

## Chapter 14

# Teaching Sustainability Competencies to High School Students using Small-Scale Community-Based Construction Projects

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### ABSTRACT

*This chapter provides case studies for teaching sustainability concepts to high school students, by implementing the service-learning model by way of small-scale, sustainable hands-on construction projects that can be built in a high school shop class. It presents two curriculum tools to assist high school shop teachers develop similar projects. These curriculum tools contain general instructions, as well as suggested “discussion points” to highlight the inherent complexity of sustainability and engage high school students in discussions surrounding sustainability. These tools, entitled “Constructing a Sustainable Great Dane Dog House,” and “Constructing Musical Instrument Stands Utilizing Sustainable Materials,” serve as reference documents for dissemination and distribution to support the development of similar future small-scale community-based sustainable construction projects. By providing case studies, this chapter supports future efforts to integrate sustainability into high school education, encourages further and similar activity development and documentation, and provides a model for promoting leadership and community engagement through service-learning for high school students and beyond. The service-learning activities outlined in the case studies have the potential to meaningfully engage high school students to increase their interest in and knowledge of sustainability.*

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## **ORGANIZATION BACKGROUND**

At Colorado State University (CSU), the Department of Construction Management (CM) has developed the CM Cares initiative to promote service-learning by infusing leadership traits, team building, and ethics through community service activities (CHHS, 2013). The small-scale construction projects and activities documented in this chapter were developed by faculty and students at the CM Department at CSU as a part of a CM Cares class during Spring 2011 and Spring 2012 for execution by local high school students. The authors thank and acknowledge Dustin Kalanick as designer and Jerry Kreisher as shop teacher and Centennial High School students for their dedication and hard work in support of development of this material. Finally, these projects received partial financial and resource support from the Institute of Learning and Teaching at CSU, the Bohemian Foundation, and Colorado Campus Compact. These projects serve as true demonstrations of community support of teaching sustainability at high schools.

## **SETTING THE STAGE**

Improving education in general, and teaching sustainability competencies in particular, are pressing needs in education in both developed and developing countries. Research shows that engineering and related education is largely deficient in teaching students basic principles of sustainable development (Azapagic, Perdan, & Shallcross, 2005). A fundamental concern for many students may be the scale of the issues involved. Students may feel helpless in the face of sustainability challenges on a global scale. In a traditional classroom, students may conclude that the impact of their efforts will be insignificant. Research suggests service-learning may provide an effective educational platform for teaching ethics related to sustainable development and

social sustainability, as well as basic principles of sustainable design (Al-Khafaji & Morse, 2006; Pritchard, 2000; Valdes-Vasquez & Klotz, 2011).

Service-learning is a pedagogy that promotes educational experiences in which students participate in and reflect upon organized activities that meet identified community needs to gain further understanding of concepts being taught and a broader understanding of the overall discipline (Hatcher & Bringle, 1997). Students who participate in service-learning develop more sophisticated metacognitive abilities, better strategic planning and task analysis skills, better ability to discriminate useful from insignificant information, and better understanding of client needs and constraints (Lemons, Carberry, Swan, & Jarvin, 2011). Community engagement and partnership is gaining recognition as a new and important dimension of learning (Gelmon, Holland, Driscoll, Spring, & Kerrigan, 2006) and service-learning directly promotes engagement and collaboration. Multi-faceted approaches are common among service-learning courses. In general, service-learning includes four components: (i) interaction and collaboration between the community and the students, (ii) critical reflection on how the service has impacted the student, (iii) actively learning from real-world application of course content, and (iv) devotion and caring amongst participants (O'Grady, 2000).

Al-Khafaji and Morse (2006) suggest that service-learning is a particularly effective strategy to better incorporate sustainability into curricula. By cultivating a sense of civic responsibility, engagement, and commitment to community (Astin & Sax, 1998; Astin, Sax, & Avalos, 1999) service-learning may promote a greater sense of stewardship toward local and global environments. The success of combining classroom learning and outside classroom experience has resulted in recent increases in offerings of and publications about service-learning courses across disciplines (Al-Khafaji & Morse, 2006; Talbert, Farnkhopf, Jones, & Houghtalen, 2003).

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