

A Consulting Model of Global Service Learning

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ABSTRACT

Service Learning is increasingly common in collegiate Computer Science and Information Systems curricula. Typically students work in real-world situations, applying their skills to address authentic community needs. Students' reports of learning benefits and positive feelings about their experiences are well recorded in the literature on service learning. The value of project outcomes to the community partner are often assumed and less commonly assessed. Recent research indicates that partner outcomes may often be less than satisfactory, and in fact, even detrimental when students execute 'one off' projects requiring resources, skills and maintenance that community partners may not be able to provide. This report describes a consulting model of service learning that highlights sustainable solutions as a key objective. Results from repeated service learning engagements with a global partner organization illustrate application of the consulting model.

Keywords

Service Learning, consulting model, sustainable development, global development, IS education, project course, capstone

INTRODUCTION

The National Service-Learning Clearinghouse defines Service-Learning as "a teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities (National Service Learning Clearinghouse, n.d)." It combines student learning and service to the community within the structure of a supervised educational experience.

An increasing body of literature documents academic experiences in service learning in the computing and CS/IS/IT fields. Numerous conference presentations, books and articles describe the popularity and wide range of student and community partner experiences, educational designs and outcomes. For one recent volume of experiences and research findings, see Nejmeh (2012).

When done well, service learning has the potential to enrich student learning in ambiguous real world environments. Student reports of increased confidence, development of technical skills, sense of satisfaction and appreciation for the needs of their partner organizations are frequently reported outcomes. For examples of recent findings, see Homkes (2008) or Connolly (2012). Student reflections, assessment of deliverables, surveys of skills and personal development can be used to substantiate the impact of service learning experience.

Delivery of tangible benefit to partner organizations is also generally an expected outcome of service learning engagements. Providing lasting value to community partners should, in practice, be a key objective of any serious engagement. However, as Connolly (2012) and others suggest (see, for example, Brooks (2008)), the needs, concerns and ultimate outcomes for community partners are often overlooked or forgotten. Solutions that are incomplete, poorly implemented, poorly documented, inappropriate to the problem at hand or simply unsustainable may provide little or no value to community partners. In fact, as Connolly (2012) suggests, these solutions may actually be detrimental to partner organizations.

There is significant risk, therefore, that benefits to ICT service learning projects are asymmetric; students generally report significant benefits from the experience, but community based partners may, in fact, find the experience expensive, risky, and potentially harmful to their missions, organizations and employees. Many community partners simply do not have the resources to finish incomplete projects, sustain or maintain complex software or systems, or perform needed application or server administration. Assessment and long-term follow-up with clients has not been well reported (Thompson and Jesiek, 2011).

ICT service learning projects often involve short life cycles from project inception through ultimate delivery and deployment. Meeting partner expectations for quality, completeness and suitability of solutions is a challenge in all software development projects and is magnified in service learning projects by the tight time schedule imposed by the academic calendar.

Final deliverables may be incomplete, defect-ridden, ill-designed, poorly implemented, inadequately tested and poorly documented. Key functional and nonfunctional requirements may be poorly realized, misunderstood or not implemented. In spite of everyone's good intentions, the value to community partners may ultimately be missing. Clearly, attention to ultimate partner capabilities, needs, capacity and ability to sustain technology deliverables is critical to the success of ICT service learning initiatives.

The lack of tangible value for community partners from service learning projects may naturally follow from the objectives and incentives that guide students. Faculty teaching ICT service learning project courses often expect students to demonstrate their knowledge and skills in building a software system or implementing some specific technology as a solution. It is straightforward for faculty to use the apparent quality of the students' system as a major portion of their project grade. And, correspondingly, students' default understanding is that they are being assessed on the quality of their application or system. Thus, typical academic objectives and incentives may subtly draw students' focus to the project or the technology, and less to the real needs of the community partner.

To address this problem, we have been developing, evaluating, and revising an alternative approach to service learning intended to provide sustainable value to our community partners. By creating engagements that are partner and process centered, instead of student and product centered, we increase the benefit to the partners while maintaining the quality educational experience to the students.

The purpose of this paper is to explain this alternative service-learning approach and describe what we have learned from the over hundreds of engagements we have had in our local community and globally. We have experimented with service learning models that help build community partners' sustainable capacity to solve problems, and seeing ICT as part of a solution, rather than focusing on delivering an ICT system intended to solve a problem. Building capacity involves working closely *with*, not *for*, partners to develop in-house knowledge and capabilities. Projects are seen throughout as joint efforts, with the partner's ability to sustain the solution as the primary engagement goal. Dependence upon student consultants to provide 'hard' deliverables is accompanied with planning for how any process enhancements or systems will be sustained: either by partner organization personnel directly, or by allocating resources to purchase follow-on expertise if needed. In this light, ICT service-learning projects may be structured to resemble professional consulting engagements -- students are assessed on understanding their client's situation, communicating well, matching solutions to client capacity and resources, and solving the complete problem.

A CONSULTING MODEL OF SERVICE LEARNING

Our service-learning consulting model is informed by Schein's process consulting model (Schein, 1988), participatory methods (Cornwall and Jewkes, 1995), and adapted to fit into a 10-week timeframe. Schein describes the three general models of consulting: doctor-patient, purchase of expertise, and the model we borrow most directly from, process consulting. Unlike the other two, process consulting is not only about delivering solutions. Rather, it is a process of working *with* the client to better understand the problem, then to co-design and implement a solution that the client owns, understands, and can sustain. Our consulting model is a mix of collegial and collaborative participation. It is collegial in that the students and their community partners work closely together on the client's project as colleagues with different skills. It is collaborative in that the engagement is not totally open-ended, but rather part of a university course that prescribes the consulting process, timeline, and the focus.

We have used our consulting model of service learning to realign priorities. "Consulting" keeps the client in the forefront. As ICT consultants, students are tasked to help community partner organizations better meet their missions using information technology. Students are expected to manage the community partner relationship, to broadly understand partner needs and constraints, to learn from their partners where they find problems in being effective, and to propose and implement solutions with, but not for, their partners. Understanding community partner capabilities, requirements, limitations, and available resources should be built into every project. Partner capacity building and sustainability of solutions should be central to any engagement. Ideally, students should make every effort to deliver tangible value that can endure beyond the end of the engagement. Most students find the consulting role easy to understand and implement; and partners appreciate the focus on building their own capacity to sustain outcomes.

We have taught Technology Consulting in the Community (TCinC) at Carnegie Mellon University in Pittsburgh with this model of service learning for 15 years (Mertz and McElfresh, 2010). In that time, we have had over 400 students engaged with nearly 300 nonprofit organizations, schools, small businesses, and municipal agencies in our region. Each semester we

place between 20 and 30 students in one-on-one community consulting engagements. We have come to understand that positive, sustainable partner outcomes are essential for building lasting community partner relationships.

The TCinC consulting model has three keystones for students:

- Define a clear problem to be solved – one that is important to the mission of the organization
- Work to build sustainability into all deliverables
- Develop the organization’s capacity not only to use the new solution, but also to manage its operations, maintenance, and continued development

Preparing community partners is also essential. They should have realistic expectations while requiring a clear scope of work, understandable implementation and deployment plans, and a feasible plan to sustain the project.

At the end of each semester we hold a mini-conference in which our community partners come to campus and make presentations alongside their student consultant. Focusing on partner outcomes, we ask the partners to do 70% of the speaking, focusing on the outcomes and how they have impacted their organizations. While some projects have minimal outcomes, rarely are they so unsatisfactory that a partner is not willing to come and speak.

Community partners are also surveyed at the end of each engagement. In the past three classes, spanning spring semesters of 2010 - 2012, we had 80 engagements, of which 49 partners replied to our survey. They were asked to answer on a scale of *strongly agree* (5) to *strongly disagree* (1) questions about capacity building.

Working with the student consultant...

- ... increased my capacity to understand, use and manage technology. (Average: 4.3)
- ... gave me enough assistance such that I will be able to continue improving on my own. (Average: 4.5)
- ... was a valuable experience and I would recommend it to other organizations. (Average: 4.7)

Regarding how the partner can build upon the work that was done by the student consultant we asked:

This final consulting report...

- ...provides recommendations that we intend to implement. (Average: 4.5)

Additional measures of partner satisfaction include:

- Many partners will work with us over multiple semesters. (Half of our partners are typically repeats.)
- Most new partner recruiting is done by past partners willing to email their peers at other organizations.

As some partners have commented in our assessment form:

- “I have recommended and will continue to recommend this opportunity to organizations who could really benefit from the services. I think it is a model program and the Pittsburgh community should consider itself lucky to have such an intelligent, skilled, and passionate resource available.”
- “The consulting process involved in this course really is a great model, it ensures both the student and community partner follow through.”
- “PHASE 3 strongly recommends this program to any organization, and look forward to our 4th rotation.”

TECHNOLOGY CONSULTING IN THE GLOBAL COMMUNITY

Building on the experience and the TCinC model, a second program, Technology Consulting in the Global Community (TCinGC) was introduced in 2004. It places student consultants in low-resourced, developing communities globally. Each summer, TCinGC matches students with government ministries, nonprofit organizations, schools, or small businesses in international locations. It is a ten-week program that replicates the process taught in the semester-long TCinC course, but on a full-time basis while students reside abroad. Students gain the personal and academic learning outcomes of the campus-based service learning course, as well as a significant intercultural work experience.

Service learning projects abroad add another layer of personal and academic value, but they also add further challenges – from simple logistics, to communicating effectively across cultures, to keeping in touch with distant instructors and project mentors. Differences in language, culture, technology experience, quality of infrastructure and available host resources complicate matters. Nonetheless, instances of service learning abroad have been reported. (Gradoville and Budny, 2011; Nejme, 2012; Kleinhenz, et.al., 2005; Morelli, et.al., 2011).

Beyond service learning projects, there is a growing body of research into the use of information and communications technology for development (ICT4D). It may be easy to find initial successes, but more difficult to find sustained solutions. Toyama, who has managed over 50 ICT4D projects, has come to the conclusion: “Wherever possible, it is more meaningful, and more sustaining, to support the growth of productive capacity within people, than to simply supply technologies for them to consume.” (Toyama, 2012).

TCinGC runs 10 weeks during the university’s summer session. Students are chosen through a selective application process. They go through a 20 hour orientation process in which they are introduced to the capacity-building consulting model, research the locations in which they will be working, review safety and security guidelines, and work on travel logistics. The program is free for students. The program pays for travel and our global partners provide accommodations and a stipend for meals and incidentals. Since 2004, 77 students have participated. 35 have been women and 42 have been men. Participants’ majors have primarily been Information Systems, Computer Science, and Engineering.

To date, our partnerships have been in 13 countries, including Chile, Cook Islands, Federated States of Micronesia, Ghana, India, Marshall Islands, Nauru, Niue, Palau, Peru, Philippines, Rwanda, and Sri Lanka. Students have also worked in an Alaskan village on the Bering Strait. All of these partnerships have come about through person-to-person relationships. These often start with relationships of faculty and staff at our university. Word-of-mouth endorsements from existing partners help keep the pipeline of projects filled.

Since the program’s beginning, TCinGC student consultants have taken on a wide range of projects. Examples include database development, content management implementations, web application development, GIS mapping, graphic design, administrative systems improvements, technology in education innovation, strategic technology planning, eGovernment strategy, and IT curriculum design. (See the program’s website for details: <http://www.cmu.edu/global/education/tcingc/>.)

Setting It Up

TCinGC requires significant investments in time and resources from all stakeholders. Careful management of engagements, relationships, assignments and scopes of work reduces risk and opportunities for projects going awry. The faculty typically begin vetting potential clients, arranging engagements and recruiting students months in advance. Potential global partners must demonstrate their reliability, openness to hosting students, financial support for housing, stipends, incidentals, project expenses and ability to properly and professionally engage with the students. The organization must have clearly defined goals, designated staff personnel and motivated leadership. A standardized memorandum of understanding (MOU) details project expectations, financial responsibilities, the consulting model, and dates. Student participants must have the technical and communications skills necessary to assist their community partners.

Logistics for TCinGC are complicated. As Carnegie Mellon is, itself, a global university, participating students may, themselves, come from one of Carnegie Mellon’s global programs. Visas, travel documents, reimbursements, local housing and transportation arrangements and allowances must generally be arranged well in advance. Contingencies must be anticipated as students and partners have, on occasion, late arising problems, complications or changes in plans.

Financing for the program (approximately \$5000 per student per summer plus faculty travel expenses) has largely come through alumni gifts, special university ‘study abroad’ accounts and departmental allowances. Once on site, the host partners provide local accommodations and a small stipend. To sustain the program into the future, we anticipate additional sources of financial support will need to be developed.

Once the student consultants arrive on-site, they begin by broadly investigating the organization, understanding its mission and operations, documenting the problems they see, and finding opportunities to use technology to be more effective. Community partners rarely have a clear scope of work defined in advance, and this process helps to arrive at one by consensus. The student consultants lead the process of investigating and articulating problems and recommending realistic solutions.

To support the process, a TCinGC faculty member typically visits the site one week after students arrive. The faculty member helps students prepare a viable scope of work and helps the community partners understand how to get tangible value out of working with the student consultants. This visit also allows faculty to vet the housing and stipend situation, to visit past partners in the area to assess the sustainability of prior engagements, and to develop new relationships for future partnerships. TCinGC faculty keep in contact with the student consultants throughout the summer to provide advice and mentoring, and to review and comment on interim reports. Upon completion of the engagement, students submit detailed project reports summarizing their scope of work, accomplishments, technical documentation and statements of personal reflections. Project clients are requested to provide their perspectives on the engagement.

Example Engagement: Partnership In Rwanda – Agahozo-Shalom Youth Village

The TCinGC partnership with Agahozo-Shalom Youth Village (ASYV) in Rwanda provides an illustrative case study. We have worked with ASYV for two summers, 2011 and 2012, and are planning again for 2013.

ASYV is a residential community for youth and young adults orphaned during or after the Rwandan genocide of 1994. It is located on 144 acres about an hour outside the capital city of Kigali and includes residential housing, a high school, community center, athletic facilities, and a farm. The construction of the village started during the summer of 2006, and the first school year began in January 2009 with 125 students. They are now at their capacity of 500 children, four classes of 125 students each (Agahozo-Shalom Youth Village, 2012).

The mission of ASYV is:

To enable orphaned and vulnerable youth to realize their maximum potential by providing them with a safe and secure living environment, health care, education and necessary life skills. Education and service are used to model and create socially responsible citizens in Rwanda and around the world.

In 2011, the two TCinGC student consultants learned that technology was becoming an important aspect at the village. ASYV did not have enough computers or reliable server connections for students' academic work. While equipment had been donated, it was not functional. ASYV did not have enough people to manage the growing network infrastructure and to provide technical support. Locations in the residential areas had low or no Wi-Fi signals. Further, the existing Student Information System had not been adequate to meet the school's growing needs. Working with the resident staff, TCinGC students helped to set up additional computer labs, start a student centered IT club to help with computer support, designed a maintenance ticketing system, reconfigured the Student Information System, and designed a plan for a better Wi-Fi environment for the residential area.

In 2012, a second team of two students worked at ASYV. Building on accomplishments of the prior student team and additional needs expressed by the ASYV leadership, the students proposed a thorough review of the student registration process, additional enhancements to the Student Information System to include alumni records, plus training and documentation for teachers and staff. To enhance the Student Information System, TCinGC students developed a Microsoft Access database since this tool was readily available and many existing staff members were familiar with it. The database was tested with sample data to demonstrate that it would effectively meet requirements. It was deployed on ASYV's server and was tested from several computers throughout the village. The head of the IT staff assigned access rights to the database to users in Education and Administration departments.

Beyond this, the student consultants recommended: 1) that ASYV source developers to build a student information system that encompasses informal education, health and wellness and alumni management, 2) that the various departments and the New York office finalize a set of metrics should be tracked in the alumni database, and 3) that education staff review its methods of communication to keep in contact with alumni.

Each summer, ASYV's investment in the partnership totaled approximately \$5700 for room, board, stipend, staff time and overhead for the two TCinGC student consultants.

Student Perspectives

In their retrospectives, two of the student consultants who worked with ASYV wrote:

Alimou Bah: "In retrospect after a year now, I can say that the TCinGC experience has helped me hit the ground running in my current job. I am working with people around the world on a daily basis in order to implement enterprise information systems for large organizations. I am confronted with framing issues, making decisions and managing expectations of clients. And all are activities that I did in my TCinGC consulting project – without the stress. I tell others that TCinGC was a great opportunity that turned out to be one of the best experiences in my life."

Nicole Ifill: "My core project experience revolved around adapting and embracing a new culture, thinking about solutions that are sustainable for the context and understanding how to navigate through resistance to change. Learning these lessons was very timely as I started a job and similar challenges exist on my current project. Also for me, consulting as a student in a developing region of the world was a way for me to gauge whether I could see myself doing similar work in the future. And since the answer is yes, I would not trade the experience for another."

ASYV Perspectives

The ASYV Executive Director, Tamar Copeland, provided this assessment of the TCinGC program following the 2012 engagement:

“In the past two years, Carnegie Mellon University’s Technology Consulting in the Global Community (TCinGC) has provided invaluable consultancies to the Agahozo-Shalom Youth Village in Rwanda (ASYV), and this year’s project has focused extensively on advancing data collection and analysis in an effort to track and measure the organization’s impact on orphan’s and vulnerable youth.”

“In 2011, Carnegie Mellon’s TCinGC provided ASYV with two consultants who, along with an academic advisor and ASYV staff, worked diligently to repair and upgrade the Village’s wireless network. Not only did the student consultant’s work result in the system’s increased capacity and reliability, they imparted hands-on training and expertise to our local staff.”

“Through its TCinGC initiative, Carnegie Mellon has provided ASYV with crucial resources that we may not have otherwise been able to access. The consultancies continue to provide invaluable exposure to expertise, training and information and have resulted in increased and better services for the children whose lives are profoundly improved during their time at ASYV.”

Eric Kalisa Salongo is the Director of Operations and Procurement at ASYV and is responsible for overseeing all IT. Relative to ASYV's expectations, he wrote:

Wi-Fi Networking Plan: “The plan was successfully implemented and the network is used by staff for email and internet access in the Village.”

New computer labs: “The labs are a big asset and a fourth lab was finished in 2012 after the second TCinGC engagement. Two labs weren’t fully used this year because of challenges with electrical grounding, unreliable power strips, and a need for efficient systems for maintaining the computer hardware. ASYV students who worked alongside the TCinGC student consultants during the installation of the first three labs provided critical support with the fourth lab.”

IT Club: “The ASYV IT Manager continues to use the IT Club students to maintain the labs. Student involvement in the Club is tied to their academic year, so there is a challenge to transfer knowledge from one class to the next. To address this, we intend to use the first school vacation (March - April) to have a mixed group of kids working together – those who were running the IT Club the previous year and upcoming kids new to the IT club. It is our hope that the experienced kids will be able to transfer knowledge even if they have short time (one to two weeks) to do so.”

Student Information System: “While a method of tracking some informal education data was demonstrated by the student consultants, this solution was not adopted because it did not fully capture the information tracking needs of the Informal Education Department such as the documenting each kid’s family situation, and measuring professional and leadership skills.”

Alumni Tracking Database: “This Microsoft Access database is being used and is helpful tool though with limited capabilities.”

Recommendations: “Regarding the Student Information System, while the student consultants recommended identifying vendors to develop a new comprehensive custom-built solution, we believe we should first bring together all stakeholders, understand our needs and expectations, and challenge the ability of the current vendor to meet these expectations. For the next TCinGC engagement, we need help developing efficient systems for maintaining the lab hardware. We need flowcharts, documented procedures, and or screencasts that can be easily followed to test and sort spare parts and repair lab computers.”

CONCLUSION AND NEXT STEPS

Increasingly, service learning has been shown to provide positive educational benefits to information systems and computer science students in terms of both technical and professional skills. Less certain are the benefits that accrue to the community partner organizations.

We have developed a viable consulting model of service learning engagement that keeps students’ focus on providing tangible and sustainable benefit to their community partners. A consulting model provides a good framework for students to gain the benefits of service learning, but in a way that also increases the potential for community partner benefit. The model is not difficult for students to understand and implement.

Community partners have generally found the experience valuable not only for the technical assistance, but also for increased insights into understanding, planning, and managing their technology. Their willingness to repeat the process, and to recommend the program to other organizations has proven valuable to growing the program.

We recognize the need for careful review and assessment of the TCinGC program's outcomes. Our future research direction will be to further test the efficacy of this type of engagement for both students and community partners. Given that follow-up with community partners is often lacking in service learning programs, we specifically intend to institute regular review of the impacts of TCinGC engagements upon their immediate conclusions, and one and two years beyond. We will look for evidence of any sustained value to partner organizations, evidence of increased organizational capacity, and the conditions under which value or organizational capacity has been sustained or lost.

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