partners. The objectives of this action research study are:

1. Evaluate our current course strategies and the learning experience and performance of our students.
2. Improve the design and delivery of our current IT capstone project management course and our IT corporate training and development course to explore alternative service learning approaches that better work with our community partner to meet its changing need for ongoing student support.
3. Measure the learning outcomes and performance of our IT students in the targeted courses.
4. Adapt the results of evaluating the experience of the previous coordinated joint approach, the joint course strategy to other IT courses

IT Course Learning Outcomes

Through course outcomes and feedback from student and community partners from previous IT courses with service learning components, we learned that early student experiences with service learning opportunities enabled students to be more innovative and creative and to develop leadership skills. This prepares the IT students to better meet the needs of the new global economy. Nambisan (2005) described how the rapidly changing global economy and the emergence of global networks challenges the ability of university programs to prepare future technologists who are able to develop innovative technical solutions besides developing narrow sets of technical skills (Nambisan, 2005).

The IT course learning outcomes are designed to provide students with hands-on, real world experience in the five major IT areas of networking, database systems, corporate training and development, web development and design, and end-user support. The project management course, as the capstone course, ties all these skill areas together for students. Overall, the program places emphasis on technology-based decision making and information management skills in dynamic business environments.

The learning outcomes of the capstone project management students completing the collaborative capstone IT service learning project under study are:

- Organize the information technology project, and work effectively as a project team;
- Collect the community partner's needs, conduct a needs analysis, and convert the needs into requirements;
- Develop project scope and detailed plan and schedule;
- Apply project scheduling methods and use project management software systems;
- Estimate costs for the project;

- Communicate professionally in oral and written means; and
- Assess project risk and success.

The learning outcomes of the corporate training and development students completing the cooperative joint capstone IT service learning project under study are:

- Design Activities –
 - Understand how and why to create and conduct a needs assessment;
 - Create a needs assessment survey tailored for the community partner;
 - Apply adult learning and other learning theories to the design of technology training;
 - Develop necessary materials appropriate for the learners;
- Training Activities –
 - Conduct training using appropriate technology systems and tools;
 - Reflect on individual training sessions; and
 - Adjust training activities as necessary.

DATA COLLECTION, ANALYSIS, AND RESULTS TO DATE

To increase the benefits of the experiential learning based on the recommendations from the literature review, we’ve introduced reflection activities into the capstone project being studied. In this project, student reflections vary between the two classes. Reflection activities include written and verbal weekly status reports, verbal reflection during team meetings, monthly individual written reflections, and written feedback and reflection through the peer review process at the end of the project. Each student in the project management course also prepares an individual reflective journal over the length of the project. Data from these reflections is used to analyze the importance of the learning outcomes from the student perspective.

A variety of assessment and evaluation tools are also being used to determine the student grades in the project management course including periodic reviews of interim project assignments, a final report, the primary community partner’s project evaluation and report, and peer feedback about individual and group performance and effort. The following checklist for evaluating the student delivery of services was adapted from Berman (2006):

Observable Indicators	Very good - 5	So-so - 3	Poor - 0
Comes to project site prepared			
Focuses on the day’s task			
Is on site the majority of work time			
Listens to team members attentively and actively			
Keeps detailed log as necessary			
Helps with the task, does fair share			
Encourages team members to persist			
Invites team members to participate			
Celebrates success with team members			
Table 1 Evaluation Checklist for Joint Service Learning Fall 2008 / Spring 2009 Project			

Adapted from Berman, 2006, p. 189.

We are also using the following guide, adapted from Berman (2006), to assess the student benefits in the service learning project. Both project management and training systems students are being assessed each semester. As we continue the analysis during the study, we expect to refine the specific assessment tools and study findings.

Type of Benefit	Specific Benefit	Assessment Tool Study Findings
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Content learning	<ul style="list-style-type: none"> - In-context learning - Enhance learning in breadth and depth - More enduring learning - Transfer of learning to new situations. 	
Personal development	<ul style="list-style-type: none"> - Perception of self as service giver - Enhanced willingness to take risks - Openness to new people and experience - Leadership, communications, and teamwork skills - Exposure to and acceptance of different society groups - More empathy – less judging. 	
Cognitive skills	<ul style="list-style-type: none"> - Deepened understanding of concepts - Enhanced transfer of learning - Brainstorming - Problem solving. 	
Community connections	<ul style="list-style-type: none"> - Awareness of community problems - Awareness of service organizations - Enhanced civic responsibility. 	
Life skills	<ul style="list-style-type: none"> - Knowing when to ask for help - Knowing when to offer help - Knowing how to find help - Finishing a job that is started - Following rules and directions - Promoting personal safety - Self-evaluating - Deferring gratification - Communicating clearly and precisely. 	
Table 2 Benefit Assessment for Joint Service Learning Fall 2008 Project		

Adapted from Berman, 2006, Figure 0.1, p. xxviii.

CONTRIBUTIONS

We expect the findings from this action research project to contribute to the areas of business education, service learning, and capstone IT project management in the following ways:

- First, this project links service learning and the undergraduate IT curriculum together.
- Second, assessment of the coordinated cross course collaborative model will add another possible curricular implementation for service learning projects in applied IT courses.
- Third, findings will be shared on the effectiveness of the cross course collaboration model on addressing one community partner’s ongoing needs. Results may have implications for faculty and administrators of capstone IT programs on changing the structure of courses when working long-term with community partners.

We expect to present the preliminary results after analyzing the data collected from the fall 2008 and spring 2009 collaborative capstone project courses during results-to-date of this action research study will be presented at the 2009 AMCIS conference in San Francisco in August.

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