

Lessons Learned from Developing and Implementing a Green Construction Training Program in Tijuana, Mexico

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The construction industry, which is a significant contributor to the gross national product in many developing countries, holds the potential to employ adequately trained workers. Careers in construction can provide pathways to sustained employment for trained individuals and the economic resources necessary to support themselves and their families. The overarching goal of this training programs was to implement hands-on learning in environmentally sustainable construction processes to increasing employment skills that promote locally-sustainable job opportunities. The curriculum was developed under the premise that sustainable construction-related employment skills can provide significant practical benefits for resource-poor populations while increasing environmental awareness and sensitivity. This paper presents the lessons learned from an international, multi-institution partnership that was formed to create a locally and environmentally sustainable construction training program that targeted unemployed young adults in Tijuana, Mexico. The multi-phase process used to develop community partnerships, aligned local employment needs with training opportunities, and develop a culturally sensitive training programs is described. The challenges encountered and lessons learned during program development and implementation are presented to provide a framework useful in the design of similar programs. A key finding of this study was the observed increase in self-efficacy among program participants at pre- and post-training measurement. This paper concludes with recommendations for those interested in providing construction-related career opportunities for individuals in resource-poor communities.

Key Words: Construction Training, International Collaboration, Mexico, Unemployment, Young Adults

Introduction

According to Adudley, Papademetriou, Polaski, and Vaughan (2004, p. 5), “Latin American countries face an enormous challenge: How to grow their national economies, create good jobs, and generate the revenues necessary to provide basic public goods such as human health and environmental protection”. In Mexico, unemployment rates are high, over 45% of its population is considered poor, and 18% extremely poor (USAID, 2011). A large portion of Mexico’s unemployed are young adults (ages 15-24 years) (Haveman, Heinrich, and Smeeding, 2012; International Labour Organization, 2012). Further, those who report being jobless for the entire year are the disadvantaged, out-of-school, low-income, young adults most in need of employment opportunities (Sum, Khatiwada, McLaughlin, & Palma, 2011). Unemployment has significant social, community, and public health implications and is linked to increased rates of alcoholism, drug abuse, physical and mental health problems, and suicide (Korpi, 2001; Levy & Sidel, 2009; Wanberg, 2011). In the case a parental unemployment, negative impacts on health, well-being, educational performance, and the social mobility of children have been noted (Korpi, 2001).

Training programs targeting unemployed young adults exist, however attrition rates are high according to Ginsburg et al. (2000), and training practitioners report that evaluations of the effectiveness of employment training programs for the disadvantaged need to be improved to enhance participant success (Weigenberg et al., 2012). Thus, studies that shed light on increasing the success of training interventions that provide employment opportunities have potential to generate significant positive social impacts for individuals, families, and communities. The purpose of this paper is to highlight the development and implementation of a sustainable construction training program for young adults in Mexico. Recommendations are provided for construction education personnel interested in establishing training programs to improve the employment opportunities for individuals in resource-poor communities.

Program Overview

The construction employment training program for Mexican young adults was funded by the United States Agency for International Development (USAID) and administered by Higher Education of Development (HED). In order to facilitate training and employment opportunities for young adults in Mexico, a partnership between Colorado State University (CSU), Universidad Iberoamericana (UIA) Tijuana campus and the Mi Casa Resource Center (Mi Casa) was formed. This partnership collaboratively developed The Green Construction Human and Institutional Capacity Building Program (hereafter, the “program”). The program was developed as a multi-institutional, (CSU, UIA and Mi Casa) multi-disciplinary (Departments of Construction Management, Business and Economics, Architecture, and Nutrition) curriculum designed to upgrade the knowledge, skill and abilities (KSA) of the teaching faculty of CSU and UIA, as well as provide green construction skills-based workforce development and education to unemployed young adults living in Tijuana, Mexico.

The program used an experiential learning approach that focused on effectively managing people, materials, and resources as a foundation for any successful enterprise. Such skills are essential to starting and/or sustaining businesses on any scale and can provide employment opportunities that make a critical difference in the lives of unemployed young adults. This partnership supports the goals of HED by working with the people in Tijuana, Mexico to expand the economic and educational opportunities in this region in Mexico.

The partnership’s core elements address curriculum development, quality standards, management, private sector and governmental collaboration, and business administration as they apply to the sustainable “green” construction industry and practice. The collaboration aspired to obtain educational excellence through mutually beneficial university, community, non-governmental, and governmental partnerships developed to increase human capacity and the capabilities of partnering educational institutions. The program also supported USAID goals by contributing to Mexico’s stability and economic prosperity through contributing to the country’s market-based economy and enhancing Mexico’s global competitiveness.

Summary of Activities by Phase

The first phase of the program consisted of establishing and building relationships between CSU, UIA, Mi Casa and the stakeholders of the program’s target region: Tijuana, Mexico. The advisory board comprised 15 representatives from government agencies, non-governmental organizations, construction companies and members of Tijuana’s community. During the first phase of the project, program curriculum was developed with input from the advisory board. The advisory board was instrumental in ensuring that the program was culturally and technically compatible with the region’s construction-specific employment needs. In addition, care was taken to ensure that the program and curriculum were appropriate for the Mexican young-adult target audience. Specific emphasis was given to identifying pertinent skills needed to promote successful transition into the construction workforce in Tijuana after training completion. Particular emphasis was placed on environmental sustainability and addressing the lack of adequate affordable housing in the region.

The second phase of the program consisted of training-the-trainers to successfully implement the construction training curriculum. The group of trainers consisted of faculty and instructors from UIA, community leaders, and content experts from Tijuana. Trainers participated in a week-long (40-hours) training-the-trainers workshop. During the workshop, those who administered the training received instruction regarding methods and techniques for conveying practical and application-oriented construction skills to trainees in Tijuana.

The third phase of the program consisted of a faculty exchange program. Three faculty from three academic departments at UIA traveled to Colorado to participate in a week-long exchange program at CSU. The goal of the program was to provide exchange faculty with an overview of green construction topics and teaching techniques used by the Department of Construction Management at CSU. During the exchange program, participants from both universities explored educational models and techniques that could be used to development a similar or complementary programs at UIA.

The fourth phase of the program consisted of the implementation of the training program for unemployed young adults. The program consisted of 360 contact hours administered during a 9-week training program curriculum. During a typical eight-hour day, participants would receive lecture-based classroom training in the morning and

participate in hands-on building activities in the afternoon. The training culminated in the completion an earthen residential structure composed of materials local to the region. This model was particularly beneficial to the participants who are accustomed to “learning by doing”. An exemplary day of training would include a classroom-based morning session where participants learned about foundation types and verbal instruction on placing concrete, etc. followed by a hands-on afternoon session in which trainees placed concrete for the structure’s foundation. Table 1 provides information on the curriculum modules.

Table 1

Curriculum Modules, Contact Hours, and Descriptions

Curriculum Module (Contact Hours)	Description/Objective
Life skills (40)	Learn and practice the important soft skills necessary for maintaining entry-level employment including: conflict and time management, problem solving, goal setting, self-esteem, sexual harassment, work ethic, team work and communication.
Construction Safety (40)	Understand that construction jobsites are some of the most dangerous workplaces. Recognize hazards in the construction industry and know the safety practices that reduce the risk of workers being involved in construction accidents.
Green Construction Fundamentals (80)	Understand the concepts of green buildings, construction components and systems. Including reading schematics/drawings and making the connection to the layout/orientation of a building and its systems. Basic math and measurements were covered.
Electricity/Solar (40)	Receive entry-level instruction and training in solar photovoltaic (PV) applications. Discuss PV panel use in residential applications, focusing on the conversion of solar energy into electricity.
Solar PV Installation (40)	Understand the energy output of PV panels at a basic level. Training and application of various PV panel installation/mounting techniques for residential structures.
Green Roofs (40)	Understand the fundamentals of green roof construction and discuss the applicability of green roofing in different climates.
Entrepreneurship (40)	Understand business development basics and creation of a business plan for their own construction-related company.
Career Readiness (40)	Learn and practice job readiness skills needed to obtain employment including: resume and cover letter writing; transferable skills, obtaining references, interview skills (including mock interviews), profession attire, thank-you letters, how to network; creating a loose network, basic computer skills and responding to job offers.

Providing for Basic Needs: Food and Transportation

One of the programs major logistical challenges was transportation of the participants to and from the training facility. Only 4 of the 18 trainees lived in close proximity to the community building and worksite utilized by UIA. The remaining 14 participants required public transportation to the training sessions. The average travel time to attend the program was more than thirty minutes due the unreliable public transportation system in Tijuana. Forty pesos (approximately three U.S. dollars) per day was provided to defray transportation costs and ensure that trainees consistently and punctually attend training sessions. While transportation cost were minimal in consideration to the total project budget, 40 pesos out-of-pocket posed a barrier that precluded participants from attending the training

session. The program was fortunate that relatively inexpensive public transportation was available in Tijuana. If similar programs are administered across large a demographic area or where public transportation does not exist, private transportation should be considered to accommodate trainees. Transportation cost was a practical barrier for the targeted trainee demographic and failing to cover this cost would have contributed to a lower rate of program completion. It should be noted that the cost of private transportation may be significant and should be budgeted accordingly when developing training program for resource-poor individuals and communities.

Focus was placed on the health and nutrition of program participants due to the demographic characteristics of the trainees. Inclusion of a daily meal for trainees ensured that program participants received at least one full and balanced meal per day. The typical meal consisted of soup, rice, beans, fruit and a stew (as is customary in Mexico). Participants were provided meals that were balanced and rich in carbohydrates due to the physical activity performed throughout the training day (8:00 AM - 4:30 PM). The meals were prepared in UIA's food-processing laboratory and served by UIA student and professors in the Department of Nutrition. The meal time also allowed practitioners to discuss nutrition concepts such as the importance of a balanced diet, the effects of poor nutrition, and illnesses. Several sustainable practices were implemented and discussed during meals. For example, the program including using non-disposable drinking cups, plates, and silverware that participants washed after their meals. At the beginning of the program, it was obvious that participants were resistant to healthy diet changes such as using less salt, eating fruits and vegetables, and eliminating soda.

Certificate and Graduation Ceremony

At the end of the training program students participated in a graduation ceremony and were awarded certificates of completion. This provided students with the opportunity to share their successful completion of the program with their families. Family support and involvement is very important in the Hispanic culture; by involving the family in the ceremony we hoped that the graduates self-confidence and sense of pride was increased. Ginsburg et al. (2000) recommend that confidence building is a critical factor in the success of young-adult employment training programs. The certificates served as proof of training completion and provided graduates a competitive advantage in obtaining construction employment.

Outcomes and Evaluation

The first cohort of trainees included 20 participants (18 male and 2 female, between 16 and 29 years old). Of the 20 participants who enrolled, 18 started the training program. Of those who started the program, two male participants did not complete the program (88.9% retention based on participants who started the program, 80.0% based on all enrollees). This retention rate is very positive given the demographic characteristics and unemployment situations of the program participants.

According the Ginsberg et al. (2000, p. 6), "Students who lack confidence will choose to leave the [training] program to save face, rather than taking the risk of experiencing a failure". A similar construct, and plausible substitute for self-confidence, is self-efficacy (Bandura, 1977, 1986, 1997) (Koen, Klehe, Van Vianen, Zikic, & Nauta, 2010; McCormick, 2001). Self-efficacy beliefs comprise the foundation for individual motivation, and one's beliefs about what they can accomplish is directly related to their incentive to act and obtain desired outcomes (Pajares, 2002). Self-efficacy was measured at pre- and post-training intervals in the study using a Spanish translation (Bäßler, J. and Schwarzer, R. 1996) of Schwarzer and Jerusalem's General Self-Efficacy Scale (1995). While not statistically significant, likely due to the small sample size ($n = 20$), the results indicated that the mean pre-training self-efficacy of trainees who completed the training was higher than for those who dropped out ($p = 0.13$) and the mean post-training self-efficacy level of trainees who completed the training was higher than their mean pre-training self-efficacy ($p = 0.29$). These results should be considered with caution due the sample size and possible influence of extraneous variables; however the trends observed were congruent with previous research (Eden and Aviram, 1993). Increase in self-efficacy may be considered a success based on Creed, Bloxsome, and Johnston (2001) who posit that high levels of self-efficacy are particularly important for the unemployed, because the efficacious person is more likely to persist in searching for employment in the face of adversity and setbacks. In light of these trends, continuation of this study through further investigation of self-efficacy as a metric for program

success is warranted.

During the graduation ceremony, a trainee shared with the audience what program participation had meant to her. She stated that “I am one of those people that truly believes in ecology and sustainability; I truly believe that we can live in a better world. I think it is necessary for people to be interested in this [program] and I thank everybody that was involved in this program because they are planting a seed, an interest. I did not know anything but I hope to continue my training in this area because I loved it, I hope to continue with this long term to infuse this in the community”. UIA’s president stated “We are very pleased to be here as witnesses of several frontiers being broken. A frontier between two nations to work together in a project that will benefit the world, to generate alternatives that do not destroy. We also saw that frontiers were broken to leave aside construction materials that have a long tradition. Also, frontiers were broken because we worked together in a world that invites us to continue working individually”. Program instructors commented on how participants were able to work as a team and how the group maintained an environment conducive to learning and inclusion. Instructors also commented that participants were able to put aside the “machismo” often present in the Latino culture and we able to fully integrate the two female participants in the group both during the training and in the extra-curricular activities.

Conclusions and Further Research

The most significant achievement of this multi-university, multi-stakeholder partnership was the successful graduation of 16 program participants. By focusing on both life and technical skills, the training provided participants with a legal and healthy means for making a living in an area where few employment opportunities exist for young-adult. From a practical perspective, the program was successful in that each of the participants was given basic safety equipment for construction and special emphasis was placed on making sure that participants were aware of the consequences of construction accidents and the importance of wearing their personal protective equipment (PPE). All course materials for the program were provided at no cost to the participants including printed curriculum, pens, pencils, paper, copies, etc. Finally, sustainable practices were implemented in the program including the construction of an earthen structure using local materials. These simple practices exposed the trainees to environmental sustainability in ways that they may not have previously considered.

The experience of international collaboration between different institutions has contributed to better knowledge transfer and understanding within, and between, both cultures. From the institutional level, both CSU and UIA gained knowledge in ways of working together to develop educational models. International collaborative partnership programs like the one described here go beyond technical cooperation and allow collaborators to explore new ways of thinking and innovative processes for education and training. The collaboration generated solutions to problems that directly impact the quality of life of unemployed young adults in Tijuana. The partnership allowed stakeholders to discredit false preconceptions and focus on redefining the problems we face. The restoring of ancient building technologies, such as adobe, and integrating them with cutting-edge technologies, such as solar panels provide opportunities to preserve culture while producing social progress. The process of establishing partnerships increased the awareness of the individual and societal impacts of construction on future generations, going beyond the basics of “green” to foster a deeper understanding of sustainability.

The partnership also fostered a deeper understanding of the issues faced by the unemployed and, through international collaboration, created opportunities to improve the quality of life of these young adults. In Mexico, many young people decide to engage in criminal activities to solve their short-term financial needs because they have lost hope in a better future for themselves and their families. Criminal activities generate a false sense of belonging and a route of escape from reality for unemployed youth, while legal and gainful employment provides true hope. Providing opportunities for unemployed youth creates pathways for future development and economic integration that leads to sustained employment and a pathway out of poverty.

Youth are often unemployed not by choice but due to the lack of opportunities. Being deficient in basic skills is a significant barrier to being a productive member of society. We have learned that not only poverty places youth at risk of unemployment, but an excess of free time due to different causes is a significant factor contributing to detrimental behaviors. Some participants had dropped out of school due to lack of family support, while others were unemployed because of the current economic situation in the area. We believe that the newly acquired green construction skills will allow our graduates to be placed in a construction sector with better prospects for both

employment at construction companies and self-employment. It is hoped that this partnership has increased the graduate's hope for the future and their ability to network among individuals of different socio-economic status. Crossing social and economic barriers is often difficult in Mexico. We believe our participants are better equipped to cross social and economic barriers as a result of the training, which will lead to greater opportunities for employment.

The following recommendations are offered to construction education programs, faculty and staff interested in improving the quality of life in resource-poor communities through partnerships between US institutions and institutions in developing countries:

- Assess training-specific institutional strengths and weaknesses.
- Identify collaboration opportunities based on institutional strengths and weaknesses.
- Form an advisory board consisting of local industry and community leaders.
- Collaborate with the local industry and stakeholders to develop and implement training programs.
- Align training with locally verified and long-term employment opportunities.
- Establish cooperative agreements with local industry to facilitate participant employment upon completion of the training.
- Identify practical/logistical barriers to trainee participation as soon as possible and budget accordingly.
- Assess the training program periodically during full implementation and modify curriculum as needed.

This paper summarizes the development and initial administration of a green construction training program for unemployed young adults in Tijuana, Mexico. Conclusions regarding the effectiveness of the program and lessons learned would be strengthened by a longitudinal study and long-term tracking on participants based on job placement and job retention metrics. It is hoped that this program will continue to be offered to unemployed young adults in Tijuana, Mexico. Similar programs should be researched, developed, and implemented within other domestic and international resource-poor communities. Finally, how participant self-efficacy influences, and is influenced by, program completion needs to be assessed. Further research is warranted among larger randomized samples to explore the effect of employment training interventions on the self-efficacy of unemployed individuals.

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