

CREATE: Costa Rica Endeavor – Aid Through Engineering

A Case Study in International Service Learning

Sarah Ott
Zuhdi Aljobeh, Ph.D., P.E.
Civil Engineering Department
Valparaiso University
Valparaiso, Indiana

Abstract:

A team of Valparaiso University civil engineering students and a faculty member undertook a service-learning project in Costa Rica that would enrich their lives as well as the lives of residents of a Nicaraguan immigrant community in a suburban area of San Jose called Pavas.

The Valparaiso University team assembled under the name Team CREATE (Costa Rica Endeavor – Aid Through Engineering). Team CREATE had a three prong project: to design and construct a 500-ft access road for a young girl with spina bifida who lives with her family in Pavas, to build successful working relationships with University of Costa Rica Civil Engineering Department students and faculty, and to learn more about Costa Rican and Nicaraguan cultures.

For the first part of the project, Team CREATE designed and constructed the road. Prior to working in Costa Rica, there was limited available information about the physical and environmental characteristics of Pavas. This required Team CREATE to be flexible and creative in the road implementation. For instance, the team did not have accurate grades of the existing roadway, so the team had to design a generic section that would work in a variety of situations. Once the team realized the immense storm conditions, a stairway at the steepest portion of the road was included because the combination of the longitudinal slope and slick concrete during Costa Rica's frequent twelve inch rainfall events became too dangerous for pedestrians to walk. In terms of physical labor, team members cleared the area, laid the foundation, developed the concrete mix, and placed the concrete.

Team CREATE also developed wonderful relationships with students and faculty of the University of Costa Rica (UCR). While working on the road at Pavas one afternoon, several students and faculty from UCR came to the site and ate lunch with the team. During the lunch, team members and UCR students shared engineering experiences and discussed cultural differences and similarities. After this beneficial time together, Team CREATE traveled to UCR and toured the campus. Team members were fortunate to walk through an environmental lab and a soil lab with several UCR professors. The relationship built with UCR will be maintained this year as a new CREATE team will continue to help the development of Pavas and other communities in Costa Rica.

The third goal of the project enabled Team CREATE to learn about Costa Rican and Nicaraguan cultures. The International Service Learning representative, Heidi Michelsen, a Valparaiso

University alumnus, deaconess, and pastor for a Lutheran church in Pavas, gave several presentations to the team about both cultures and their histories. Another cultural experience Team CREATE was fortunate to have a tour through the rainforest. A sloth, toucan, poisonous tree frog, and leaf-cutter ants were only a few of the unique sights the team saw on the hike through the rainforest.

CREATE: Costa Rica Endeavor – Aid Through Engineering A Case Study in International Service Learning

Sarah Ott
Zuhdi Aljobeh, Ph.D., P.E.
Civil Engineering Department
Valparaiso University
Valparaiso, Indiana

Introduction

A team of Valparaiso University civil engineering students and a faculty member undertook a seven-day service-learning project in Costa Rica that would enrich their lives as well as the lives of residents of a Nicaraguan immigrant community in a suburban area of San Jose, Costa Rica, called Pavas. Service learning is dually beneficial. It is an important aspect in students' educational and personal growth, as well as physically beneficial for the community receiving the service¹. Service learning is “a form of experiential education in which students engage in activities that address human and community needs together with structured opportunities intentionally designed to promote student learning and development.”¹ As stated by the U.S. Government's Learn and Serve America program, “service-learning offers a unique opportunity for America's young people -- from kindergarten to university students -- to get involved with their communities in a tangible way by integrating service projects with classroom learning. Over the course of a project, participants are able to grow personally and gain a view on “potential global and societal impact as engineers.”⁴ Service-learning engages students in the educational process, using what they learn in the classroom to solve real-life problems.³ They are also “able to enrich their education by enhancing their engineering skill sets; developing new problem-solving techniques; and strengthening leadership abilities as well as teamwork skills.”⁴ Students are able to contribute as engineers by becoming actively involved. The students' growth is even tangible, giving participants a better quality of life⁶; “a national study of Learn and Serve America suggests that effective service-learning programs improve grades, increase attendance in school, and develop students' personal and social responsibility.”³

The Project

The Valparaiso University team assembled under the name Team CREATE (Costa Rica Endeavor – Aid Through Engineering). Team CREATE had three goals to accomplish: the first goal was to design and construct a 500-ft access road for a young girl with spina bifida who lives with her family in a shanty town of Nicaraguan immigrants in a suburban community of San Jose, Costa Rica, called Pavas, the second goal was to build successful working relationships with the University of Costa Rica Civil Engineering Department students and faculty, and the third goal was to learn more about Costa Rican and Nicaraguan cultures.

The project began after Professor Zuhdi Aljobeh was contacted by Heidi Michelsen, a pastor, deaconess, an International Service Learning (ISL) representative in Costa Rica, and a

Valparaiso University alumnus from the Lutheran Church in Pavas asking for Valparaiso University Civil Engineering Department help. Professor Aljobeh distributed the project information to the senior civil engineering students. A team of four students who were interested in service learning was selected to design a complete project that included multiple tasks. One of the tasks was to design a 500-ft long concrete road.

Having an integrated project is especially valuable for participants because it allows students the responsibility of all decision making and the method of approaching real world engineering problems instead of solving isolated engineering problems as is typical in a classroom setting.⁶ Although the senior design team designed different aspects for the community for their senior design class, they also took on the service learning project on a volunteer basis and not for academic credit. To help achieve the extra work for the service-learning project, the senior design team recruited other civil engineering students and a Spanish major, hence known as Team CREATE.

Team CREATE collected over \$24,000 in a nation-wide endeavor to fund costs for travel, ISL fees, housing, food, and construction materials. The team developed informative brochures and letters for fundraising that were sent to churches, businesses, alumni, family, and other interested people. In terms of academic credit, the Valparaiso University civil engineering department determined that any service learning projects would be on an extra curricular basis and not required for school credit. Therefore, any service learning projects would not be required and would be accomplished with the best intentions.

For the first goal of the project, Team CREATE designed and constructed the road. This was not an easy task, since the road is to be located in an area between a river and a railroad right-of-way with a ground slope of approximately 30%. There was limited available information about the physical and environmental characteristics of Pavas prior to designing the road. Professor Aljobeh and a senior design project student traveled to Costa Rica in October 2007 for a three-day information collection trip to gather information about the construction site and community needs. They collected approximate topographic measurements, road dimensions, rainfall and drainage data, and took many pictures of the site. They were also successful in understanding the community's needs and wishes. For lack of accurate topographic measurements, Team CREATE had to be flexible and creative in the road design. For instance, the team did not have accurate grades of the existing roadway, so the team had to design a generic section that would work in a variety of situations. Given the limited available space between houses for the road, the roadway cross section was inverted, creating a V-shape so the storm water runoff would drain away from the houses and down the middle of the road to an outlet at the lower section of the road. A stairway at the steepest portion of the road was included in the road design for pedestrian safety. In terms of physical labor, team members cleared the area, laid the foundation, prepared the concrete mix, and placed the concrete. Roadblocks in a project, like the lack of information Team CREATE was exposed to, can be a healthy diversion on the path to learning. Conflict helps prompt social and moral development.⁴

Another benefit of service learning projects for communities is that it “gives hope that, as adults observe increasing numbers of youth actively involved in constructive, pro-social work, their

jaded views of youth may be transformed. In today's society, when it seems that adults fear and despise youth, a move to a positive partnership is important for both the nation and the generations that comprise it.”² In the case of CREATE, Pavas community members worked along side team members during the construction. Pavas men helped lay the formwork, carry cement bags, and mix the concrete, while Pavas women helped clear the area of garbage and smooth the fresh concrete. With such great daily interaction, it was evident that community members were more relaxed as time passed and as the construction developed. This is an indicator of transformed views. Also, Team CREATE hired one of the community members, Abraham, as a construction manager, to help organize the community members in their help with the project. Abraham was very helpful because even though we had a translator she was unfamiliar with Spanish technical construction vocabulary, which made Abraham so valuable because he knew what needed to be done without the team fumbling to translate correctly.

The Learn and Serve America programs suggest that service-learning is an effective strategy to help students by building effective collaborative partnerships between colleges and other institutions and organizations.³ Team CREATE was able to utilize this positive strategy because they developed wonderful relationships with students and faculty of the University of Costa Rica (UCR). While working on the road at Pavas one afternoon, several students and faculty from UCR came to the site and ate lunch with the team. During the lunch, team members and UCR students shared engineering experiences and discussed cultural differences and similarities. After this beneficial time together, Team CREATE traveled to UCR and toured the campus. Team members were fortunate to walk through an environmental lab and a soil lab with several UCR professors. The UCR facilities are quite extensive and their students have a vast amount of resources to work with and learn from. The relationship built with UCR will be maintained this year as a new CREATE team will continue to help the development of Pavas and other communities in Costa Rica.

The third goal of the project enabled Team CREATE to learn about Costa Rican and Nicaraguan cultures. The International Service Learning representative, Heidi Michelsen, gave several presentations to the team about both cultures and their histories. Another cultural experience Team CREATE was fortunate to have was a guided tour through the rainforest. A sloth, toucan, poisonous tree frog, and leaf-cutter ants were only a few of the unique sights the team saw on the hike through the rainforest. After the rainforest tour, the team traveled to the Pacific Coast and spent a few hours on a volcanic-sand beach.

Conclusions

The team's service learning project in Costa Rica was a valuable experience for several reasons. Team members learned how to fund raise appropriately. Instead of simply asking for money from loving families, members shared the difficult life a young girl with spina bifida has in Pavas and how Team CREATE was going to help in her commute to school. Team members also learned how to implement the knowledge they have learned in engineering courses in real life situations by designing and constructing a road in seven days with limited information. International projects provide opportunities for students to work in teams and under real world constraints.⁶ Through this engaging and productive opportunity, they were able to meet

community needs and benefit both parties. Team members learned about Costa Rican and Nicaraguan cultures and were fortunate to experience them daily. Team CREATE struggled with the language barrier, learned to overcome differences in culture, and fostered a sense of caring for the entire Pavas neighborhood. This international service-learning project is especially valuable for engineering students because it provides professional experience that students would not receive otherwise. It allows participants to understand and explore global issues as well.⁶

Bibliography

1. Hallo, Jeffrey C. "MUTUAL BENEFITS." *Parks & Recreation*, 42, pp. 50-53, 2007.
2. Terry, Alice W. "An Early Glimpse: Service Learning from an Adolescent Perspective." *Journal of Secondary Gifted Education*, 11, pp. 115-35, 2000.
3. "What is Service Learning?" Learn and Serve America, U.S. Government. http://www.learnandserve.gov/about/service_learning, accessed 13 Jan. 2009.
4. McCormick, Mary. "Reading Between the Lines: Evaluating Self-Assessments of Skills Acquired During an International Service-Learning Project." ASEE Annual Conference and Exposition, Conference Proceedings, 2008.
5. Freeman, Sarah, Jonathan Crocker, and Chris Swan. "The Role of Small Scale International Service Projects in Engineering Education: The Students' Perspective." ASEE Annual Conference and Exposition, Conference Proceedings, 2007.
6. Swan, Chris, David Gute, Douglas Matson, and John Durant. "International Community-Based Projects and Engineering Education: The Advisor's Viewpoint." ASEE Annual Conference and Exposition, Conference Proceedings, 2007.

Brief Biographical and Contact Information:

Sarah Ott:

Sarah.Ott@valpo.edu

Sarah Ott is a senior civil engineering student at Valparaiso University. She will be graduating in May 2009. She plans on attending graduate school at North Carolina State University to pursue a Masters degree in transportation.

Zuhdi Aljobeh, Ph.D., P.E.

Zuhdi.Aljobeh@valpo.edu

Dr. Aljobeh is an associate professor of civil engineering at Valparaiso University. His teaching, research and practice are in the areas of environmental engineering and stormwater management. He has worked on many commercial development stormwater management projects, industrial air pollution monitoring and control projects, agricultural waste odor control, environmental site assessments and remediation.