

Community Connections: Lessons Learned Developing and Maintaining a Computer Science Service-Learning Program

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ABSTRACT

This paper describes Community Connections, an ongoing service-learning project at the University of San Francisco aimed at bridging the digital divide. We discuss Community Connections' work both in San Francisco and in Peru, the advantages and learning outcomes of incorporating service-learning into a traditional computer science curriculum, outline some of the pitfalls and challenges in implementing this program, and provide advice for implementing technology-oriented service-learning programs at other institutions based on our experiences.

Categories and Subject Descriptors

K.3.2 [Computers and Education]: Computer & Information Science Education; K.4 [Computers and Society]: General

General Terms

Design

Keywords

service-learning, pedagogy

1. INTRODUCTION

Service-learning is an pedagogical approach that marries active learning, community service, and reflective activity [10]. Service-learning has become an increasingly popular pedagogical tool in the past decades, with journals [7] and organizations such as Campus Compact [4] and Learn and Serve America [8] devoted specifically to the development of service-learning as a pedagogical tool.

In this paper, we present a case study of the construction, implementation and growth of Community Connections, a service-learning project at the University of San Francisco

(USF). We describe the particular projects we have worked on, outline some of the challenges we have faced and our solutions to these challenges, and offer some advice and strategies for readers interested in starting a technology-oriented service-learning program at their own institution.

2. WHAT IS SERVICE-LEARNING?

As described above, service-learning is an educational philosophy that promotes active learning through community engagement and directed reflection. By active learning, we mean that students have an opportunity to learn through hands-on experience, as they would in an internship. This sort of learning is very different from what students are typically familiar with, and has the potential to take them out of their normal comfort zone and engage them in ways that the classroom cannot [3]. Service-learning differs from an internship in that students are expected to engage in some sort of project involving service to the community. This is intended to build stronger relationships between the university and the community, develop students' sense of civic engagement and help students construct a more refined awareness of the world they live in and their role in shaping this world. Service-learning courses also typically include an explicit, structured reflective component [6, 1] in which students are asked to explicitly process and synthesize their learning and experiences.

Within computer science, there have been quite a few successful service-learning projects, such as EPICS [13] and the Urban Technology Project [5]. There have also been quite a few publications describing the implementation of service-learning projects through integration with existing computer science courses [9], creation of new courses [14], and department-wide programs [2]. (This is only a sample, and not meant to be a comprehensive list.) However, each program is unique, with its own set of priorities, concerns and challenges, which is why we feel that there is value to a case study presenting our experiences with service-learning at USF.

2.1 Service-learning at USF

The University of San Francisco is a private, urban Jesuit university. It has undergraduate and master's programs, with a total student population of about 13,600, with about 5200 undergraduates and 8400 graduate students. USF has made a strong commitment to service-learning, particularly at the undergraduate level. All undergraduates are now re-

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SIGCSE '08 Portland, Oregon

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quired to take a service-learning course. Service-learning also has a strong connection to the university's Jesuit tradition, and its mission to "educate minds and hearts to change the world."

Adding a service-learning requirement for all undergraduates has had several interesting consequences. One of these is a change in the population of students taking service-learning courses. Previously, these classes were populated with self-selected students who had already "bought into" service-learning, and were excited about this sort of course. Adding a service-learning requirement has meant that these classes now also contain students who are taking the course only because they have to. The instructor must now find ways to engage those students who are reluctant, fearful or nervous about service-learning. A second consequence has been the need for additional service-learning courses, particularly in the sciences. If the service-learning requirement is to be meaningful, and not just another box on the graduation checklist, then it is important that students are able to have service-learning experiences that relate to their expertise and area of study.

3. COMMUNITY CONNECTIONS

In response to a need for service-learning opportunities within the Computer Science department, we developed Community Connections in the Spring of 2003. Community Connections is an umbrella organization for our service-learning efforts, including courses, immersion trips, and other outreach or social-justice related projects.

Community Connections has been associated with a number of projects at USF¹. In this paper, we will focus on two particular outreach projects, in San Francisco and in Peru, and the associated course.

3.1 San Francisco

The core of our service-learning projects take place in San Francisco. Our primary focus is on enabling our students to use their skills to help bridge the digital divide - the gap between those with access to technology and the ability to effectively use that technology, and those without. In practice, this has had three distinct components: upgrading and maintaining community labs, developing informational resources, and direct client education.

We began by partnering with Network Ministries in Spring 2003. Network Ministries operates two drop-in computer labs in San Francisco's Tenderloin neighborhood; one for adults and one for children. USF students upgraded their machines, rebuilt their server and website, and helped maintain the labs. Based on this success, we began similar partnerships with St. Anthony's Foundation, Good Samaritan Family Resource Center, and Bayview MAGIC, helping to maintain their drop-in computer labs.

We were also able to convince USF, as well as several other area businesses, to donate computers that were slated for replacement. Like many businesses, USF replaces all computers at the end of their 3-year warranty. However, these machines are still typically in good shape and have many more years of use left in them. USF students then cleaned up these machines and set them up in community partners' labs.

¹see <http://www.cs.usfca.edu/cc> for more information

Early on, we realized that providing hardware and support addressed only one component of the digital divide; information and education about using information technology effectively was an equally important part. As a result, we began offering tutoring sessions for adults in St. Anthony's A+ certification program and computer literacy courses at Good Samaritan Family Resource Center. We then expended this into the development of an A+ certification training curriculum for adult education students at St. Anthony's Foundation.

3.2 Work in Peru

In 2003, we began a partnership with two K-12 schools in Tacna, Peru². Since then, we have conducted four immersion trips (the fifth is planned for May 2008) to Tacna to set up computer labs and teach courses. Unlike many service-learning projects, this is not associated directly with a course; students participate on a volunteer basis. This has allowed us to develop a community of students who participate, with returning students serving as mentors for the newcomers.

For each trip, we begin preparations in the preceding November. Students are expected to assist in fundraising and preparations, including preparing computers for shipment, developing course materials, and preparing documentation. We travel to Tacna in March and spend five days working with the schools there.

As with our work in San Francisco, we started with a focus on providing hardware and connectivity. On our first trip, we shipped over 150 donated computers to Tacna and spent the week setting up machines and building networks. As with our domestic work, we quickly realized that providing hardware was only the tip of the iceberg; what the teachers and students in Tacna really needed was training on how to effectively integrate technology into their educational curriculum. Our subsequent trips have included further hardware upgrades, but have focused more on knowledge transfer, including classes on webpage design, blogging, and computer maintenance, and classes on basic Internet usage, and online course design using Moodle [12] (an open-source course management tool) for teachers. On our most recent trip, we took 10 inexpensive digital cameras, which we gave to a group of sixth-graders with instructions to "document their lives." The next day, we showed the students how to upload their photos to Flickr³ and blog about them using Vox⁴.

This experience has proved to be highly beneficial not only for the people of Tacna, but also for our students. We discuss the learning outcomes in more detail in Section 6.

4. ACADEMIC INTEGRATION

Determining the best practices for integrating service-learning into the computer science curriculum has been an ongoing challenge. We have developed a multi-pronged approach, in which some SL activities take place within the scope of a course, and others take place outside of a formal class.

We offer a service-learning course titled CS 480: Computers and Society. The course discusses the social and ethical issues surrounding technology, including privacy, security,

²see <http://www.cs.usfca.edu/peru> for more information

³<http://www.flickr.com>

⁴<http://www.vox.com>

professional ethics, and the digital divide. Students partner for a semester with one of the community organizations mentioned above and spend at least two hours a week working with them. They also keep a blog in which they reflect about their experiences (both positive and negative) with their community partner, and how it relates to the material discussed in the course. Finally, they each develop a “toolkit” in which they demonstrate how a community partner might use a particular web technology (such as podcasting or blogging) to better serve their community.

Incorporating service-learning into CS 480 (which was formerly a more traditional computer ethics course) provided a nice way to ground discussion of ethical and social issues surrounding information technology in actual student experience. Often, discussions of ethical dilemmas or social consequences are based on hypotheticals or “what-if” scenarios. Class discussion can easily devolve into nit-picking over the details of the scenario while missing the bigger picture. By incorporating service-learning, students were instead able to discuss their actual experiences and the real-life dilemmas they had encountered. For example, our discussion of file-sharing and piracy was greatly enhanced by the experiences of the students who had recently returned from Peru. In Tacna, DVD piracy is rampant; as a result, all of the movie theaters in the town have closed, leaving kids with fewer social outlets. This experience provided a concrete example of the problems created by what many students had previously thought of as a victimless crime.

5. COMMUNITY PARTNER NEEDS

One aspect of service-learning that is, unfortunately, often forgotten about is adequately addressing the needs and concerns of the community partner. Early on, we realized that if we were going to set up labs for a community partner, we couldn’t just leave at the end of the semester and expect them to keep everything running for a year until the class was offered again; most community partners don’t have the resources for this, which is why we were working with them in the first place!

To address this problem, we developed a set of stipends that were used to provide support for students who continued to work with our partners once CS 480 was finished. This had two beneficial results: it allowed us to maintain continuity with our community partners, and it provided new employment opportunities for USF students.

Many of USF’s graduate students are international students, who are prevented from working outside the university by the conditions of their student visa. Hiring them as assistants to work with community partners provided them with an opportunity to make some extra money, gave them a chance to participate in service-learning, and also provided them with much-needed opportunities to get practical hands-on experience.

Stipended positions have also allowed us to develop experienced students who can act as leaders and mentors. This has been critically important in allowing the program to continue and grow for several reasons. First, it allows more experienced students to train and guide newer students, providing much-needed continuity with community partners who now have familiar faces to work with, as opposed to having to train new students each semester. Second, it reduces the amount of time a faculty supervisor must spend overseeing students (a common concern of faculty starting

service-learning courses), and third, it helps to foster a sense of community and belonging amongst our students.

6. LEARNING OUTCOMES

It is essential to remember that service-learning is an experience designed primarily to educate our students. We work to help address the needs of the community, but the primary emphasis is on student learning.

- **Technical knowledge.** Working with a community partner provides our students with an excellent active-learning opportunity to debug, problem-solve and get first-hand practical experience setting up and maintaining computers, servers, and networks. This is precisely the sort of experience that is often difficult to provide in the classroom; classroom labs are often well-constrained, and missing much of the “messiness” that students routinely encounter when working with a community partner (and in real life). We have had several students get jobs based on their experience working with Community Connections.
- **Social knowledge.** As mentioned in section 4, we tie students’ service-learning experiences into their academic coursework. This provides students with an opportunity to learn first hand about the digital divide and develop a greater understanding about the underlying causes of this divide. They get first-hand exposure to issues surrounding access to technology, literacy, poverty, and education.

Students also learn about the transformative power of technology. This was particularly evident in Peru, where, after setting up a computer lab at Colegio Cristo Rey in Tacna, we received an email containing the following excerpt from the pastor:

[today] there was a totally new phenomenon at the school. At the sound of the bell - for break periods- it was always a mad dash to the patios to with a majority turnout for soccer. From that day on none of the seniors and very few of the juniors showed up on the court... All of them were dashing to the computer labs or to the PCs in the library for their chance to get connected or to see how the other guys did it.

Providing the students in Tacna with access to the Internet gave them access to a much wider world than they normally had. This experience gave our students at USF direct experience with the ways in which technology could truly be a force for positive change in people’s lives, hopefully helping to fulfill USF’s mission to “educate minds and hearts to change the world.”

- **Personal knowledge.** Service-learning can also be a transformative experience for students. They learn a great deal about themselves, what they are capable of, and their own strength. Often, students are very intimidated by their first trip to the Tenderloin (or to Peru); they may not have seen poverty up close, they don’t think they know enough to be of use, and they are afraid of interacting with some of the clients. Through their work with a community partner, they

can develop self-confidence, a belief in their own problem-solving abilities, and increased empathy for others.

7. ISSUES AND CHALLENGES

Implementing a program like Community Connections is not without its problems and challenges. Some of them involve the initial creation of the program, and others involve keeping the program healthy and growing.

A challenge that has been specific to computer science has been the successful incorporation of reflection. A reflective component is an essential piece of a service-learning course, yet this is something that most computer science students (and faculty, for that matter) are unfamiliar with, and often uncomfortable considering. Many of our students are quiet, introverted types who are more comfortable sitting in from of a computer screen than sharing their feelings with a class. Because of this, the traditional discussion-oriented reflection techniques were not very successful at encouraging students to share and process their experiences.

We found that electronic journaling using blogs turned out to be a very effective means of reflection. Students were given open-ended questions concerning their community partner or a classroom topic and asked to blog about them. The written format gave quieter students, or those students for whom English is a second language, more time to properly compose their thoughts outside the pressure of a classroom. As Mills discusses [11], the electronic format also allows students to easily read and link to each others' reflections, thereby creating the sort of dialog that is so valued in verbal classroom-based reflection.

A challenge with any service-learning project is maintaining an ongoing relationship with the community partners. While universities tend to be more familiar with projects that have a well-defined beginning and end that coincide with an academic period, the partner's work is ongoing. A successful relationship with a partner requires recognition of this, as well as efforts to maintain communication and interaction between periods when a service-learning course is offered. This might involve occasional phone calls between the faculty member and the partner, or finding means for students to stay involved with a partner once a course has ended.

A related challenge when dealing with community partners is managing expectations and constructing projects that can succeed. This means that the partner should have a clear idea of both the students' abilities, and also the learning outcomes of the class. Ideally, the faculty will meet with the community partner beforehand, share a syllabus, and concretely discuss what the students are expected to get out of the experience. This sometimes creates anxiety amongst faculty who are concerned about losing control over their students' learning. We would argue that this is not something to be afraid of, but rather something to encourage. Many of the issues students will be learning about are not black and white, and a multiplicity of viewpoints can only help them to develop a more sophisticated understanding.

8. ASSESSMENT

It is often very difficult to determine how effective service-learning is as an educational tool, particularly with our small class sizes (10 or fewer). So far, we have relied primarily on students' reflection as a way to assess their learning.

One thing we want to establish is whether students have learned any technical or professional knowledge through their service. The following quote, taken from the blog of a CS 480 student, illustrates the professional and technical expertise (a well as self-awareness) acquired by these students.

It's difficult to realize how you've changed through a span of time. ...[W]orking with the Bayview YMCA has broadened my knowledge of other communities. Before my first visit to Bayview, I no idea what I would see. ... What really scared me was the possibility that I would not have the knowledge and experience needed to help the Bayview YMCA out. ... I remember going in those labs for the first time thinking to myself, what if I can't fix what they want me to fix. Only after the first day there did I realize I had nothing to be afraid of.

This student helped develop an online A+ certification course for St. Anthony's foundation:

When I first got to St. Anthony's I had no clue what we were going to do, let alone how there would be any possible way we could contribute to St. Anthony's cause. ... I walked into the Tenderloin with word-of-mouth opinions on the community, but I wanted to experience it for myself. The community provided an amazing experience in everyday life in that I see another aspect of humanity and how another subset of people live. In terms of myself, I learned that I am very capable of contributing to the community. It also has allowed me to see that I enjoy interacting a whole lot more with people than I had originally thought (I'm not as anti-social as I thought I was with people I did not know). In terms of my abilities, ... I never knew that I could be capable of contributing so much. I understand the struggles and obstacles of restructuring a class so that it be more flexible for others. Also, I feel that my ability to work with others in a team while taking the input of students improved greatly.

We are also interested in teaching students about their relationship to the larger world. We refer to this as social learning. In addition to the above quotes, the following quote from the blog of a former CS 480 student illustrates the social learning we hope to achieve:

I have learned about the nature of contributing to my community and those in need. I want to provide more than material items and temporary solutions. By providing practical and useful tools for non-profit organizations, I can donate my time and become an advocate for change.

Finally, we hope that service-learning helps students to learn about themselves; not only to become better people, but also to be more self-confident and self-reliant. The following quotes, from a post-trip survey of the 2007 Peru team, illustrates the personal learning we strive for:

What surprised you most during the trip?

1. My ability to adapt to new situations as the arose.
2. All the things that did not go right in spite of all the planned sessions we had. This made me realize that we can plan for ourselves, but it works a little differently outside. All is not pretty out there and we need to adjust to make things happen.

These reflections provide some anecdotal evidence that service-learning is able to achieve USF's goal of educating students not only to be leaders in their field, but also to be agents of change within their community.

9. LESSONS LEARNED

In creating Community Connections, we have identified some strategies for success that are transferrable to other faculty or institutions interested in exploring service-learning.

- Identify allies and resources. Many universities have an Office of Service Learning, or Community Outreach, or something similar. They can help locate and maintain partnerships and provide training and reflection resources. There are also less obvious allies, such as such as the mailroom (to help with shipping internationally), the IT department (to help with acquisition of donated hardware), the Provost's office (to help with international travel issues), the advancement office (to help with fundraising), and of course the Dean's office (to give the "green light" to our work). Make it easy for your allies to say "yes"; for example, administrators might find one-time stipends or student salaries easier than ongoing funding.
- Keep things inexpensive. All of this work has been done on a shoestring budget. While it sounds expensive to take a group of students to Peru, we are able to do it each year for under \$15,000. We shop for cheap tickets, find inexpensive hotels on the Internet, use donated equipment and software, and plan ahead. This is a sum that's easily raised through a combination of student fees (about \$300 per student), fundraising, and small university grants (less than \$5000 each).
- Identify strong community partners. Our most successful experiences, both locally and abroad, have been with partners who understand what we are trying to do, what service-learning is, and feel like they have a stake in the process. This requires maintaining a relationship with the partner, taking the time to find out what they hope to get out of the partnership, and giving them a real role in student education.
- Institutionalize. For a project like Community Connections to continue beyond a year or two, there needs to be support (in terms of faculty recognition, teaching load, or even perhaps staffing) at the Dean's level and above. Again, if your institution has a Service-Learning or Community Service office, this can help. Often, it will be necessary to have a track record of success before you can start down this road.

10. CONCLUSION

This paper has presented a case study describing the creation, implementation, and growth of Community Connections, a service-learning project at USF. We feel that the addition of service-learning to our curriculum has been a huge success. It has given our students opportunities to learn practical skills, to become more aware of the problems and challenges facing their community, and to develop leadership, self-confidence, and self-reliance.

Implementing this sort of program requires a combination of strong advocacy, institutional support, planning, and committed community partners with a stake in the learning outcomes. If these issues are successfully addressed, it is possible to create a program that can be extremely enriching and rewarding for students, faculty, and the community.

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