Abstract

The Urban Agriculture Community-Based Research Experience (U-ACRE) is designed to attain four main objectives: 1) develop student research skills through community engagement; 2) connect undergraduates to professional networks and increase dissemination skills through presentations, grant writing, and publication; and 3) increase awareness of STEM fields and USDA careers in undergraduate students as well as K-8 students through mentoring and involvement with U-ACRE; and 4) advance applied research and outreach with community partners to improve food security and nutrition through the use of urban agriculture.

U-ACRE community partners include food producers (aquaponic farm and arboretum), food providers for low income consumers (transitional living center and food distribution centers), schools (K-8), and non-profit social enterprises (café and culinary training for young adults emancipated from the foster care system). U-ACRE students all complete an extensive online on sustainable urban food systems, and participate in ongoing research service learning and internships classes. Our U-ACRE students benefit from active engagement in ongoing research, serving as team leaders at community sites, mentoring K-8 students, submitting applications to the Institutional Review Board at CSUF, presenting papers and/or posters at national and local conferences and to county-wide community organizations. Outputs include: thriving urban gardens at schools and other facilities, a lunch waste diversion program through vermicomposting (with corresponding data collection app) at a large middle school, U-ACRE student designed garden iPad app for K-8 students, sustainability tutorials for K-8 students focused on nutrition, urban farming, and environmental education. Formative assessment at the first milestones shows significant increases in skills and knowledge of research, urban agriculture, and communication skills, as well as USDA career opportunities. Our partners have benefited from increased access to fresh foods and nutrition knowledge as well as enhancement of urban farming and resource management methods and practices.

Introduction

In Orange County, 34% of low-income households experience hunger at least once a day and well over 1/3 are children. U-ACRE will seek to improve OC’s food security and engage diverse students in STEM fields by 1) providing underrepresented undergraduates to gain knowledge, skills, and handson experience in food and agricultural sciences, preparing them for USDA-related occupations; 2) providing innovative instruction through service learning, community-based research and web-based platforms; and 3) providing the community with expertise in urban agriculture and sustainable practice, including a replicable model for increasing food security and improving nutrition.

Food insecurity disproportionately affects underrepresented communities, which makes it imperative that institutions develop ways for students from these groups to attain an undergraduate education that includes exposure to and experiences in STEM disciplines. Yet Hispanics, the group most affected by food insecurity, also have the lowest educational attainment (Estrada 2009), representing just 6.8% of those earning bachelor’s degrees in STEM fields, and 4.7% of those earning STEM master’s degrees in 2010 (National Center for Education Statistics 2012). As momentum builds to increase the diversity of students prepared for studies in priority areas such as Global Food Security and Hunger, it is particularly important to mentor underrepresented students so that they can gain ground in acquiring STEM skills.

Urban agriculture can simultaneously increase community food security and engage diverse students in STEM fields—outcomes that the current U-ACRE project is already demonstrating. Moreover, experiential learning, which lies at the heart of U-ACRE, increases research skills; aids retention, particularly for underrepresented students (Osborne and Karukitis 2009, Summers and Harbowski 2006); and promotes student preparedness and interest in STEM and NIFA-related fields (Langley-Tumbaugh et al. 2007, Barlow and Villarejo 2004, National Research Council 2003).

Discussion

In addition to student research projects completed, U-ACRE students have developed three iPad apps for university data collection and/or K-8 student learning and presented at 33+ national and local conferences including community presentations to the OC Food Access Coalition and the Fullerton School Board. Frequent presentations and a high level of community engagement open opportunities for direct and authentic assessment. U-ACRE student learning outcomes are achieved by our students as they mentor Ladera Vista Junior High School (LVJHS) students. Research projects involving the school garden and vermicompost units include: understanding the influence of garden-based programs on adolescent food preferences and choices; factors affecting the amount of food waste diverted and worm castings produced through vermico-mposting lunch waste; citizen science and its effects on environmental attitudes and evaluating the effects of technology in the garden. Our latest cohort of students is using the results from previous cohorts to design their research including: decreasing food particle size further with the addition of a bike-generator to power a food processor. This will allow us to add experiential learning opportunities with engineering and alternative energy. Project diversity is increasing over time and with expanding K-8 partnerships.

The U-ACRE collaboration with the nonprofit Pathways of Hope (includes multiple transitional living and food distribution centers), involves maintaining an urban container garden as well as opportunities for research. U-ACRE research projects include focus group interviews to increase understanding of fresh food utilization by low income communities, mapping the use of space and time for food acquisition by food insecure adults, as well as enhancing and measuring agricultural productivity through the design and implementation of an aesthetic and water efficient urban garden. U-ACRE project depth and breadth is increasing with 11 community partners to date and the invitation to collaborate with the American Heart Association and Second Harvest Food Bank in the future. Our capacity to serve students is increasing with faculty time the strongest limiting factor.