Fall 2013

Farms on Campus: Strong Stakeholder Support for an Educational Garden at a Non-Land-Grant University

Gina M. Bacigalupi
San Jose State University

FARMS ON CAMPUS: STRONG STAKEHOLDER SUPPORT FOR AN EDUCATIONAL GARDEN AT A NON-LAND-GRANT UNIVERSITY

A Thesis

Presented to

the Faculty of the Department of Environmental Studies

San José State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science

by

Gina M. Bacigalupi

December 2013

The Designated Thesis Committee Approves the Thesis Titled

FARMS ON CAMPUS: STRONG STAKEHOLDER SUPPORT FOR AN EDUCATIONAL GARDEN AT A NON-LAND-GRANT UNIVERSITY

by

Gina M. Bacigalupi

APPROVED FOR THE DEPARTMENT OF ENVIRONMENTAL STUDIES

SAN JOSÉ STATE UNIVERSITY

December 2013

Dr. Rachel E. O'Malley — Department of Environmental Studies, San José State University

Dr. Will Russell — Department of Environmental Studies, San José State University

Dr. Ellen L. Woodard — Department of Geography & Environmental Studies, California State University, East Bay

Abstract

FARMS ON CAMPUS: STRONG STAKEHOLDER SUPPORT FOR AN EDUCATIONAL GARDEN AT A NON-LAND-GRANT UNIVERSITY

by Gina M. Bacigalupi

University farms and gardens are increasingly seen as effective tools for learning a variety of academic subjects and as resources that allow users to connect experientially to nature. Most existing university farms, however, are found at resource-rich land-grant universities. This research evaluated stakeholder interest and willingness-to-pay in money, time, and labor for a proposed educational farm at a public, urban, non-land-grant university through an online survey of over 400 members of the California State University East Bay, Concord Campus community. Overall, support for an educational farm at this site was high amongst all stakeholder groups. Students and stakeholders who hold multiple positions on campus reported greater interest in interacting with a campus teaching farm than did faculty and staff, while administrators expressed the least likelihood to participate in the proposed farm. Younger respondents and females anticipated greater interaction levels than did older or male groups. Income affected willingness-to-pay paradoxically: middle-income respondents anticipated contributing the greatest financial support, while those in the highest and lowest income categories projected contributing the smallest levels of financial support. Across all stakeholders, high interest in garden-based education reflected the recent growth of urban gardening and experiential learning in city centers around the world. More avenues may be needed for administrators, decision-makers, and funders to interact with garden classrooms to render university teaching gardens more viable, widely-utilized, and financially tenable.

Acknowledgements

I would like to start out by acknowledging my thesis committee. First of all, thank you to my chair, Dr. Rachel O'Malley for her help in turning a project into a thesis and for helping me produce a document I am proud of. She never lost confidence in my abilities or me. Thank you to Dr. Will Russell for his feedback, editorial prowess, and guidance throughout the process, start to finish. A heartfelt thank you goes to Dr. Ellen L. Woodard who gave me this project in the first place. Always in my corner, she has been and continues to be a role model, mentor, and friend.

My research would not have been possible without support from the College of Social Sciences Research Grant. I am grateful for key individuals from California State University, East Bay who include: Darice Ingram for her online survey genius, Dr. David Larson for his continual support of my work – he and Dr. Woodard are the reason I went to graduate school, Brian Cook who gave me the go-ahead to conduct research on the Concord Campus, Marcia Brown for helping me reach out to the Geography and Environmental Studies students, and Kathleen Bryant for her insight into the world of Scholar OLLI. My time at San José State University was definitely improved by: Dr. Shannon Bros-Seemann who inspired me, showed me a new way to learn and teach, and helped me answer many of my "why" questions, Alan Levanthal who was my go-to-computer guy and always had pearls of entertaining wisdom to share, and Signora Dorina Cereghino, my Italian professoressa who kept me grounded, sane, and excited to learn the language of my relatives.

On the day of the graduate student orientation, I sat at our department's seminar table with Amy Peterson, Brittney Relerford, Lisa Henderson, Miranda Melen, Nora Cata, and Rebecca Riesenfeld-Dannels, the six other ladies in my cohort. Dr. Russell told us to look around and understand that we would be each other's support system, friends, and colleagues, whom we would depend on throughout our time in the program. Though none of us knew it at that moment, each of us felt we could get through it alone, that we were not there to make friends. About two weeks in, we realized how incredibly lucky we were and how we could not be in better company. It has been a privilege and an honor to be amongst these smart, kind, supportive, and genuine women.

In addition to my cohort, I had the opportunity to befriend some truly wonderful people who have continued to support me, console me, and cheer me on in both my academic and personal lives. I met Geno Uliana in Dr. O'Malley's Sustainable Agriculture class, where we bonded over our Italian heritage, love of soccer, and similar way of thinking. Spending time with him either outdoors hiking or inside eating crêpes provided much-needed breaks from my thesis work. I have always been one to study alone, so when I agreed to swap study notes and review test material for with Nick Friedman, I did not expect either to be a very useful endeavor. I am happy I was wrong and so incredibly thrilled I took that chance, for not only did I learn from him, but he became a dear friend, whose advice and guidance have helped me immensely. My cohort had the pleasure of adopting Michael Hobbs from the previous year's cohort. Kind, generous, and thoughtful, he was always willing to go out of his way to lend a hand if any of us needed help. I have also had the good fortune of getting to know his son Ryan. I am grateful to them both for their keen insect collecting skills; my collection for entomology class would have been seriously lacking without their assistance. Being around them is always fun, as I have discovered through cooking and holiday crafting sessions at their house.

I must also thank my family, family friends, and longtime friends. Their inquiries into how my research was coming along or how I was enjoying grad school were always welcome and appreciated. This was especially true of the Palmer Family, and I was happy to share my progress with them. I thank Kathleen Palmer for attending my thesis defense and being willing to come to my defense when the discussion amongst audience members got lively. The same goes for my Auntie Carol. She and my Uncle Bob continue to be huge influences on my life. Related by love instead of by blood, they have both taught me so much about who I am and what values and morals matter most. Though Uncle Bob is now with me only in spirit, he continues to be my male role model. I miss him and his mischievous smile dearly. My Auntie Carol started as my kindergarten teacher but has since become my confidant, someone I can share my ideas, hopes, and dreams with. I adore the time we spend together, especially our movie nights and birthday lunches in San Francisco. Lastly, I thank my mom, Arilla. I would not be the person I am today without her boundless amounts of support, love, and energy. I am ridiculously lucky to have her and would not have come this far in my academic career or life in general if I did not have her. Her willingness to help me with whatever I ask, her tolerance of the ups and downs that is the life of a grad student, and her strength amaze me on a daily basis. Because of this, I am willing to forgive her for putting my childhood

dog Ginger's name on my fourth grade field trip permission slip instead of mine. It is the least I can do.

Table of Contents

List of Figures

List of Tables

Introduction

Background, Motivation and Scope

As early as 1876, an increasing number of farmers were losing interest in farming, despite the efforts of land-grant universities (Gras 1925). These institutions were specifically designed to appeal to everyday people, as opposed to just the upper echelons of society (Gras 1925). Waning farmer interest along with the agricultural industrialization of World War II, where small-scale farms were pitted against large-scale farms with an unprecedented intensity, produced a movement away from agriculture toward other professions (Howard 1945).

Agricultural industry coupled with convincing advertisements and the deterioration of workers' wages have, for decades, trained Americans to settle for quick, low-quality, cheap, processed food that often bears little resemblance to its original ingredients. The loss of knowledge regarding food sources and origins that followed contributed to the dependency on unsustainable lifestyles that many Americans now suffer (Ikerd 2011). A separation from food awareness also represents an increasing disconnect with nature, as many Americans spend their time indoors engaged with technologies, instead of being outside interacting with their natural surroundings (Cheng & Monroe 2012). A high consumption of cheap, processed foods and a low amount of outdoor physical activity have helped exacerbate the obesity and diabetes epidemics currently plaguing Americans (Ikerd 2011).

More people are concerned about the origins of their food, how it is grown, and the widespread use of pesticides and fertilizers. Community gardens are increasingly popular as they help with cost savings and motivate neighbors to get involved (Parry et al. 2005). This food revolution has spread to university campuses as well, primarily in the form of educational farms and gardens (Allen & Brown 2006; Parr & Van Horn 2006). Educational farms may provide a unique and valuable learning environment that can be integrated into a variety of disciplines while at the same time helping to reeducate visitors about their relationships with food. Nuances of their adoption and management, however, remain unclear, especially for public, non-land-grant universities that serve culturally diverse populations and have limited resources.

Literature Review

How Americans Managed to Disconnect and Reconnect with Their Food

Industrialization of Agriculture

The origin of agriculture is associated with a broad stretch of land spanning from Europe through the Fertile Crescent in the Middle East to southeast Asia, while the second agricultural revolution began in Western Europe (Bowler 1992). The timespan of this second major period of agricultural advancement is widely debated, with some identifying the beginning as early as 1000AD and others citing it as late as the mid-1800s. Regardless, the second agricultural revolution introduced improvements such as better equipment for draft animals, the concept of crop rotations, the use of horses instead of oxen, the idea of using grasses and legumes to improve soil, and the development of better vegetable varieties (Bowler 1992). The Industrial Revolution shifted agricultural focus from subsistence to surplus and commonly-owned fields to privatized lands.

The third agricultural revolution occurred in North America. Beginning in the late 1800s, this period of transformation featured the increasing importance of off-farm inputs, with the first petrol-powered tractor being built in 1892, the first food manufacturing plant opening in 1907, and the horse becoming obsolete in the 1920s and 1930s (Bowler 1992). Each agricultural "improvement" brought about more mechanization and greater disconnect with the majority of the population and their food (Grey 2000).

The Land-Grant University

Mandates and Motivations

Much of the technology present in modern agriculture has come out of the land-grant universities, and due to their influential role in shaping American agriculture over the past 150 years, their inception, history, and more recent status should be acknowledged. Representative Justin S. Morrill of Vermont served in the House of Representatives from 1854-1866 before becoming and remaining a Senator until his passing in 1898 (Duemer 2007). During his political tenure, he was concerned with the effective utilization of public lands, inadequate farming methods, and educational institutions that were ineffective at meeting the needs of those in the mechanical arts. He specifically wrote the Morrill Act to open universities up to laymen, hoping to shed the esoteric collegiate image. Although passed in both the House and Senate, President Buchanan vetoed the bill. Morrill's efforts were later supported by President Lincoln who was dismayed at the government's sluggishness at forming a department of agriculture. The Morrill Act was passed in 1862, yet it was not the first attempt at a movement linking public land and education. Since Colonial times, land grants were used for higher education as well as for schools, hospitals, asylums, and institutes for the deaf. President Jefferson proposed the selling of public land in order to fund education. Though touted as landmark legislature, Duemer (2007) suggested it was a natural progression.

The act provided 17,430,000 acres of public land, giving 30,000 acres per senator and congressman in each state to establish universities for the general populous

(McDowell 2003). All 151 land-grant institutions developed during this time were classified as Doctoral/Research Universities. In 1862, 60% of Americans were farmers, compared to less than 2% today. For the first time, collegiate institutions made classes and degrees accessible to the working masses, claimed no subject matter (including dairy barns and blacksmith forges) to be unworthy of study, and permitted access to information by citizens who would normally not be accepted to or have the desire to attend higher education (McDowell 2003).

World War II's Contributions to Agricultural Industrialization

The industrialization of agriculture marked a huge shift in the production of food, becoming less personalized and having a narrow focus of production and efficiency (Grey 2000). World War II called on US farmers to produce like they never had before. In 1942, the US Department of Agriculture asked farmers to produce 125 billion pounds of milk, 28 million head of cattle and calves, 4 billion dozen eggs, 83 million pigs, and to plant 3.4 million acres of peanuts and 9 million acres of soybeans (Sloan 1947). These amounts were often double or triple those during peacetime. In 1944, farmers produced 136% of what they had between 1935-1939 (Sloan 1947).

There was also a push to use agricultural products in industry; corn and sugar were turned into alcohol for explosives, cotton was used for gunpowder, linseed was used for battleship paint, and gourd fibers were turned into sponges (Sloan 1947). Thus, not only was food needed to feed citizens but it was also needed for industry, thus putting a greater demand on farmers to produce. As increased mechanization and industrialization removed individualism from farming and streamlined it toward centralization, a growing number of farmers became disenchanted with their profession (Howard 1945). Industrialization made it progressively more difficult for small-scale farmers to succeed.

The industrialization of food, including the chemical alteration of agricultural products into new edible and inedible items was considered by chemists prior to the 1920s but entered a more social arena in 1934 with the formation of the National Farm Chemurgic Council (Howard 1945). This group advocated the continual teamwork between those in science, industry, and agriculture. In 1938, the Department of Agriculture commissioned four large research laboratories strategically positioned in major farming areas: Peoria (IL), New Orleans (LA), San Francisco (CA), and Philadelphia (PA) with the goal of finding new ways to use agricultural crops in industry (Howard 1945).

Despite emphasis on increased farm production, food shortages were still a problem. The military was responsible for taking a large portion of food production, thus prompting a rationing in the domestic sector. Women became the target audience of large propaganda campaigns during WWII, and the success of rationing depended on their cooperation (Yang 2005). Women were essentially given an entirely new set of food rules; they were told what food was healthy, instructed to choose nutrition over taste, to cook frugally and simply, and were urged to seek food substitutes and learn additional culinary skills in order to work with the different types of food available. The government's nutrition campaign not only changed food rules but also altered America's eating habits (Yang 2005). The media successfully found ways to change women's attitudes and behaviors toward food. Women technically had a choice; they could have chosen not to conform, but in wartime, no one wanted to seem unpatriotic.

Victory gardens were another important way for citizens, especially women, to show patriotism. Victory gardens were not only encouraged as a means to reduce pressure on commercial farmers but also as a way to restore order during a period of intense uncertainty (Miller 2003). In 1943, there was an estimated 18-20 million victory gardens. Self-sufficiency was closely associated as a constituent of American freedom; citizens were once again able to feel a sense of individualism by producing their own food on their own land (Miller 2003). Gardening was a way to strengthen ties with neighbors and community members while promoting eating healthily and exercising.

Impact of the Built Environment

Consisting of the "neighborhoods, roads, buildings, food sources, and recreational facilities in which people live, work, are educated, eat, and play," the built environment has been proven to influence both eating habits and levels of physical activity, especially in children (Sallis et al. 2006, 90). Historically, communities were designed with easy pedestrian access, employed mixed land use techniques, had a grid of connected streets, and had moderate to high density. Communities built post-World War II were generally in suburban areas geared toward using cars as the main method of transport; these communities may have little or no access to safe walking, biking, or playing areas. Sallis et al. (2006) found that without this access, sedentary behaviors increase, leading to a higher chance of obesity. Eating habits and physical activity patterns are often developed during childhood and can contribute to health problems later in life.

The Green Revolution

The Green Revolution was born from pressure to increase crop yields, the repurposing of World War II military chemicals into pesticides and fertilizers, and the well-funded, land-grant university powerhouses (Matson et al. 1997; Tilman 1998; van den Bosch 1978). Farmers were encouraged to douse their fields in chlorinated hydrocarbons like dischloro-diphenyl-trichloroethane, commonly known as DDT (Matson et al. 1997). This family of pesticides can remain in the environment for decades after application. Organophosphates and carbamates were two other new types of chemicals at farmers' disposal, and though not persistent like DDT, they are instantly toxic to target and non-target fauna (Matson et al. 1997).

As early as the 1960s, ecological ramifications of heavy pesticide use were already being noticed. Rachel Carson's 1962 seminal work *Silent Spring* brought public attention to the destruction these chemicals were doing to the environment (van den Bosch 1978). This sparked copious amounts of research over the following decades into the environmental pitfalls of pesticide use, eventually showing that they contribute to the disruption of natural nutrient cycles, soil erosion, loss of soil fertility, reduction of beneficial species and general biodiversity, and the pollution of groundwater, waterways, and the atmosphere (Matson et al. 1997; Tilman 1998). Another important work was Robert van den Bosch's 1978 book *The Pesticide Conspiracy*, which highlighted the collaborations between the pesticide industry, land-grant universities, the government, and other agribusinesses. He advocated alternative pest control strategies, such as integrated pest management (IPM), which promotes a more holistic approach than mainstream methods, combining knowledge of the ecosystem and the organisms' biology with close monitoring and timely action (van den Bosch 1978).

Movements Toward an Alternative Food Stream

World War II facilitated the current industrialized food economy by emphasizing "capital-intensive farming and efficient production" (Grey 2000, 144). Before the war, farmers grew a variety of crops, but afterwards many switched to monoculture, especially after the Green Revolution's promotion of high-yielding seed (Matson et al. 1997). The ownership of food production transitioned from farmers to expanding transnational and multinational corporations that sought to own and control all steps of the production process, from seed to sales (Grey 2000). Through contracts with growers (that often indebt the grower to the corporation), they ensure products are standardized and of equal quality (Grey 2000).

Inspired by works of prominent authors like Rachel Carson and Robert van den Bosch, the natural food movement encouraged individuals to source or produce their own natural foods, supporting the development of today's food revolution and alternative food movements (Ikerd 2011). Beginning in the 1960s, the movement spread into the 1970s and 1980s with increased concern about the effects of agricultural pesticides, allowing for the upswing of the organic movement of the 1990s. The movement's popularity caused big retailers to want to participate, industrializing the alternative foods market and pushing more dedicated consumers to abandon the burgeoning mainstream organic movement and seek locally grown items instead (Ikerd 2011).

While the industrial food stream is mainly concerned with profits, the alternative food stream favors direct marketing techniques, working to create connections between producers and consumers, urging both to take an interest and have a stake in the products' quality and the degree of sustainability of production (Grey 2000; Hinrichs 2000). The direct connections between producer and consumer are increasingly important. Prior to World War II, farmer's markets were much more commonplace than they were after the war. Due to an increasing concern about the future of the family farm, counterculturalism, and an upsurge in environmentalism in the mid-1970s, farmer's markets began to become more popular again (Hinrichs 2000). The number of farmer's markets has been doubling each decade ever since (Ikerd 2011). The number of community supported agriculture (CSA) programs has also risen. These subscription-based programs allow members to purchase a share of a farm's produce. Members pay upfront for a season and receive a weekly supply of food. Many CSA shares are delivered to homes or drop-off locations, but some require the shareholder to visit the farm for pick-up. This allows the consumer to actually see where the food is grown and under what conditions and can provide even more educational opportunities than buying from a market stall (Hinrichs 2000).

Agroecology: An Interdisciplinary Field

An Indefinable Term

The rise of the alternative food stream popularized the term agroecology. Since it is such an integral part of the movement, it is necessary to acknowledge its history and evolution. Scholars differ on who first coined the term agroecology (Dalgaard et al.

2003; Wezel et al. 2009). By the 1970s, agroecology was defined as a scientific discipline and by the 1980s, was also seen as a social movement with set practices (Wezel et al. 2009). These two decades were marked by increasing concern about pesticide use by the public and usage of off-farm fossil fuel-dependent inputs by members of the agricultural community (Altieri 1989). Interest in more sustainable farming practices was heightened.

Agroecology is closely linked with sustainable agriculture, a highly debated phrase. With seemingly countless definitions, sustainable agriculture generally involves environmental and cultural sustainability (Edwards et al. 1993). The proposed role of agroecology is to support the development of sustainable food production systems and to seek out possible interactions within those systems that can help reduce environmental degradation and intense use of natural resources due to conventional farming methods (Dalgaard et al. 2003).

Dalgaard et al. (2003) divided agroecology into two complimentary branches of science – hard and soft. The hard side focused on physical and natural science issues such as the unhealthy state of much of conventionally managed agricultural lands. Only pursuing hard science approaches was considered impractical at attempting to feed the growing population. The soft side traced energy through each level of an agroecosystem and incorporated the role of humans and their ability to develop and take control of their own food systems (Dalgaard et al. 2003).

Contributing to agricultural sustainability, agroecosystems promote a balance of productivity and stability (Wezel et al. 2009). As a science, agroecology has expanded its scale beyond the field to include the entire food system, incorporating interactions between all living organisms in an agroecosystem (Dalgaard et al. 2003; Wezel et al. 2009). Agroecology aims to be truly interdisciplinary, often including aspects of agronomy, ecology, sociology, anthropology, and economics and as a result, lacks a uniform definition (Dalgaard et al. 2003). The term and its usage encompass different elements in different countries. Some consider it as solely a science, or a social movement, or a practice, though these different categories are often connected (Wezel et al. 2009).

Critics of agroecology cite both scale and interdisciplinarity as potential barriers. Dalgaard et al. (2003) claimed there was a discrepancy between the scale of agroecological research and the level at which decisions regarding that research are made. Small-scale studies at the farm field level are often generalized to the regional, national, or global levels that decision-makers require, leading to misinterpretation of results or a complete disregard of the study. For agroecology to succeed as an interdisciplinary field, knowledge needs to readily flow from the disciplines involved, which is not always easy due to continual subject specialization and different languages of communication (Dalgaard et al. 2003).

Agroecology as a Social Movement

The current popularity and increasing use of the word agroecology is representative of the concern about how food is grown. The term represents the alternative food steam, incorporating agriculture, ecosystems, and human interactions. It is not, however, always a simple move from conventional thinking to agroecological methodology. Altieri (1989) posited how agricultural problems were often seen as technology problems; historically when there is a problem, new technology is developed to alleviate it. Sustainability cannot be viewed as merely a technology problem because agroecological solutions generally do not require much technology. What need to be attended to, however, are the socio-economic factors controlling what food is produced, how, and for whom. Any agroecological strategies developed should include both social and economic factors (Altieri 1989).

Francis et al. (2003) cited human behavior as a vital part of agroecology. It connects people with their food, a quality lacking in the conventional food stream. They claimed the disjointedness the conventional food stream creates represented a "separation and lack of awareness of how and where food is produced and processed" and how it contributed to "people's decisions to consume fast food while discounting the importance of health as well as other human and environmental impacts" (102). As people view themselves as part of the agroecosystem, they are motivated to evaluate the system and to hopefully make an effort to increase the system's sustainability. Francis et al. (2003) asserted that despite our potential to and tendency to disrupt (agro)ecosystems, people do have the power and skills to (re)develop sustainable food systems.

Land-grant universities - Bound by Policy and Not Untouchable: Challenges Currently Faced

The mere nature and existence of the agroecology movement has pointed out the current problems and failings of land-grant institutions. For instance, Cooperative Extension Services, the outreach arm of the land-grant university system that for decades has represented a transfer of technology from scientist to farm, has seen a decline in public financial support over the last decade. From 2000-2005, nine state legislatures decreased the amount allocated for extension services (Warner 2008). The University of California Cooperative Extension Service endured a 25% budget cut during the same time. According to Warner (2008), "the viability of publicly funded extension services" is called into question as the popularity of "crop consultants" and "privatized extension services" rises (759). This also indicated that members of the farming community felt some extension services do not meet their needs (Warner 2008). Furthermore, many scholars at the land-grant universities try to abandon their teaching duties in favor of research; they have claimed good research is the necessary precursor to adequate teaching, but McDowell (2003) claimed there is little correlation between research productivity and student views of teaching effectiveness. For an extension service to function correctly, its agents need to be responsive to the values and needs of the citizens it is supposed to be serving (Warner 2008).

Land-grant universities have enjoyed decades of success but have found themselves under an increasing amount of pressure to find ways of better serving the needs of laypeople. With reduced funding from federal and state sources, it was evident according to Armbruster (1993), that the public was not valuing the output of land-grant institutions like they had in the past. He called for an evaluation of citizen concerns and a subsequent adjustment of research, extension programs, and teaching. Land-grant institutions need to be seen as unique, with a broadened knowledge base in research and education programs and publicly accessible research information in clear language free of heavy academic jargon. As people become less concerned with cheap foods and more concerned about sustainable food production, Armbruster (1993) proposed an interdisciplinary approach will be needed to address these concerns.

Though criticized for not meeting the needs of small-scale farmers, farmers of color, farmers interested in sustainable practices, and even large-scale industrialized farms, Ostrom and Jackson-Smith (2005) claimed there is a general agreement amongst land-grant institutions that they cannot afford to meet everyone's needs. There is much debate as to whose needs should be prioritized. The institutions admit influential agricultural interest groups often motivate research priorities. This is also in keeping with a general move by land-grant universities toward biotechnology research and development so as to attract new financial supporters as well as exemplar students and faculty.

Theoretical Basis and Framework

Experiential Learning in Agricultural Education

Two essential parts of education are creating enthusiasm in students and linking the subject matter to past experiences (Francis et al. 2011). The theory of experiential learning involves the student interacting in meaningful activities (Parr & Trexler 2011). Key elements of experiential learning include moving outside the classroom and relating lessons to hands-on, practical applications. A similar, parallel theory is called action learning, where acting and learning are one in the same (Lieblein et al. 2004). In experiential learning, focus is put on the learning process instead of solely on content. At the collegiate level, the goal is to create graduates who are independent, critical thinkers who have the tools to deal with a constantly changing and complex world. It is useless if students have book learning yet lack an understanding of how to apply this knowledge in the real world. Beyond this, integrating attitudes and morals into education forces students to realize and acknowledge their own values (Lieblein et al. 2004). Material needs to be pertinent to the students and have a culturally appropriate context.

Agroecology lends itself well to the elements of experiential learning. Combining classroom lectures with actual field experience were favored by students in a study by Parr and Trexler (2011), and it was these two components that actually led students to choose sustainable agriculture as their major. Lieblein et al. (2004) highlighted practicality over theory, emphasizing how action education provides a set of skills and methods for studying the intricacies of farming and food systems. Agroecology's interdisciplinary nature implies learning via a systems approach, creating well-rounded students (Francis et al. 2011).

Lieblein et al. (2000) called for change in agricultural colleges, claiming education and research programs have become too narrowed and do not readily foster the exchange of knowledge and information from one department or field to the next. Narrow approaches cannot adequately address broad-scale issues such as agricultural sustainability. Cross-disciplinary sharing of information is crucial as is interacting with those outside academia and in the agroecology field; this can be achieved through guest lectures or internships (Lieblein et al. 2000). Experiential, action, and participatory learning often include the instructor removing himself or herself from the role as sole holder of knowledge and becoming a learner alongside students (Lieblein et al. 2004).

Stakeholder Perceptions

Importance of Gathering Stakeholder Input

Collecting stakeholder input is a vital yet often underutilized tool for program and policy planning and priority setting. A stakeholder can generally be defined as someone who has the right to comment or contribute input to at least a portion of the decision-making process; generally those with some knowledge of or stake in the situation are preferred (Mariger & Kelsey 2003; Warnick & Thompson 2007). When evaluating a system or program, stakeholder perceptions can provide insight that may have otherwise been overlooked by researchers (Dallimer et al. 2009). Furthermore, stakeholder groups can provide a wide array of knowledge, expertise, experience, and backgrounds that can assist the decision-making process or program evaluation (Dallimer et al. 2009). Mariger and Kelsey (2003) acknowledged that while ideal, it was sometimes impractical and very difficult to gather stakeholder input at every step of the process. They recognized, however, the importance of gathering stakeholder input for aiding decision-makers and especially for garnering eventual stakeholder support of revised or proposed programs.

Land-Grant Universities Required to Gather Stakeholder Input

Gathering stakeholder input is especially important and necessary in the university setting because, as Dunn et al. (1985) suggested, it provides professors with insight they can apply to their teaching and research. For land-grant universities, collecting stakeholder input is required. Though originally developed to serve its citizens, land-grant universities largely abandoned this commitment during the 1950s and 1960s when emphasis was put on technology (Kelsey et al. 2001). Professors who favored research over teaching became predominant, and prominent universities had trouble keeping esteemed research professors unless they were promised research would take priority (Kelsey et al. 2001).

The 1980s and 1990s brought a number of critics of this research-heavy emphasis of the land-grant institutions. To help develop more citizen-sensitive research priorities, a portion of the 1998 Farm Bill, called the Agricultural Research, Extension, and Education Reform Act, required stakeholder input be gathered from those who both conducted and used agricultural research and extension or education programs from land-grant institutions (Kelsey & Pense 2001; Kelsey et al. 2001). Kelsey et al. (2001), found the longer research professors remained at Oklahoma State University, the more they focused on research and less on teaching. Even the style of their research changed from research that could immediately be put to practical use to the more lucratively funded, long-term, esoteric research. At the same time, faculty acknowledged both the need to identify and serve stakeholders as well as the barriers to doing so. Stakeholders generally preferred practical research, yet it was the long-term research that provided faculty with job security and opportunities for promotion. While applied research would be more accessible to stakeholder groups, more esoteric research was what conferred the professors' job security and promotion. Although stakeholder needs should be addressed, faculty in the study did not want to be held accountable by them nor did they want these groups steering their research.

If land-grant institutions fail to gather stakeholder input, they jeopardize their public funding. These universities could also be at fault if they design programs that do not accurately represent stakeholder values (Kelsey & Pense 2001). The 1998 Farm Bill was meant to encourage institutions to gather input from underrepresented citizens who had for decades been excluded from the process (Kelsey & Pense 2001). Gathering input often enhances understanding amongst stakeholder groups and allows those stakeholder groups to feel their participation has made a difference. Trexler and Parr (2006) noted the Kellogg Commission on the Future of Land-Grant Universities of 1999 strongly urges land-grant institutions to actively engage their stakeholders in order to properly adhere to the Morrill Act of 1862.

Consulting Stakeholders: Development of Academic Major or University Curriculum

Trexler and Parr (2006) and Parr et al. (2007) demonstrated the use and benefits of gathering stakeholder input for developing an undergraduate major in sustainable agriculture at University of California, Davis. Parr et al. (2007) suggested that because sustainable agriculture programs at the university level were relatively new, there were few models for developing curriculum, thus further necessitating the need for input. In both of these studies, stakeholder groups consisted of either academics in disciplines related to sustainable agriculture or were agricultural professionals. While faculty, staff, and graduate students sat on the development committee, it was unclear whether stakeholders other than those outlined above were consulted in the decision-making process.

Parr et al. (2007) found that for content, academics valued students in a sustainable agriculture major to have knowledge of natural sciences (especially ecology and soil science), social sciences (especially food systems and economics), and interdisciplinary and applied content knowledge (especially interdisciplinary studies and farming practices). For student experiences, they especially valued classroom coupled with field experience, followed by on-farm internships. In keeping with experiential learning theory, the academics valued progressive teaching techniques, emphasizing the value of hands-on, practical application. Though a different stakeholder group, similar results were found by Trexler and Parr (2006) when they consulted agricultural professionals. They felt the sustainable agriculture degree should have an interdisciplinary approach, intertwining agronomic, environmental, and social aspects of the field. The major should incorporate classroom discussions, team projects, and practical experiences ranging from farm visits to guest lectures to farm internships and apprenticeships.

Stakeholder Input and Perceptions and its Relation to Environmental Justice

Schlosberg (2004) acknowledged that if people are not respected, recognized, and considered, they will not participate in the greater community and claimed involvement in decision-making processes represents an element of social justice. Kelsey and Pense (2001) posited how participation "adheres to the core values of equity, parity, and justice" (26). Schlosberg (2004) stated environmental justice activists want policy-making procedures that not only encourage as much community participation as possible but also take cultural diversity into consideration. Thus, soliciting stakeholder input and gathering an understanding of what is needed and wanted by a community is indeed an aspect of environmental justice. This passion and demand for a role in the decision-making process stems from disenfranchisement, exclusion, and poor recognition

(Schlosberg 2004). Participation can often be seen as a right and has led to an increased sense of ownership of projects, greater social cohesion, and allowed more people the opportunity to learn and act, giving them a heightened sense of empowerment (Pretty 1995).

Community Gardens

New Wave of Urban Agriculture

The rise of urban agriculture is among the most important and influential ways of reconnecting people with their food. Urban agriculture is not a new concept, however. It has existed for thousands of years and includes historic examples such as the hanging gardens of Babylon, Machu Picchu, the medieval cities of Yemen, and Mexico City in the 15^{th} century (Smit 2002). Urban agriculture has been used in developing nations for millennia. According to Smit (2002), urban farming favors groups of people who have the tendency to be discriminated against in the workplace (such as women, young people, seniors, and poor people) because it does not matter who cares for the crops as long as they are tended. Urban agriculture fosters connections in the community and creates a common denominator amongst locals.

Urban agriculture has a broad definition that generally refers to agricultural activities within city limits and encompasses all sorts of garden projects such as community gardens, school gardens, entrepreneurial gardens, backyard gardens, windowsill gardens, and rooftop gardens (Brown & Jameton 2000). Agricultural activities are usually solely gardening-related due to US regulations about farming livestock in urban areas. Oftentimes vacant lots are used for gardens and can be leased to the community by the city or a private owner; this can unfortunately create problems because the land owner can choose to sell off the land at anytime, leaving the community without their garden.

The last urban farming wave was the victory gardens of World War II, which were able to grow significant amounts of produce during a time of rationing and food shortages. The most recent wave actually started back in the mid-1970s during the initial stages of the food revolution. City dwellers who subscribed to the new ecology movement and who were also upset about skyrocketing food prices decided to grow their own produce. According to Brown and Jameton (2000), some saw it as a way to show their concern for environmental stewardship while others used it as a way of uniting communities against poverty and reducing food costs.

Urban agriculture has had its legislative challenges, though. In 1975, a subcommittee hearing in the House of Representatives on the verge of authorizing a distribution of plants and seeds for urban gardening failed due to lack of support by the United States Department of Agriculture (USDA) and the influence of a group of seed companies and other agribusinesses (Brown & Jameton). In 1977 Congress approved $1.5 million for the Urban Gardening Program that would support gardens in six cities via grants ranging from $150,000-$250,000 from the Cooperative Extension Service. In 1993, the pool of money increased to $3.6 million for gardens in 23 cities. The program soon fizzled due to lack of support from the USDA, the House, and the Cooperative Extension Service. Today urban gardening ventures are supported by private donations, grants, philanthropic gifts from individuals or foundations, loans, support from businesses, entrepreneurs, and sometimes even the government (Brown & Jameton 2000).

Health Benefits of Urban Agriculture

Brown and Jameton (2000) highlighted the many human health benefits of urban agriculture. It increases access to affordable fresh produce, thus improving nutritional health and helping ensure food security in food deserts. Urban farming requires manual labor, providing a source of physical exercise as well as the use of gross and fine motor skills. Gardening increases quality of life and reduces stress, even for passersby. It takes political efforts, which helps foster leadership development and community organization. Urban agriculture also provides environmental health benefits in the form of increasing biodiversity in communities by supplying habitat and food sources for pollinators and other wildlife.

Community Health Benefits of Urban Agriculture

In addition to providing access to fresh produce or increasing biodiversity, community gardens foster social benefits, including social capital (Alaimo et al. 2010). Generally, social capital can be measured at the "national, state, local, and neighborhood levels" and considers factors such as crime rate, mortality, and health status (498). Individuals or the neighborhood as a whole can promote social capital at the community level. If seen as a community or neighborhood effort, neighborhood projects where some residents participate is sufficient to develop a neighborhood-wide connection and fosters a level of trust that will carryover to those who did not take part. Community gardens count as a neighborhood activity that engages some of the community and hopefully inspires others to participate. Often these gardens end up focusing more on social and cultural experiences than actual cultivation of food. They help residents develop a better attitude toward their neighborhood, increasing opportunities to bond, assist one another, and take pride in the neighborhood. Chances for increasing social capital via community gardens can be aided by support from neighborhood organizations, such as a block club (Alaimo et al. 2010). Having an outdoor space where people can come together, learn, bond, and grow food is valuable.

School Gardens

Background and Benefits

School gardens have been promoted for centuries and include advocates like Rousseau, Gandhi, Montessori, and Dewey (Blair 2009). Initially introduced for aesthetic reasons, school gardens in the US became especially popular in 1918 and again during World War II yet declined in the 1950s as more emphasis was placed on technology. School gardens are designed for a variety of purposes including "academic, behavioral, recreational, social, political, and environmental remediation" (16). When farms and nature were more accessible to children, the purpose of school gardens was to teach students using experiential methods, provide a connection between agriculture and nature, and to increase or shape the children's awareness of both (Blair 2009).

Today, children lack regular access to farms and the learning experiences that come with it. As technology mesmerizes and organized sports beckon, children's schedules are micromanaged, leaving them little time for imaginative play and connection with nature (Blair 2009). Cheng and Monroe (2012) posited this lack of connection with nature could impact a child's development. School gardens can help fill this void if they are designed to contain small spaces, places to dig in the dirt, and areas where children can embark on imaginary adventures. According to (Blair 2009), few school gardens provide such natural elements and instead favor neatness and structure. She suggested school gardens go beyond growing produce and incorporate more nature in them, such as ponds, trees, and plants to attract pollinators.

Positive exposure and experiences with nature as a youth can lead to more heightened environmental awareness and action as an adult (Blair 2009). If a child connects with nature and feels a sense of inclusion, they should be more motivated to want to care for and protect nature (Cheng & Monroe 2012). Experiential learning is generally the type of learning children engage in while they are in school gardens (Blair 2009). Children's lack of access to nature coupled with "an overemphasis on factual knowledge has led to weakness in processing skills and critical thinking in the average US citizen" (19). By being in a school garden, children have the opportunity to engage and participate in inquiry-based learning (Blair 2009). Ozer (2007) found children who were involved with their school garden were more likely to feel a bond between themselves and their school. Skinner et al. (2012) found students who were "more engaged in the garden were more likely to be engaged in science and school in general" (29).

School gardening also fosters group learning and allows students to utilize skills not generally associated with classroom learning, such as physical strength or visual-spatial skills (Ozer 2007). Garden spaces can provide a break from the stereotypical sterile school environment by offering spaces that accommodate a variety of play behaviors and learning styles (Dyment & Bell 2008). Students who were on greened school grounds (including school gardens) were more likely to be more civil, to communicate more effectively, and to be more cooperative, according to a study by Dyment and Bell (2008). At the same time, they were better able to work in small groups and stay on task. Those children who often found the indoor classroom setting difficult could better interact and learn when they were outside.

Challenges

Both Blair (2009) and Ozer (2007) called for more rigorous evaluation of the effectiveness of school gardens. Blair (2009) cited systematic biases in data collection, the short duration of many experiments, and the poor design of experiments as three main problems with evaluative processes found in the current literature. She went on to state most of the evaluative studies on school gardens focused on third to sixth grade students, with studies on high school students and school gardens almost non-existent. She generally found science proficiency, nutrition, and food behavior to be the most common factors evaluated. Ozer (2007) suggested researchers go beyond questions relating to nutrition and examine the effects on children's social and academic development.

Blair (2009), Hazzard et al. (2011), and Ozer (2007) all acknowledged on-the-ground challenges of sustaining school gardens. Top barriers included lack of time, lack of gardening knowledge and experience on part of the teachers, lack of personal interest of the teachers, lack of funding, lack of space, lack of support from parents or volunteers, poor integration with standards-based curriculum, vandalism, inability to sustain the garden during school breaks, and lack of a garden coordinator. Hazzard et al. (2011) provided best practices for sustaining school gardens. In addition to emphasizing the importance of a garden coordinator who can run the garden and collaborate with teachers, they recommended schools develop a committee for their school garden that includes administrators, parent volunteers, teachers, and the garden coordinator. This way, responsibility is shared and tasks such as fundraising or gathering materials are delegated. The goal of the committee is to help ensure the continued use and success of the garden (Hazzard et al. 2011).

University and Student Farms

Examples from Land-Grant Universities

With the renewed interest in agriculture, namely sustainable agriculture, land-grant universities have been prompted to develop academic majors, curriculum, and student farms. A majority of efforts to inspire change are student initiated. A prime example is University of California, Davis (UC Davis). Parr and Van Horn (2006) discuss the history and progress of UC Davis' Student Experimental Farm, which was developed in the 1970s by a group of students concerned about the environmental and social impacts of conventional, mainstream agriculture. They were given about 20 acres (8 hectares) of land and financially supported by funds from the dean of the College of Agricultural and Environmental Science (CAES) to develop student research and education projects. Experiential learning principles were upheld from the start, and research projects took interdisciplinary approaches. After the first year, supportive faculty realized a farm manager was needed to coordinate and maintain the program. In the 1980s, three gardens within the farm were designed in efforts to give students practical hands-on experience. The demonstration garden, later called the ecological garden, was where students could learn about crops and horticulture. The market garden was a place for students to grow organic produce and sell it to an on-campus, student-run restaurant. The children's garden was an area where university students gave tours and classes to local elementary school children. In the mid-1980s, CAES funds paid for three part-time staff and one full-time farm manager/director. During the same time, the farm began offering a summer course in sustainable agriculture, and by the 1990s, two additional practicum courses were offered during the regular school year. In 2003, a group of students formed Students for Sustainable Agriculture and began pursuing the development of an undergraduate major in sustainable agriculture (Parr & Van Horn 2006).

The founding of the Student Organic Farm at Michigan State University is another leading example of student-initiated efforts. As Biernbaum et al. (2006) detailed, in Fall 2000, a group of students in the Student Organic Farm Initiative began looking for potential sites for a farm on campus and gathered information about other student farms. In Fall 2001 and Spring 2002, students wrote and submitted proposals to possible funding sources, including the USDA Higher Education Challenge Grant Program and the W.K. Kellogg Foundation. In 2002, the W.K. Kellogg Foundation granted them $95,000; between 2001-2005, approximately $120,000 was needed to set up their initial site. In 2003, the first farm manager was hired; in May of that year, the farm successfully produced its first crop of greenhouse-grown lettuces and root crops. They set up a CSA program consisting of three, 16-week sessions with 25 members the first year and 50 the second. They resubmitted a grant proposal to the USDA Higher Education Challenge program and this time received $100,000; they were able to hire an assistant farm manager as well as an education coordinator. By this time, hundreds of students were visiting the farm. Students involved with the farm began asking for classes on sustainable agriculture and related topics. In 2005, the university was given a USDA Integrated Organic Program grant that helped fund course development in 2005-2007. The proposed curriculum is designed to combine classroom coursework and practical, hands-on experiences at the farm. Biernbaum et al. (2006) remarked one of the biggest challenges was having enough people with both farming and people skills to sustain the farm and keep students learning; they highly recommend those developing a student farm start out with a full-time staff, expert, or farm manager.

Example from a Non-Land-Grant University

Despite the passing of the Sustainable Agriculture Research and Education Act in 1986, which urged the University of California to take initiative, since 1967, the non-land-grant University of California, Santa Cruz (UCSC) has been home to the UC system's first diverse sustainable agriculture program, now called the Center for Agroecology and Sustainable Food Systems (CASFS) (Allen & Brown 2006). The UCSC farm now focuses on both theoretical and applied research, classroom-based and experiential education, and public service.

Employing agroecological techniques such as organic soil amendments and double digging beds, Alan Chadwick and his student protégés were the first to practice organic gardening at UCSC in 1967. The original 17 acres (7 hectares) were later expanded to 25 acres (10 hectares) for an organic farm in 1972, where practicums in agriculture began. In 1975, the first full apprenticeships were offered through the campus extension program. The farm's apprenticeship program remains incredibly popular. Due to the university's desire to incorporate more academics into the farm, reduced fiscal support from the university, and heightened public concern about the environmental and social impacts of the conventional food stream, the farm underwent a change in role in the 1980s, away from just recreational. In 1981, Stephen Gliessman was hired and created the Department of Environmental Studies' Agroecology Program; in 1994 the name changed from Agroecology Program to CASFS (Allen & Brown 2006). Due to dissatisfaction with extension services, local farmers began to use the farm as an informational resource.

Many large land-grant universities have farms and agricultural programs, and they have bigger budgets, more available funding, and a greater number of faculty, staff, and students than non-land-grant UCSC. Allen and Brown (2006) acknowledged that UCSC and CASFS adapted their programs to a small budget so that they could remain dedicated to interdisciplinary approaches, experiential learning, and serving their community.

Problem Statement

Educational farms serve a multitude of purposes. In an age when people are often far removed from the food-growing process and are unaware of where their food comes from, educational farms can help fill a knowledge gap. Much of the time, that knowledge is gained through hands-on experiences, which has been shown to compliment lecture-style formats (Francis et al. 2011; Lieblein et al. 2004).

Educational farms can provide a variety of learning opportunities. Nutrition students can examine crop chemistry, while biology students can study pollinators. Future teachers can learn how to use school gardens in planning their curriculum or to gain inspiration for creating something similar at their teaching site.

In the literature, scattered accounts describe the development and establishment of educational farms on university campuses, and what literature exists generally pertains to land-grant universities (Biernbaum et al. 2006; Parr & Van Horn 2006). While some of that information is useful, it may or may not be applicable to non-land-grant universities, especially to those that are urban and do not necessarily have a historical relationship with agriculture. This study, therefore, aimed to assess stakeholder values and preferences for an educational farm using a case study of the California State University, East Bay (CSUEB) Concord Campus.

Research Question

CSUEB is a public, urban, non-land-grant university in the San Francisco Bay Area with the potential to develop an educational farm on a 0.5 acre (0.2 hectare) patch on its Concord Campus. This research sought to consult both campus and non-campus community stakeholders involved with the Concord Campus to assess divergent and convergent values regarding the potential installation of an educational farm. The central question that derived from this objective was:

How does support for and willingness to interact with an educational farm differ based upon the respondent's:

1) position at the university (student, faculty, staff, administrator, lifelong learner)?

   H_1: Students and lifelong learners will be the most supportive and willing to interact. Faculty and staff will show an intermediate level of support and willingness to interact. Administrators will be the most conservative with their support and willingness to interact with the farm.

2) physical proximity to the proposed farm

   a) campus affiliation?

   H_{2A}: Those affiliated with the closest campus will be the most supportive and willing to interact.

   b) county of residence?

   H_{2B}: Those living closest to the farm will be the most supportive and willing to interact.

3) gender?

H_{3A}: Males and females will not differ in support for the farm.

H_{3B}: Males will be more willing to contribute physical labor to aid in the building and maintenance of the farm.

4) age?

H_4: Younger respondents will be more supportive and willing to interact with the farm than older respondents.

5) annual income?

H_{5A}: Annual income will not affect support for the farm and its potential farm functions or willingness to interact with the farm.

H_{5B}: Willingness to contribute financially will increase as income level increases.

Methods

Study System

This study was conducted at California State University East Bay's (CSUEB) Campus in Concord, Contra Costa County, California, approximately 40 miles (64 kilometers) northeast of San Francisco. CSUEB's main campus is located in Hayward, approximately 35 miles (56 kilometers) south of the Concord Campus, in Alameda County (fig. 1).

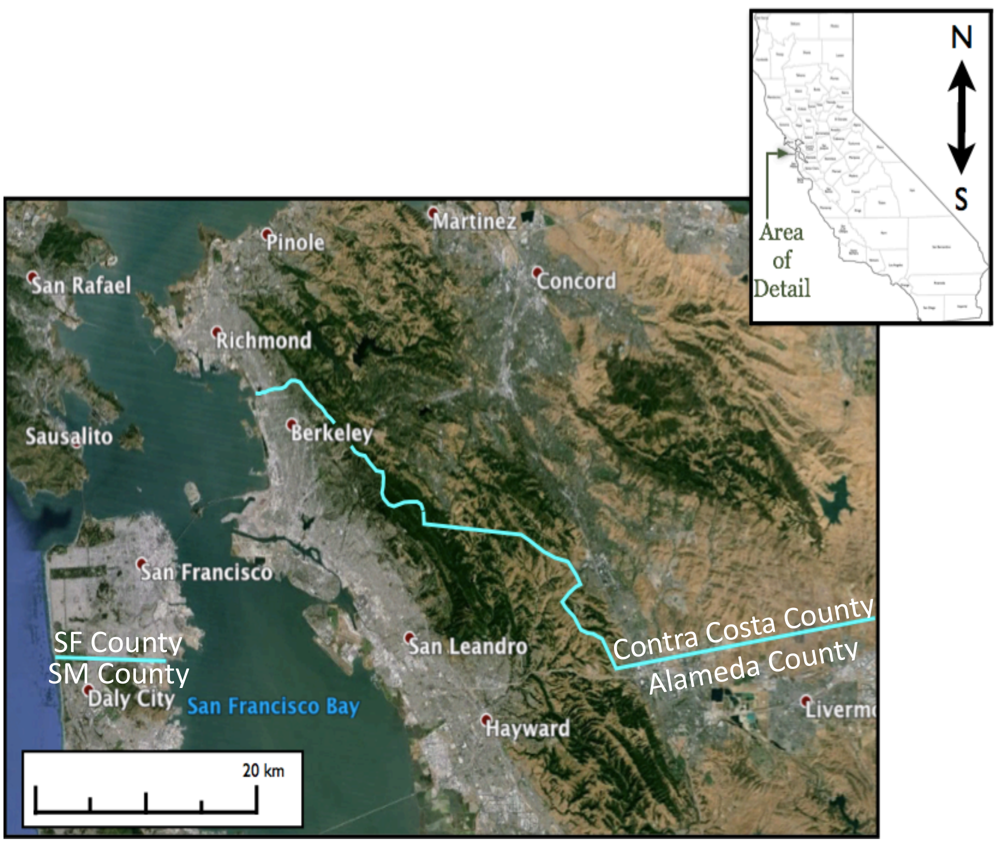

Fig. 1. San Francisco Bay Area. Source: Prepared by Michael Hobbs. Used with permission.

Human Population

Contra Costa County, California, has just over 1 million (1,049,025) residents (United States Census Bureau 2010). Concord is the largest city in the county, with 122,067 people, of which 65% identify as White, 14% Hispanic/Latino, 11% Asian, and 6.5% African American (United States Census Bureau 2010; table 1; ethnicity categories are those used by the 2010 United States Census). The population of Concord is relatively youthful (table 2). The campus also closely borders Clayton, the smallest city in Contra Costa County, with 10,897 residents.

TABLE 1. Percentage breakdown of ethnicities in Concord, California. Source: United States Census Bureau 2010.

Ethnicity	%
White	65%
Hispanic/Latino	14%
Other	13%
Asian	11%
Mixed	6.4%
African American	3.6%
American Indian or Alaska Native	0.7%
Native Hawaiian or other Pacific Islander	0.7%

TABLE 2. Percentage breakdown of age in Concord, California. Source: United States Census Bureau 2010.

Age	%
Under 18	23%
18-19	2.5%
20-24	6.5%
25-34	15.3%
35-49	21.8%
50-64	19.2%
Over 65	11.8%

In Fall quarter 2011, the CSUEB Concord Campus had 654 full-time and 162 part-time students enrolled (CSUEB Planning and Institutional Research 2011). Of these 816 students, over 70% identified as Asian; the next largest group, Whites, comprised just over 10% of the student population (table 3; ethnicity categories are those used by CSUEB Planning and Institutional Research).

TABLE 3. Percentage breakdown of ethnicity of Fall 2011 student population at the CSUEB Concord Campus. Source: CSUEB Planning and Institutional Research 2011.

Ethnicity	%
Asian or Pacific Islander	71.4%
White	10.4%
Hispanic	3.9%
African American	1.7%
American Indian or Alaska Native	0.4%
Declined to state	9.6%
Nonresident aliens	3.9%

Twice as many female (569) as male (247) students attend the Concord Campus (CSUEB Planning and Institutional Research 2011). Most students were either seniors or juniors (table 4).

Of the 816 students enrolled in Fall quarter 2011, 535 lived in Contra Costa County, 132 lived in Alameda County, and 117 lived in other counties (CSUEB Planning and Institutional Research 2011). While the CSUEB Concord Campus offers classes in a variety of disciplines, the campus is known for its comparatively large number of students in nursing and related health sciences, education and liberal studies, and business (table 5).

TABLE 4. Approximate percentage breakdown of academic standing of CSUEB Concord Campus students in Fall 2011. Source: CSUEB Planning and Institutional Research 2011.

Standing	**% (of 816)**
Seniors	44%
Juniors	35.5%
Sophomores	2.6%
Freshmen	6.5%
Post-baccalaureates	11.8%

TABLE 5. Most common degree programs at the CSUEB Concord Campus as of Fall 2011 and approximate percentage breakdown. Source: CSUEB Planning and Institutional Research 2011.

Major	**% (of 816)**
Nursing/Pre-Nursing/Health Sciences	42%
Business Administration	13.6%
Psychology	9.7%
Liberal Studies	8.1%
Teaching Credential Program	6.3%
Criminal Justice Administration	6%

The CSUEB Concord Campus is the only four-year institution in Contra Costa County and neighboring Solano County. There are no educational farms or demonstration gardens in the area designed specifically to act as outdoor learning laboratories, to directly complement inside classroom learning, to adhere to the university's strategic plan, or to take the input of campus and non-campus community stakeholder groups into consideration. The Contra Costa Times has a demonstration garden in association with the Contra Costa County branch of the Master Gardener Program. It offers limited educational opportunities in the forms of classes and workshops. Diablo Valley College is part of the Contra Costa County Community College District. Their Pleasant Hill Campus is 7.3 miles (11.7 kilometers) from the

CSUEB Concord Campus and has a campus garden maintained by students in the Adaptive Horticulture program. The garden is open to the campus community and general public for visits and harvests but does not include further interaction or participation from those not in the Adaptive Horticulture program. This garden hosts plant sales, yet there is no evidence of other events such as classes or workshops for other campus or non-campus community members.

Natural Environment

As in the rest of the San Francisco Bay Area, Concord has a Mediterranean climate with cool, wet winters and warm, dry summers. Located more inland than bayfront cities such as San Francisco or Oakland, Concord experiences higher average maximum temperatures (85ºF/29.4ºC) and lower average minimum temperatures (38ºF/3.3ºC). Maximum temperatures generally occur in July, and minimum temperatures generally occur in December. The rainiest months tend to be December, January, and February. Average yearly precipitation is about 15 inches (38 centimeters). Concord is approximately 85 feet (26 meters) above sea level. The CSUEB Concord Campus is largely undeveloped, apart from two parking lots and a central quad area with five buildings (fig. 2). The rest of the 386 acres (156 hectares) is rolling hills.

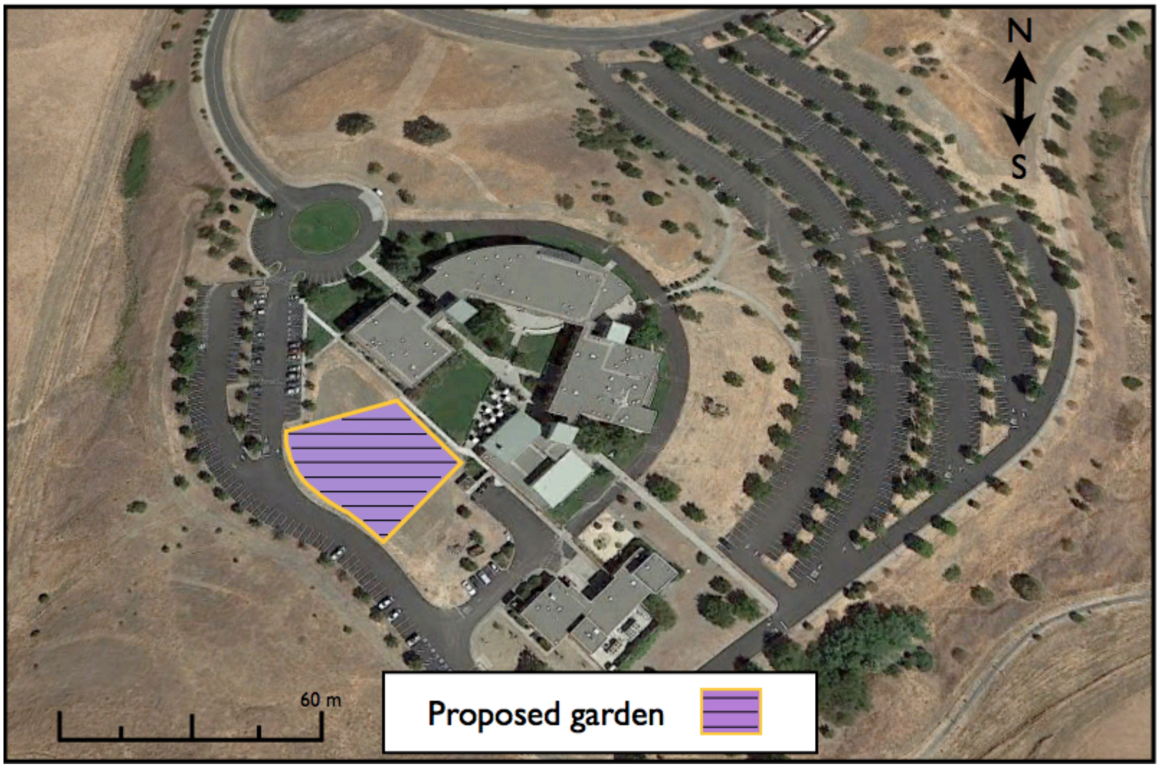

Fig. 2. CSUEB Concord Campus. Source: Prepared by Michael Hobbs. Used with permission.

Four main soil types are found on the campus: Altamont Clay, Altamont-Fontana Complex, Briones Loamy Sand, and Positas Loam (USDA Natural Resources Conservation Service 2008). The potential site of the educational farm is located in an area with Altamont Clay. On top of the clay is fill from construction projects on the campus.

Contra Costa County is known for its biodiversity of flora and fauna with over 2,107 native and non-native plant species (Calflora 2012) (tables 6 & 7).

TABLE 6. Selected native plant species in Contra Costa County. Sources: (1) Bartolome et al. 2004, (2) Calflora 2012, (3) California Department of Fish and Wildlife 2008.

Scientific Name	Common Name
Grasses	Grasses
Nasella pulchra	Purple needle grass
Nassella lepida	Foothill needle grass
Danthonia californica	California oatgrass
Trees	Trees
Quercus agrifolia	Coast live oak
Quercus berberidifolia	Scrub oak
Quercus chrysolepis	Canyon live oak
Quercus douglasii	Blue oak
Quercus lobata	Valley oak
Platanus racemosa	California sycamore
Populus fremontii	Fremont cottonwood
Pinus sabiniana	California foothill pine
Ubellurlaria californica	California laurel
Aesculus californica	California buckeye
Shrubs	Shrubs
Adenostoma fasciculatum	Chamise
Artemisia californica	California sagebrush
Baccharis pilularis	Coyote bush

Rare native shrub and tree species in the area, according to Calflora (2012), include *Arctostaphylos auriculata* (Mount Diablo manzanita), *Arctostaphylos manzanita ssp. Laevigata* (Contra Costa manzanita), *Eriogonum truncatum* (Mount Diablo buckwheat), *Quercus dumosa* (Scrub oak), and *Juglans californica var. hindsii* (Northern California Black Walnut).

TABLE 7. Selected commonly known fauna in Contra Costa County.

Scientific Name	**Common Name**
Birds of Prey	Birds of Prey
Buteo jamaicensis	Red tail hawk
Buteo lineatus	Red-shouldered hawk
Accipiter cooperii	Cooper's hawk
Cathartes aura	Turkey vulture
Bubo virginianus	Great horned owl
Mammals	Mammals
Lynx rufus	Bobcat
Puma concolor	Mountain lion
Lepus californicus	Black-tailed jackrabbit
Odocileus hemionus	Black-tailed deer
Procyon lotor	Raccoon
Mephitis mephitis	Striped skunk
Spermophilus beecheyi	California ground squirrel
Sylvilagus bachmani	Brush rabbit
Canis latrans	Coyote
Reptiles	Reptiles
Sceloporous occidentalis bocourtii	Coast Range fence lizard
Elgaria multicarinata multicarinata	California alligator lizard
Anaxyrys boreas halophilus	California toad
Pituophis catenifer catenifer	Pacific gopher snake
Lampropeltis getula californiae	California kingsnake
Crotalus oreganus oreganos	Northern Pacific rattlesnake
Diadophis punctatus	Ring-necked snake

Threatened or endangered animal species include *Ambystoma californiense* (California tiger salamander), *Rana (aurora) draytonii* (California red-legged frog), *Masticophis lateralis euryxanthus* (Alameda whipsnake), and *Charina (bottae) umbratica* (Southern rubber boa) (California Department of Fish and Wildlife 2008; Cook et al. 2006). The county has several prominent insect pest species such as *Epiphyas postvittana* (Light brown apple moth), *Homalodisca coagulata* (Glassy-winged sharpshooter), and *Dysaphis plantaginea* (Rosy apple aphid).

Study Design

General Methodology for Gathering Stakeholder Input: Surveys

Mariger and Kelsey (2003) proposed cross-sectional surveys as an appropriate and effective method for gathering input from diverse groups of stakeholders. Stakeholder studies often performed a pilot test of their survey tool or passed it by an advisory committee or group of experts (Flicker et al. 2008; Graham et al. 2005; Warnick & Thompson 2007; Wilkins et al. 2000). Punch (2003) claimed pilot testing is a key element in producing an adequate evaluation tool; the pilot test should yield information about individual questions, the overall survey, and the proposed distribution method. Providing some sort of cover letter introducing the project and its goals and inviting the individual to participate was fairly common across survey designs (Flicker et al. 2008; Garcia-Llorente et al. 2011; Graham et al. 2005; Warnick & Thompson 2007). Graham et al. (2005) sent out thank you emails along with their reminder emails; upon email survey completion, participants received an on-screen acknowledgement. This was also the only study reviewed where an incentive was offered to participants and where potential participants were emailed before receiving the survey to request participation.

Developing the Survey Tool: Recommendations from the Literature

Punch (2003) described the elements of a strong survey. After outlining the variables involved and how they relate to the study's objectives, deciding what information is desired from each of the variables is key. It is important to decide how the survey will yield the desired type of information. Determining whether variables are categorical or continuous will help frame the way survey questions are posed. He recommended scaled responses over dichotomous ones because more information and more variance will be produced, allowing for more detailed analysis. Survey questions should be short, clear, and concise, and there should only be one idea contained in each question. Pilot testing is especially important because revisions are often necessary.

Crawford et al. (2001) specifically discussed web survey design. They highlighted several important problems with online surveys. People can choose not take the survey, or they can begin it and not complete it. With paper surveys, (potential) participants are able to look over the entire survey before or as they take it, while some online surveys hide information and display it as the participant progresses. In their study, different techniques were explored for garnering online survey participation. They found those who were told the survey would take 8-10 minutes had a higher response rate than those who were told it would take 20 minutes. A series of reminders were sent to different groups; they were found to be marginally helpful in generating responses. The time the survey was distributed was discovered to be very important.

Stakeholder Surveys for This Study

All hypotheses pertaining to stakeholder groups were addressed by a survey that was emailed to identified stakeholder groups in the campus and non-campus communities. Stakeholder groups in the campus community were defined as: students, faculty, administration, and staff from the CSUEB Concord Campus, and students in the Department of Geography and Environmental Studies at the CSUEB Hayward Campus. For this research, the Scholar OLLI program was included as a stakeholder group in the non-campus community.

A one-week pilot survey was administered during the week of April 25-May 3, 2012 at San José State University (SJSU) in order to evaluate survey quality and its deliverance procedure (fig. 3). Students (n = 24) in the ENVS 154 Principles of Sustainable Agriculture course, faculty in the Departments of Environmental Studies (n = 18) and Nutrition, Food Science, and Packaging (n = 5), deans (n = 3) of the Colleges of Social Sciences, Science, and Applied Sciences and Arts, and staff from the Department of Environmental Studies office (n = 3), university grounds (n = 23), and selected directors of campus programs (n = 5) were surveyed. SJSU Professor Rachel O'Malley provided the email addresses for students enrolled in ENVS 154 Principles of Sustainable Agriculture. Email addresses for faculty, staff, and administration were accessed using the department, college, and facilities webpages of SJSU. Participants were given one week to complete the survey, and they received two reminder notices: one in the middle of the week and the second one the day before the survey closed. Survey results and associated comments about the survey were reviewed qualitatively, and the survey was revised as necessary. For instance, existing questions were streamlined to improve clarity, and information from the comments sections was used to develop new questions.

In November 2012, the Executive Director of the Concord Campus, Brian Cook, granted permission to survey the target campus. Darice Ingram, Public Affairs and Communications Specialist at the Concord Campus, sent the revised survey in Fall 2012 to students, staff, faculty, and administrators at the CSUEB Concord Campus via a campus listserve (fig. 3). The initial mailing was followed-up with weekly reminders for the first month. The survey was left permanently open, but respondents were given a “complete by” date on the first page of the survey. The process was repeated during both the Winter and Spring 2013 quarters at the Concord Campus. In Spring and Summer 2013, students enrolled in courses from the Department of Geography and Environmental Studies at the Hayward Campus were sent the survey via a departmental listserve (fig. 3). The link remained live during both quarters, but students did not receive email reminders. In Summer 2013, Darice Ingram sent the survey out a final time through an entire university email listserve, which included administrators, faculty, staff, and students who also hold jobs on campus. Because the survey was anonymous, respondents were asked to disregard the email if they received it and had already participated. CSUEB’s lifelong learner organization, Scholar OLLIs, received the survey twice, in July and August 2013, as part of a monthly newsletter from the Scholar OLLI program; these 1,000 potential respondents did not receive email reminders (fig. 3).

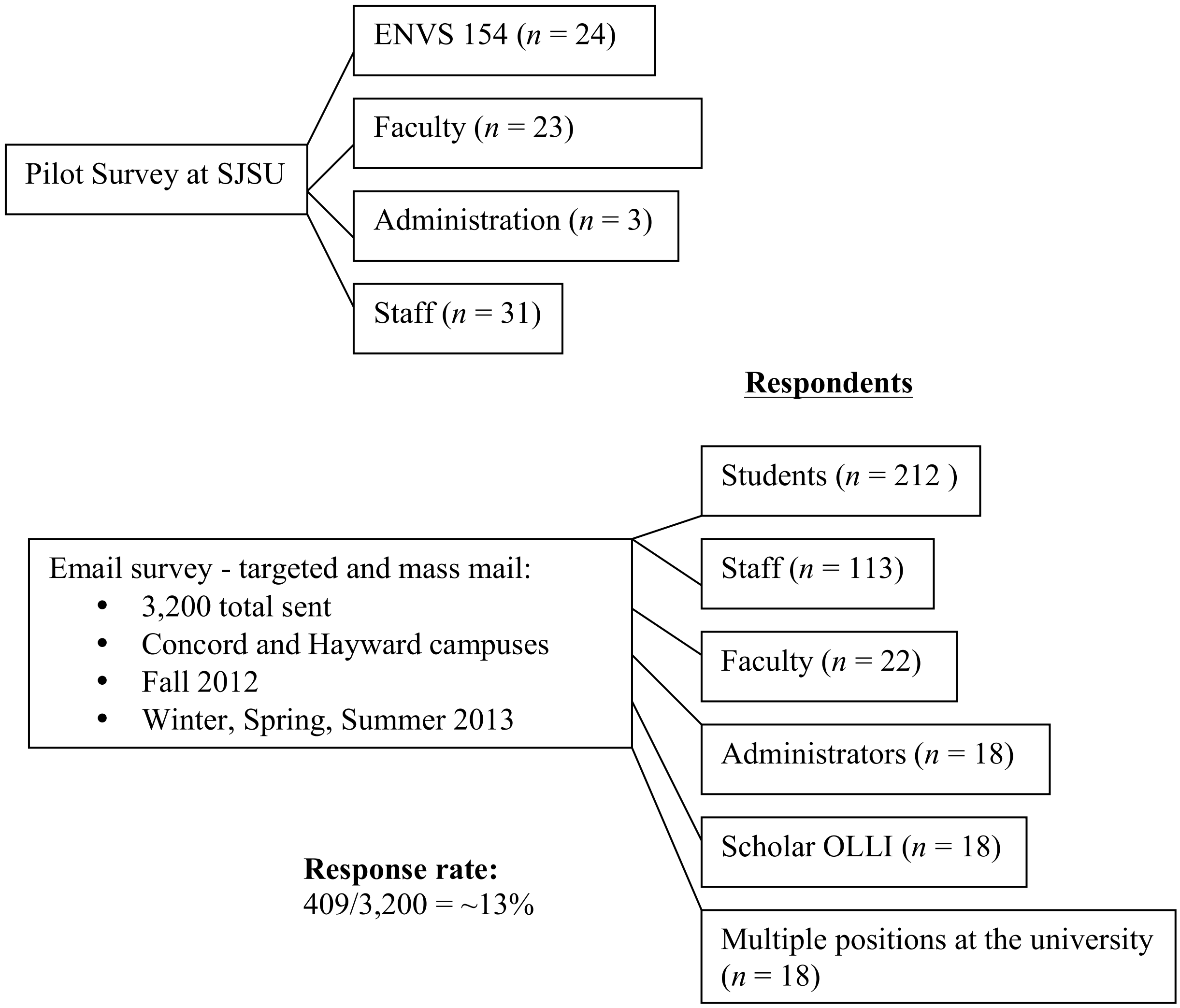

Fig. 3. Study design.

Data Collection

The online survey was administered using Survey Monkey© and was comprised of 26 questions of multiple question types (Appendix A). A majority of the survey questions used a 10-point (1-10) end-defined Likert scale. Ten points were used (instead of five or seven) in order to increase scale sensitivity (Cummins & Gullone 2000). Survey questions were designed to support the research question and hypotheses regarding educational farm elements and uses, and respondent willingness-to-pay in money, time, and labor.

Data Analysis

Descriptive and inferential statistics were used to analyze survey data with the support of SYSTAT 13© software. Predictor variables included: connection to CSUEB, campus affiliation, county of residence, gender, age, and annual income. The majority of individual Likert responses were positively skewed, so Kruskal-Wallis and Dwass-Steel-Chritchlow-Fligner Test for All Pairwise Comparisons post hoc tests were used. Due to the large number of questions and to help normalize response variables and facilitate analysis and graphing, many response variables were grouped based on similarities and the groups were then given abbreviated names (tables 8 & 9). Normalized aggregate response variables were analyzed using ANOVA and Tukey's Honestly-Significant-Difference Test post hoc tests (Norman 2010). Variables pertaining to hands-on, interactive activities were considered active, whereas more theoretical questions were referred to as passive (tables 8 & 9).

TABLE 8. Response variables and abbreviations for passive-type questions used in data analysis.

Response Variable	Abbreviation (if any)
General support for an educational farm on the Concord Campus	General support
Perceived usefulness of an educational farm	
Willingness-to-pay	
Perceived usefulness of potential farm functions (including academic courses with hands-on practical components, a campus nursery, hosting local K-12 field trips, offering volunteering and service learning options, and offering workshops and demonstrations)	Usefulness of farm functions
The importance of offering various types of courses taught in conjunction with the farm (including quarter-long courses, short (1-4 week) courses, trainings (i.e. teacher trainings), and weekend workshops)	Importance of courses
The importance of teaching science-related topics in association with the farm (including mathematics, applied, health, life, and physical sciences)	Importance of science-related topics
The importance of teaching humanities-related topics (including art, language, philosophy, and writing)	Importance of humanities-related topics
The importance of teaching education- and social science-related topics (such as anthropology, business and economics, education, and history)	Importance of education- & social science-related topics
The importance of teaching hands-on, applied gardening skills in association with the farm (including topics on agricultural pests and beneficial insects, beekeeping, compost and vermicomposting, organic agriculture, and pruning)	Importance of applied gardening skills
The importance of teaching less hands-on skills in association with the farm (such as garden therapy, landscape design, photography, scientific illustration, and theme gardens)	Importance of less hands-on gardening skills

TABLE 9. Response variables and abbreviations for active-type questions used in data analysis.

Response variable	Abbreviation (if any)
Likelihood to visit	
Likelihood to take courses	
Willingness to donate time and labor to construction tasks associated with the farm's built environment (i.e. assembling a greenhouse, building archways and potting benches, designing interpretive signage, designing and installing irrigation, plumbing an outdoor sink, and pouring cement pads for soil mixing)	Construction tasks
Willingness to donate time and labor to gardening tasks associated with the farm's built environment (i.e. planting flowers, building compost piles and worm bins, seeding, and installing vines)	Gardening tasks
Willingness to donate time and labor to the equipment and soil maintenance (including digging beds, turning compost piles, and troubleshooting irrigation)	Equipment & soil maintenance
Willingness to donate time and labor to plant maintenance (including planting, weeding, and harvesting)	Plant maintenance

Results

Who Responded

Position at CSUEB

Results from 409 surveys were analyzed. This yields a 13% response rate. Most respondents were students (n = 212) and staff (n = 113), followed by faculty (n = 22), administrators (n = 18), OLLIs (n = 18), and those with multiple positions at the university (n = 18). Seven respondents did not answer this question, but their responses were analyzed in other tests.

Physical Proximity to the Proposed Farm

Campus Affiliation

A majority of respondents were solely associated with the Hayward Campus (n = 190), followed by those just at the Concord Campus (n = 143), and those affiliated with both campuses (n = 73). Three people left this question blank.

County of Residence

Most respondents stated they lived in Contra Costa County (n = 165), closely followed by Alameda County residents (n = 147). Ten came from Solano County, 18 were from "other" counties, and 69 declined to state. Responses from those who declined to state were excluded from county-related statistical analyses.

Gender

An overwhelming majority of respondents were female (n = 264) compared to 71 males. Four people selected the "other" option while 70 declined to state their gender; for gender-related statistical analyses, these responses were excluded.

Age

There were 89 respondents 18-30 years old, 44 between 31-40 years, 43 between the ages of 41-50, 50 who were between 51-60, 25 between 61-70, 6 over 70 years old, and 108 declined to state. Because the age question was added to the survey after its initial distribution, 44 respondents were not asked their age. For age-related statistical analyses, responses from those who declined to state as well as those who were not asked were excluded.

Annual Income

There were 43 respondents whose annual income was <$1,000, 77 people who earned $10,000-$30,000, 107 who made $30,001-$70,000, 30 respondents who earned $70,001-$90,000, 43 whose annual income was >$90,000, and 109 who declined to state. Responses from those who declined to state were excluded from income-related statistical analyses.

Overall Trends

Survey results showed widespread support for an educational farm on the CSUEB Concord Campus across stakeholder groups, gender, income levels, and other demographic parameters. On a scale of 10, mean scores for support, usefulness and likelihood of visiting the farm were 8.343, 8.087, and 7.182, respectively. Interest in potential farm functions such as courses associated with a farm, a campus nursery, field trips to a campus farm, volunteer/service learning opportunities, and workshops/demonstrations, was also consistently high, with mean scores ranging from 8.4 to 8.7 out of 10.

Class Topics

Support for applied gardening skills classes, including classes on pests, bees and beekeeping, composting, organic agriculture, and pruning, was notably high across all respondents, with a mean score of 8.804 out of 10. Support for teaching less hands-on garden topics, such as garden therapy, landscape design, photography, scientific illustration, and theme gardens was also high, with a mean score of 7.949 out of 10.

Duration of Courses and Course Content

Mean support for all types of farm-related courses was high, ranging from weekend workshops ($\bar{x} = 7.889$) to teacher trainings ($\bar{x} = 7.776$) and short courses (1-4 weeks) ($\bar{x} = 7.531$) to quarter-long courses ($\bar{x} = 7.350$). Science-related topics were considered important to teach in association with a campus farm ($\bar{x} = 7.740$). Education and social science-related topics were also identified as pertinent ($\bar{x} = 7.020$).

Respondent ratings were not quite as high when it came to humanities-related topics ($\bar{x} = 6.120$ out of 10), as well as when asked to consider more active roles on the farm. Likelihood of taking a course was positive overall, but more variable by stakeholder group than general support for the farm, with a mean response score of 6.030. Engaging in gardening tasks required to build a farm was similarly positive, but variable, yielding a mean score of 5.598 across all respondents, and mean support for plant maintenance tasks dropped a bit further to 5.350.

Interest in construction tasks relating to creating the farm's built environment was more variable, yielding a mean score across all respondents of 5.159 out of 10. Labor related to soil and equipment maintenance was more uneven still, with a mean level of interest of 4.808 out of 10. It was the one measure that dipped below the halfway point across all respondents. Interestingly, not all groups of users were equally hesitant about this kind of interaction with a campus farm, however, yielding some of the most interesting patterns among stakeholders and different demographic groups.

Stakeholder position at the CSUEB Concord Campus, CSUEB campus affiliation, county of residence, gender, age and income all influenced the self-reported levels of support and engagement with an educational farm at the CSUEB campus.

Position at CSUEB

Even given the strong overall support for an educational farm at the Concord Campus, the nature of the respondents' position at CSUEB further influenced their level of support and interest in an educational farm, the amount of importance placed on course content, the degree of perceived usefulness of various farm functions, and their willingness to interact with the farm (table 10).

Patterns Amongst Stakeholder Groups

There were two main patterns found. The first demonstrated respondents with multiple positions at the campus, for example those who are both students and on the staff, showed the most support for and interest in educational farm activities for a range of measures. They showed extremely high levels of general support for an educational farm at the Concord Campus ($\bar{x} = 9.167$), closely flanked by students, faculty, and staff (fig. 4). Administrators and OLLIs were also supportive, but at a lower level than other groups.

TABLE 10. Significant effects of position at CSUEB on response.

Independent Variable	**Test Statistic**	***p*-value**	***n***
Overall support	H = 23.327	0.002	385
Likelihood of visiting	H = 33.808	< 0.0001	334
Perceived usefulness	H = 24.693	< 0.0001	385
Willingness to do construction tasks	F(5) = 10.517	< 0.0001	334
Willingness to do gardening tasks	F(5) = 9.876	< 0.0001	335
Willingness to do soil and equipment maintenance	F(5) = 11.451	< 0.0001	329
Willingness to do plant maintenance	F(5) = 11.220	< 0.0001	329
Likelihood of taking courses	F(5) = 20.201	< 0.0001	355
Importance of science-related courses at the farm	H = 11.229	0.047	347
Importance of education and social science-related courses at the farm	H = 11.426	0.044	335
Importance of teaching applied gardening skills through the farm	H = 16.068	0.007	340
Importance of teaching less hands-on gardening topics through the educational farm	H = 23.602	< 0.0001	338
Importance of quarter-long courses	H = 24.685	< 0.0001	354
Usefulness of courses in general	H = 14.162	0.015	368
Usefulness of a campus nursery	H = 25.490	< 0.0001	367
Usefulness of field trips	H = 22.733	< 0.0001	366
Usefulness of service learning and volunteer opportunities	H = 25.973	< 0.0001	366
Usefulness of workshops & demonstrations	H = 16.210	0.006	365

Statistically speaking, administrators and OLLIs essentially behaved the same. Furthermore, despite apparent differences amongst means, faculty, those with multiple positions, and OLLIs all behaved similarly. Staff and students not only behaved differently from each other but also from every other stakeholder group. This same pattern of support translated to the belief that courses taught in conjunction with the farm would be useful and showed up again in likelihood to visit. A similar pattern was seen with regards to the importance of education and social science courses, teaching both applied gardening skills as well as those that are less hands-on, and offering quarter-long courses. Administrators and OLLIs were always more modest in lending their support, except OLLIs placed higher importance of having field trips to the farm than did administrators.

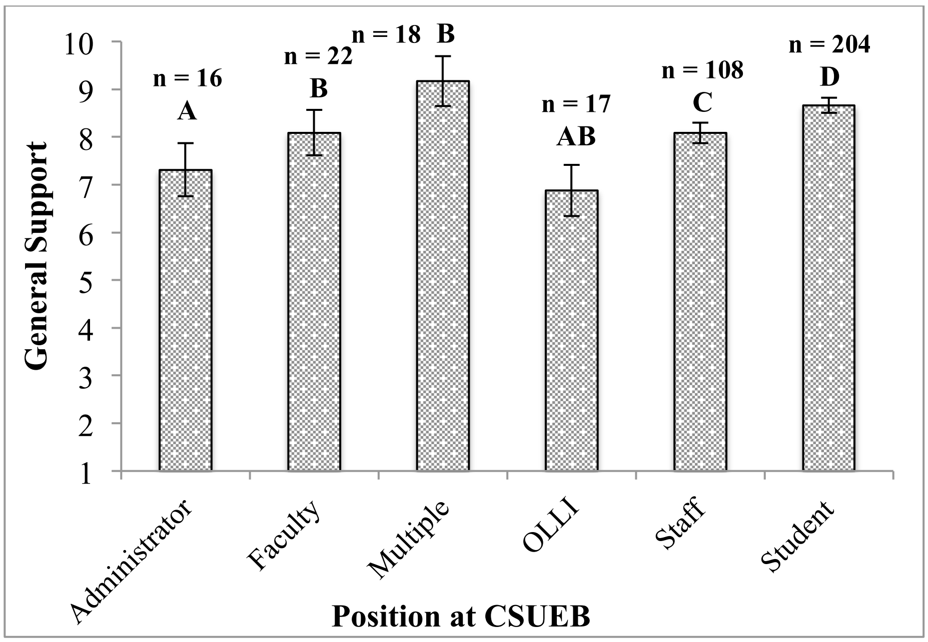

Fig. 4. Influence of position at CSUEB on general support for an educational farm (*p* < 0.0001). Values are means (±SE), n is the number of people who responded to the question from each group, different letters indicate statistical differences based on post hoc results (*p* < 0.05); annotation is the same for figures 4-13.

The other main pattern found amongst stakeholder groups was that in a few measures, students were more likely to interact with a campus farm than any other stakeholder group. Students were found to be more willing to help with construction and gardening tasks related to the building of the farm as well as with equipment and soil maintenance and plant maintenance (fig. 5). Statistically, all other stakeholder groups behaved the same, with students acting differently.

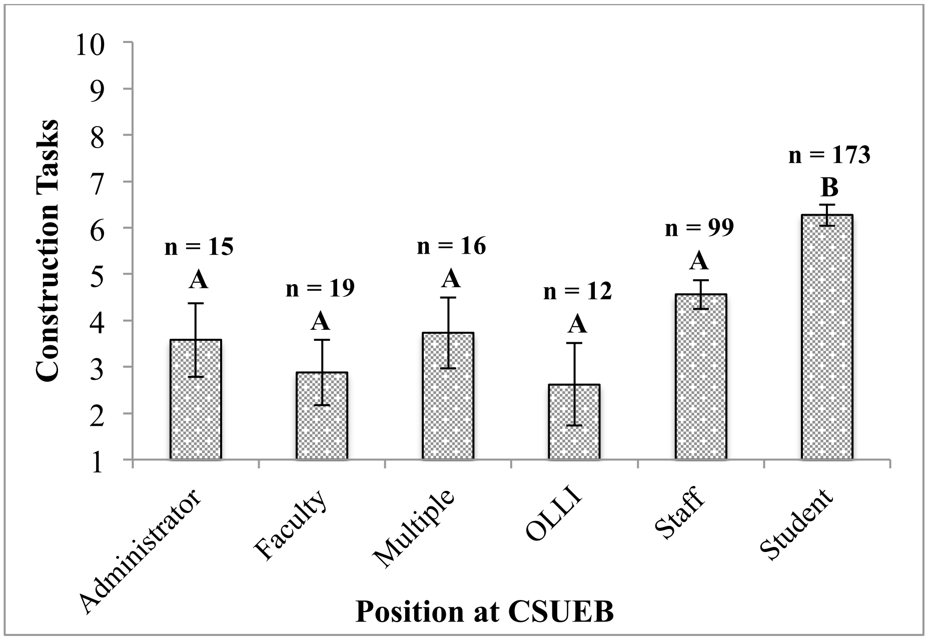

Fig. 5. Influence of position at CSUEB on willingness to contribute time and expertise toward construction tasks that would contribute to the farm's built environment ($p < 0.0001$).

Physical Proximity

Campus Affiliation

Campus affiliation influenced respondents' likelihood of visiting the farm, their level of support toward lending time and labor for elements of the built environment and maintenance tasks, and also the likelihood of taking courses (table 11).

Those associated with both campuses as well as those only on the Concord Campus were found to be equally likely to take courses associated with the farm, more so than respondents at the Hayward Campus (fig. 6). Concord Campus respondents behaved statistically the same as Hayward Campus respondents, despite fairly large differences in means. This pattern was also seen in likelihood to visit, albeit overall likelihood to visit was higher than probability of taking courses. The pattern was again reflected in willingness to interact with the building and maintenance of the farm.

TABLE 11. Significant effects of campus affiliation on response.

Independent Variable	**Test Statistic**	***p*-value**	***n***
Likelihood of visiting	H = 42.390	< 0.0001	338
Willingness to contribute time and expertise toward construction tasks for the farm's built environment	F(2) = 8.372	< 0.0001	338
Willingness to contribute time and expertise toward gardening tasks for the farm's built environment	F(2) = 7.017	0.001	338
Willingness to contribute time and expertise toward soil and equipment maintenance	F(2) = 9.816	< 0.0001	332
Willingness to contribute time and expertise toward plant maintenance	F(2) = 9.154	< 0.0001	332
Likelihood to take courses	F(2) = 16.045	< 0.0001	359

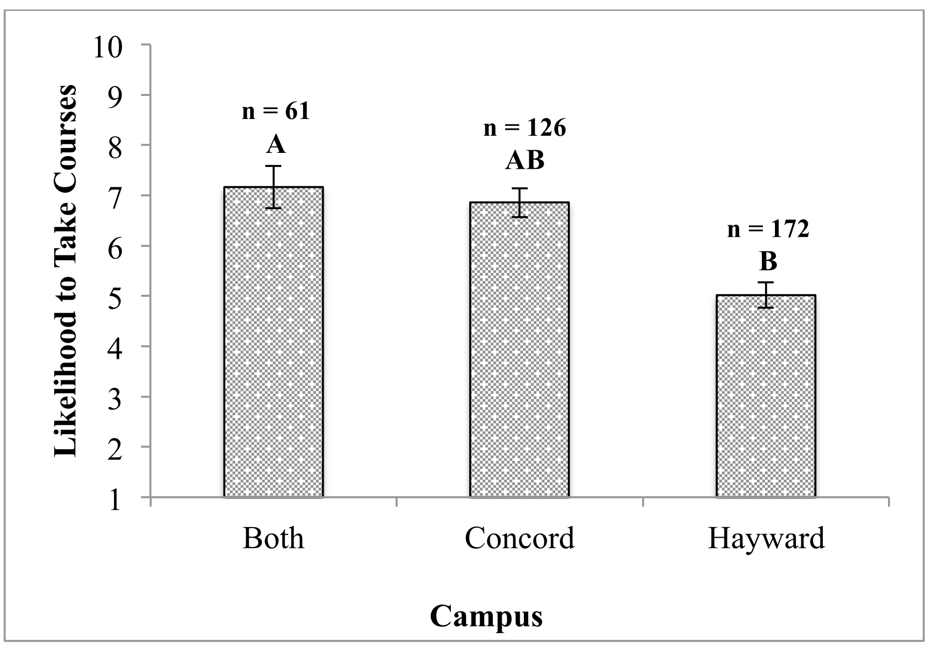

Fig. 6. Influence of campus affiliation on likelihood to take courses in association with an educational farm ($p < 0.0001$).

County of Residence

A respondent's county of residence contributed not only to his or her overall level support for the farm, likelihood of visiting, likelihood of taking courses, and general support for weekend workshops but also willingness to give time and labor to components of the built environment as well as to maintenance tasks (table 12).

TABLE 12. Significant effects of county of residence on response.

Independent Variable	**Test Statistic**	***p*-value**	***n***
Overall support	H = 8.466	0.037	338
Likelihood to visit	H = 41.142	< 0.0001	337
Willingness to contribute time and expertise toward construction tasks for the farm's built environment	F(3) = 4.432	0.005	335
Willingness to contribute time and expertise toward gardening tasks for the farm's built environment	F(3) = 5.594	0.001	335
Willingness to contribute time and expertise toward soil and equipment maintenance	F(3) = 7.437	< 0.0001	331
Willingness to contribute time and expertise toward plant maintenance	F(3) = 9.065	< 0.0001	331
Likelihood to take courses	F(3) = 12.852	< 0.0001	333
Importance of weekend workshops	H = 14.425	0.002	333

Those living closest to the Concord Campus, Contra Costa County and Solano County residents, demonstrated equal likelihood to take courses, though statistically behaved the same as respondents from other counties (fig. 7). Residents from farther away counties, such as Alameda County, showed they are naturally more removed from the Concord Campus. While Alameda County residents showed comparatively less willingness to take courses or participate in the building or maintaining of the farm, their results for general support of the farm ($\overline{X}$ = 8.110) as well as for weekend workshops ($\overline{X}$ = 7.572) were comparable to respondents from the other county groups.

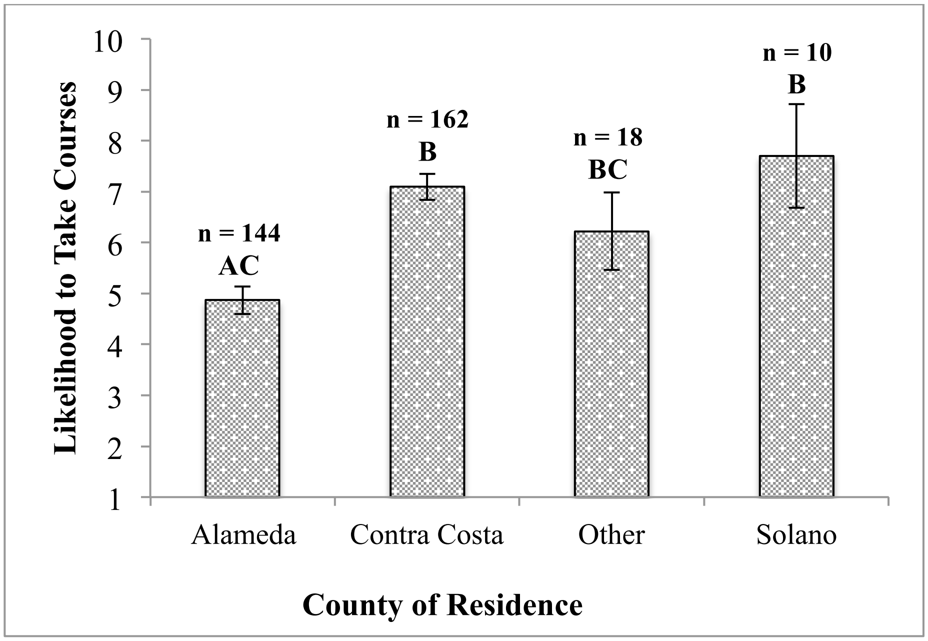

Fig. 7. Influence of county of residence on likelihood to take courses in association with an educational farm (p < 0.0001).

Gender

Females were more positive than males in all tests where there was a significant difference. Gender influenced course content, types of courses, and potential farm functions while also predicting overall support, likelihood to visit, and general usefulness of an educational farm (table 13). It did not have an affect on willingness to contribute time and labor to the building and upkeep of the farm.

TABLE 13. Significant effects of gender on response.

Independent Variable	**Test Statistic**	***p*-value**	***n***
General support	H = 12.087	0.001	333
Likelihood to visit	H = 4.933	0.026	332
Perceived usefulness	H = 9.983	0.002	334
Importance of quarter-long courses	H = 4.950	0.026	329
Importance of short courses	H = 9.960	0.002	328
Importance of teacher trainings	H = 9.402	0.002	326
Importance of weekend workshops	H = 16.552	< 0.0001	328
Usefulness of teaching science-related topics	H = 6.511	0.011	330
Usefulness of teaching education- and social science-related topics	H = 8.434	0.004	323
Usefulness of teaching applied gardening skills	H = 17.409	< 0.0001	332
Usefulness of teaching less hands-on gardening skills	H = 15.632	< 0.0001	330
Importance of courses associated with the farm	H = 21.080	< 0.0001	334
Importance of a campus nursery associated with the farm	H = 18.612	< 0.0001	334
Importance of field trips	H = 10.678	0.001	332
Importance of volunteer and service learning opportunities	H = 20.458	< 0.0001	332
Importance of workshops and demonstrations	H = 26.679	< 0.0001	331

Despite statistical differences, both genders demonstrated high levels of support and placed high levels of importance and usefulness on various aspects relating to the farm. This pattern is illustrated in fig. 8, where females and males show their interest in an educational farm, with means of 8.764 and 7.557, respectively.

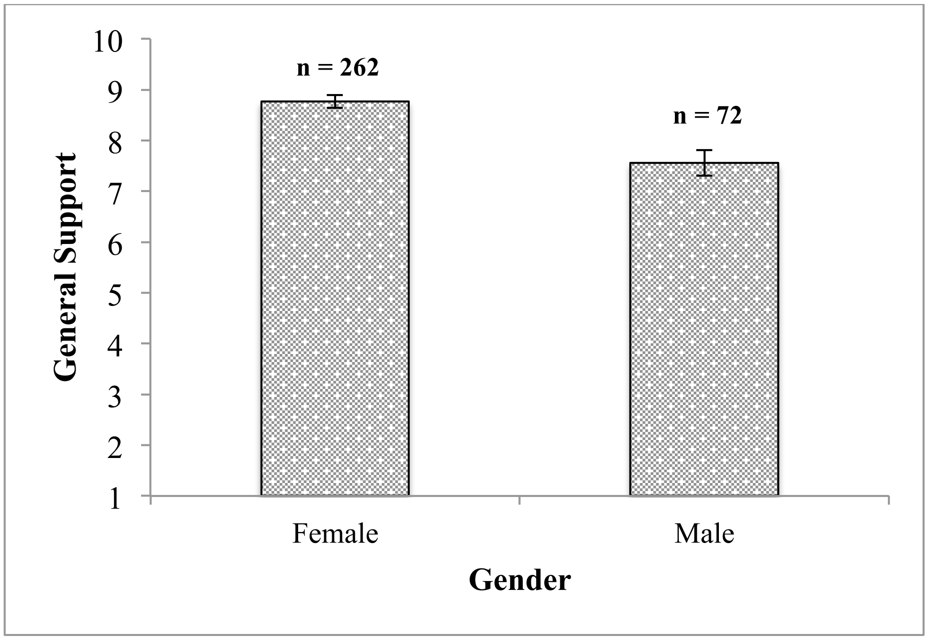

Fig. 8. Influence of gender on general support for an educational farm (*p* < 0.0001).

Age

For analysis purposes, age was divided into the following groups: 18-30 year olds, 31-40 year olds, 41-50 year olds, 51-60 year olds, 61-70 year olds, and >70 years old.

While age was not found to generally influence the more theoretical, passive variables such as general support, usefulness of an educational farm, willingness-to-pay, course content, or farm function, it definitely showed an effect when it came to the more active variables, such as visiting the farm and donating time and labor toward its construction and maintenance (table 14).

Generally, the younger the respondent, the more likely he or she was to come to the farm either for a visit or to help out in some way. There was a high likelihood to visit, with small differences between each age group (fig. 9). There were very few respondents in the >70 age bracket, which likely accounted for the group's high variability.

TABLE 14. Significant effects of age on response.

Independent Variable	**Test Statistic**	***p*-value**	***n***
Likelihood to visit	H = 11.465	0.043	253
Willingness to contribute time and expertise toward construction tasks for the farm's built environment	F(5) = 8.420	< 0.0001	252
Willingness to contribute time and expertise toward gardening tasks for the farm's built environment	F(5) = 7.578	< 0.0001	252
Willingness to contribute time and expertise toward soil and equipment maintenance	F(5) = 7.835	< 0.0001	250
Willingness to contribute time and expertise toward plant maintenance	F(5) = 5.890	< 0.0001	250
Likelihood to take courses	F(5) = 7.238	< 0.0001	251
Usefulness of teaching less hands-on gardening skills	H = 17.922	0.003	251

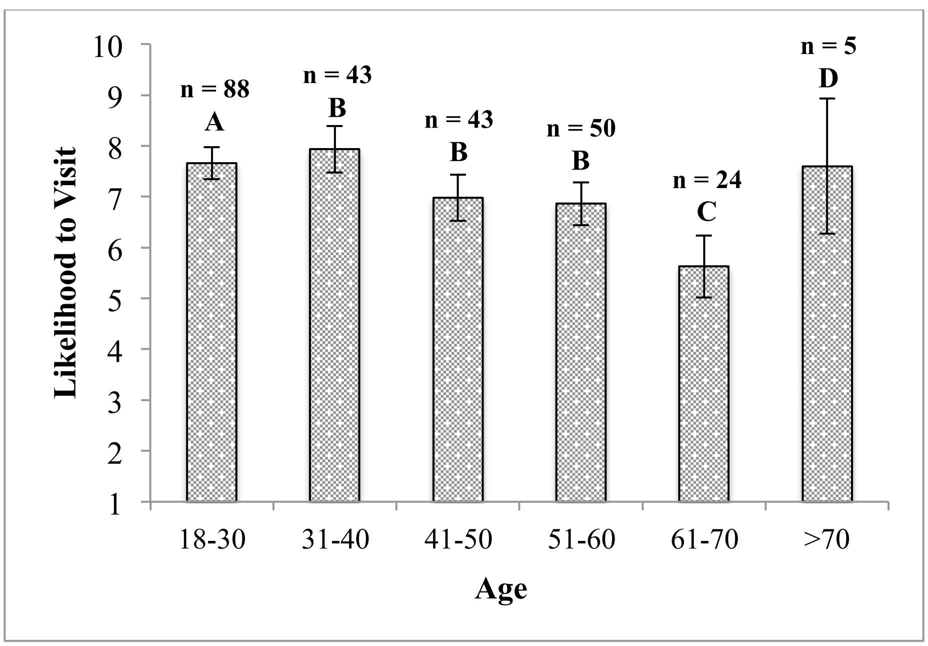

Fig. 9. Influence of age on likelihood to visit the proposed educational farm (p = 0.043).

Willingness to contribute time and labor to the built environment or maintenance of the farm reflected the same pattern as likelihood to visit. Younger respondents were found to be most willing to give their time and labor to any task associated with the building or upkeep of the farm than were respondents in the other, older age groups. This pattern was reiterated again in likelihood to take courses, with the mean likelihood of each age group declining with increase in age (fig. 10). Once more, there was a lot of variability in the >70 age group, in part because there were few respondents who fell in that age range. This variability makes it appear that those in the youngest age group behave the same statistically as those in the highest.

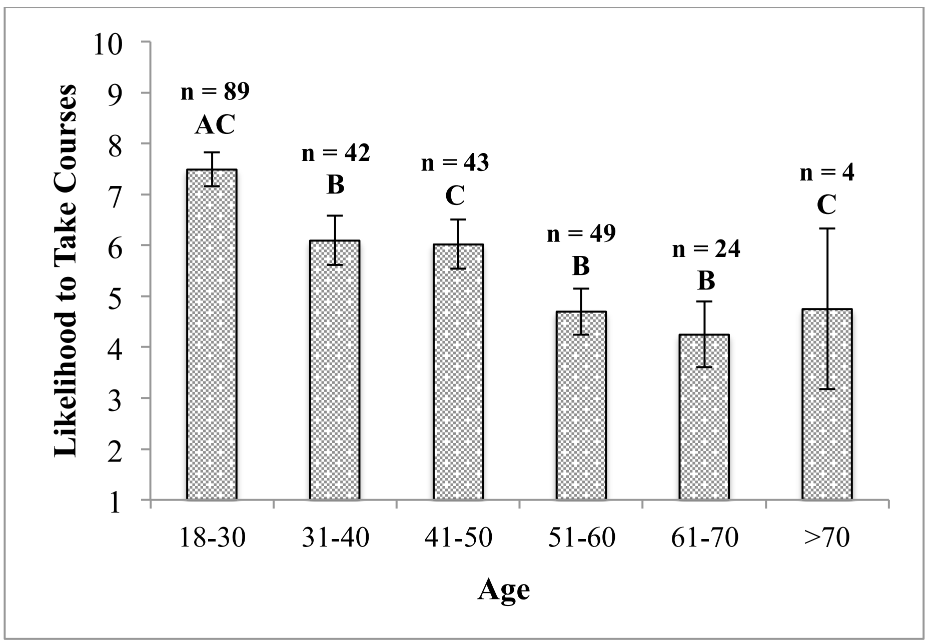

Fig. 10. Influence of age on likelihood to take courses in association with an educational farm (*$p < 0.0001$*).

Annual Income

For analysis purposes, income levels were grouped together as follows: <$1,000, low-income ($10,000-$30,000), medium-income ($30,001-$70,000), medium-high-income ($70,001-$90,000), and high-income (>$90,000).

Income was found to influence overall perceived usefulness of an educational farm, willingness to contribute time and labor to the initial construction of the farm and its upkeep, and willingness-to-pay (table 15).

There was generally a high level of perceived usefulness of an educational farm amongst all income levels, with very small differences between groups (fig. 11). Each group behaved statistically different, except for the highest and lowest groups, which behaved the same. They felt an educational farm to be slightly less useful than did the other groups.

TABLE 15. Significant effects of annual income on response.

Independent Variable	**Test Statistic**	***p*-value**	***n***
Perceived usefulness	H = 12.179	0.016	300
Willingness to contribute time and expertise toward construction tasks for the farm's built environment	F(4) = 8.610	< 0.0001	298
Willingness to contribute time and expertise toward gardening tasks for the farm's built environment	F(4) = 6.937	< 0.0001	298
Willingness to contribute time and expertise toward soil and equipment maintenance	F(4) = 7.976	< 0.0001	296
Willingness to contribute time and expertise toward plant maintenance	F(4) = 6.868	< 0.0001	296
Willingness-to-pay	H = 13.967	0.007	296

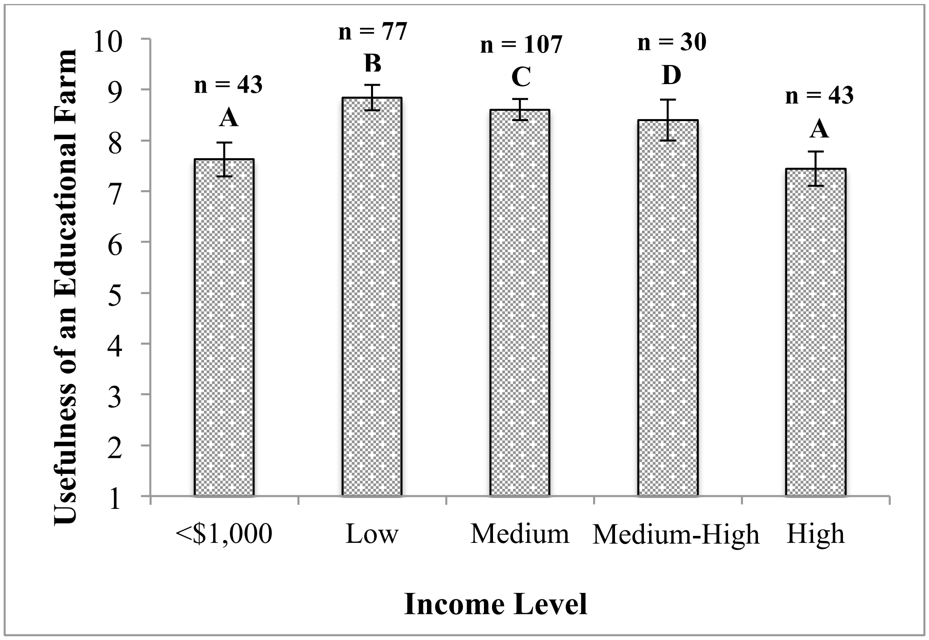

Fig. 11. Influence of annual income on perceived usefulness of an educational farm (*p* = 0.016).

Respondents in the <$1,000 and low-income ranges were more willing to donate their time and labor towards building and maintaining the farm than they were money. This is in comparison to those in other income levels who demonstrated that as income increased, general willingness to interact with the farm decreased. This pattern was seen across all four tests involving commitments of time and labor to tasks associated with the built environment and maintenance and is illustrated in fig. 12.

Willingness-to-pay was definitely influenced by income level but not in the way one would expect. Willingness-to-pay increased with each income group until the highest bracket, where it plummeted (fig. 13). Contrary to predictions, there was a trend indicating respondents in the high-income range were equally unwilling to pay as respondents in the <$1,000 range as also evident by their statistical behavior. It appeared those in the medium-high range behaved the same as those in the high-income range; the immense variability of the high-income group was likely the cause. Those in the middle income ranges were overall most likely to contribute monetarily to an educational farm.

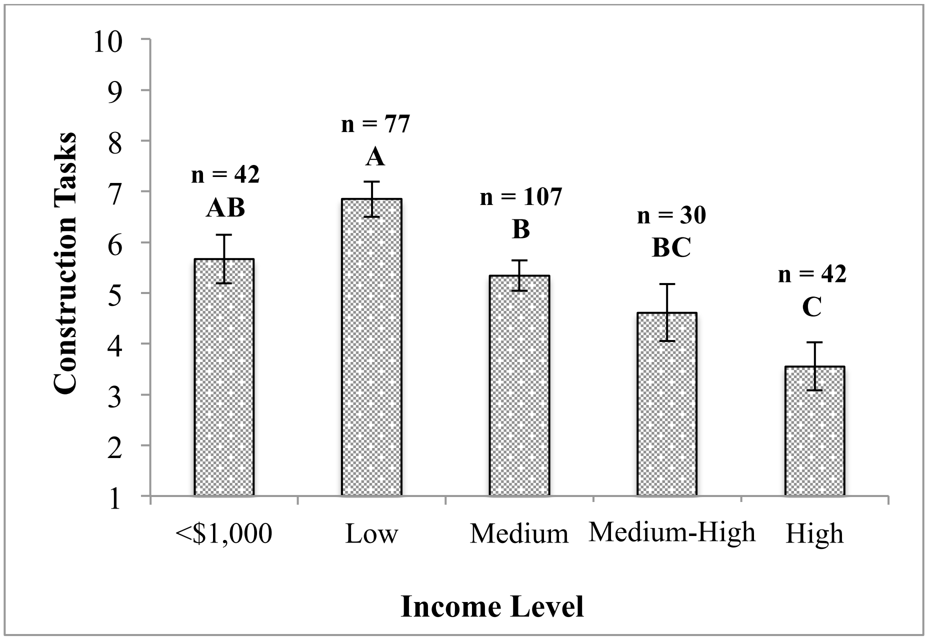

Fig. 12. Influence of annual income on willingness to contribute time and expertise toward construction tasks for the farm's built environment ($p < 0.0001$).

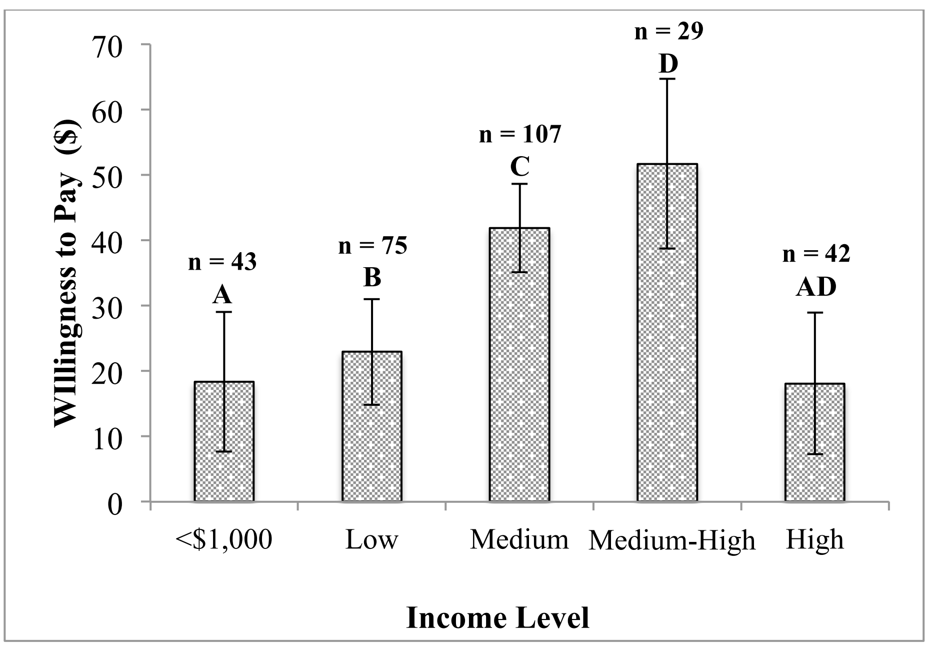

Fig. 13. Influence of annual income on willingness to pay ($) towards an educational farm ($p = 0.066$).

Summation of Results

Students and those with multiple positions tended to be the most supportive, likely, and willing to interact with an educational farm in some capacity on the CSUEB Concord Campus. Staff, faculty, OLLIs, and administrators were generally supportive of all aspects of the farm, but to a lesser degree than students and those with multiple positions. Respondents from both campuses demonstrated a greater overall interest than respondents from either the Concord or Hayward Campus. Not surprisingly, a respondent's geographic distance from the Concord Campus influenced their willingness to interact with the farm; those living closest were the most likely to express a desire to be involved. Females were found to be more supportive of the farm in numerous ways than were males, though willingness to interact with tasks associated with the built environment and maintenance of the farm was not found to be affected by gender. Age definitely played a factor in determining willingness to donate time and labor; the younger the respondent, the more likely they were to help. Annual income also predicted willingness to work; those making the least were the most likely to work. Respondents with the lowest incomes as well as those with the highest incomes were found to be equally unwilling to contribute monetarily to the farm.

Discussion

Areas of Agreement

The remarkable amount of abstract support for an educational farm at the CSUEB Concord Campus suggested students, staff, and faculty are engaged with experiential opportunities at this site, and that they are not gravitating toward remote and online learning experiences to the exclusion of campus-based opportunities. Variability in willingness to engage in more hands-on tasks relating to the farm distinguished the level of commitment amongst stakeholders regarding an educational farm on the Concord Campus. Uniform support for passive interaction with the farm was consistent with the idea that people like the environment in principle. When it came to actually committing to participating, however, there was much less uniform support, as was evident in the results.

Position at CSUEB

Educational farms at other universities are generally initiated and established through student interest and perseverance (Biernbaum et al. 2006; Parr & Van Horn 2006). This enthusiasm was in keeping with results seen from the student community at CSUEB, particularly in those responses pertaining to hands-on interaction with the farm. It was also reflected in interest in courses, as students are naturally going to be the most likely to enroll and be the most eager to try to incorporate quarter-long classes into their course load. The reason for the OLLIs' hesitancy in comparison to the students might have been two-fold. Active members are only occasionally involved with the Concord Campus, at monthly meetings and lectures. While OLLIs may still support the farm in theory, their lack of more regular contact with the campus could account for part of the reason why they were not as supportive as other groups. They do, however, by definition of their group, have a commitment to lifelong learning. This dedication is a key element and goal of experiential learning (Sibthorp et al. 2011).

The other potential reason for their hesitancy was age. OLLIs are at least 55 years old. Of the OLLIs who disclosed their ages, the youngest was 62 and the oldest was 94, with most being in their mid-60s to mid-70s. There is likely a lot of variability in physical capability, which would account for the wide range of responses regarding active interaction with the farm. OLLIs did, however, place greater importance on having field trips to the farm than did administrators. Perhaps they saw themselves or OLLIs as a group as potential field trip visitors.

Staff and faculty adhered to predictions that they would show an intermediate amount of support and willingness to interact. Staff tended to be quite willing to interact with the farm; one reason could be because they felt by helping they could also benefit. As demonstrated in the comments section of the survey, one staff member suggested that staff should have access to produce grown on the farm. Based upon results from statistical analyses and survey comments, it appeared faculty may want to be more involved with the hands-off aspects of the educational farm such as teaching courses or planning curriculum versus engaging in the actual building or upkeep of the farm. One enthusiastic faculty member, for example, expressed a willingness to donate her time and expertise to leading entomology and pest management presentations.

Administrators were predicted to be and were the most hesitant about giving their general support. As the main decision-makers, administrators are naturally risk-averse and budget-conscious. For example, one administrator commented in the survey that he would like to see 7-10 years worth of funding upfront. Administrators were also very conservative in declaring their willingness to interact with the farm. Interestingly, they demonstrated more support for offering courses than they showed for any other response variable.

General Trends and Observations

Amongst stakeholder groups, teaching science-related courses were seen as more important than education and social science-related courses, which was interesting for a few reasons. Maybe respondents simply did not understand how non-science courses could relate to a farm. The other reason this finding was somewhat puzzling was that the Concord Campus has large amount of education students. An educational farm on the campus would serve as a multi-faceted experiential learning tool. As students, they can learn how to use experiential learning techniques by actually engaging in them firsthand. Then as teachers, they can bring their students to the farm for field trips and demonstrate how many different subjects can be reinforced by interacting with the farm (Parr & Van Horn 2006).

What could be deduced by looking at the results was that if the students want an educational farm, they are going to have to work hard to show their support for it and demonstrate there is a need for it. Faculty will need to be on board if courses are to be taught in association with the farm; curriculum will have to be developed or adjusted to suit the hands-on experiential nature of an educational farm. Administrators will have to be convinced investing time, money, and energy into developing and running a farm will be a worthwhile venture or otherwise convinced that those proposing and supporting the project, likely students and select faculty, are dedicated enough to take on the development and operation of the farm themselves.

Perhaps those who did not fully believe in the idea did not completely understand what an educational farm is or what benefits it can bring. This was evident in the comments sections of the survey. For instance, several respondents were concerned it would be a waste of funds, such as an economics faculty member who said he will "vigorously oppose" the farm if it gets underway. Others felt they would have answered differently if they had known what an educational farm entails. One student felt an educational farm was too childish and that by college, students should not have to "watch plants grow." These more negative comments were outnumbered by those pledging support, claiming an educational farm would be an excellent addition to the Concord Campus. For instance, one student said it would be vital to the future of education, for most people do not know how their food is grown or where it comes from. Francis et al. (2003) highlighted this lack of awareness and acknowledged how the more people view themselves as part of the food system, the more willing they are to want to be a part of it and to improve its overall sustainability. Another student was looking forward to the farm being a place of relaxation and tranquility where students can relieve stress. This was supportive of work by Kanters et al. (2002) who cited outdoor education experiences can help reduce students' tension, anxiety, and feelings of depression associated with stress from college.

Many respondents acknowledged how an educational farm can foster interdisciplinary studies. Both Francis et al. (2011) and Lieblein et al. (2000) supported this claim, stating the importance of sharing information across different fields and disciplines and how easily this can be done in an educational farm setting. One survey respondent noted how this type of farm can reach across many educational disciplines. She commented, "not everything great comes from an app. This could be a very unique tool in which to combine technology, education, and hands-on experience in a very positive way." Unfortunately, many, did not see how a farm can be connected to coursework. Therefore, resources should be made available that could demonstrate, for instance, how language courses can use the farm to help with descriptive writing or find inspiration for poetry. When compared with other possible science subjects, math's potential links to the farm were underappreciated. As evident by comments from a statistics faculty member, it is very plausible to link math with the farm; they would love their students to use the farm for practicing writing statistical reports on plant growth.

To gain the overall support of the different stakeholder groups, an abundance of information would need to be made available so that everyone could have the opportunity to see and understand the purpose of having an educational farm on the campus. Including stakeholder groups in decision making and planning are key ways of getting them on board, as Schlosberg (2004) pointed out. Involving as many different groups as possible is also a main goal of having an educational farm on the campus in the first place.

Physical Proximity: Campus Affiliation and County of Residence

General support was not influenced by campus affiliation, which contradicted H_{2A}. It was, however, affected by the county of residence, which supported H_{2B}. Physical proximity in general adhered to predictions and made a difference in willingness to contribute time and labor to the farm, though. This finding was supported in the literature, as it has been shown willingness-to-pay decreases as geographic distance increases (Gökşen et al. 2002; Pate & Loomis 1997).

Respondents belonging to both universities were likely more willing to participate in some way because they were more closely tied to the university in general. Respondents from the Hayward Campus lacked that link to the Concord Campus. This theme was iterated a number of times in the comments section of the survey. One respondent said, “This project sounds great. However, I work full-time at the Hayward Campus. I have had only one visit to the Concord Campus.” A Hayward Campus student said the farm might be of better use if it were at the Hayward Campus instead, while a Hayward Campus faculty pointed out the hassle for those who attend that campus to make the journey from there up to the Concord Campus. She went on to suggest a shuttle service on organized workdays might be a way to alleviate the travel burden. Some Hayward Campus affiliates, though, were very supportive of a farm on the Concord Campus. A staff member, while only moderately likely to visit the farm, felt it “has a lot of value” and “the location is ideal.” A student, who was very likely to visit the farm and also very willing to help with the farm, agreed, "the Concord Campus would be an ideal site for such a venture."

While campus affiliation affected willingness to interact, so did county of residence. A number of respondents mentioned they live closer to the Hayward Campus and would be more likely to visit or participate if they lived closer to the Concord Campus. One staff member who, while not at all likely to visit, thought the farm was a "great idea" and "hopes that it will happen" but she lives "too far away" and is "too old to do much to help, but it would be great for curriculum and students." Another staff member said she would "very much like to participate" but was unable because she lives in Hayward and works at the Hayward Campus, though she applauded the idea of the project and wished it success.

Concord Campus respondents often behaved statistically the same as those form the Hayward Campus. This query came up via a recurring issue posed by several Concord Campus respondents, which was the lack of time they foresaw being able to give to the farm in any form - classes or helping out. A possible explanation was that some programs, such as the nursing program, are so intense they leave students with very little time to commit anywhere else. Two nursing students responded this way in the comments section of the survey. While both supportive of the idea, they saw no possible way they would be able to help or take courses related to the farm. One solution to this would be to encourage use of the farm by nursing faculty in their existing coursework. The farm would be an excellent connection to required nutrition studies. While some

Concord Campus-only students were unable to lend their support, others felt it would be a great addition to a campus that does not have much else on it.

In order to increase engagement with the farm its value needs to be made apparent. The farm can be used to augment existing courses or be a source of new hands-on classes that would help suit different learning styles but also complement major coursework. This would help make those concerned with course load feel the farm was more accessible to their busy schedules.

Gender

According to the literature, women tend to be more suited for lecture-style courses because they often favor memorization techniques for information retention and rely on the teacher to structure their learning (Severiens & Ten Dam 1997). This would imply women were less suited for and would be thereby less supportive of courses with experiential components. Survey results showed the opposite, indicating female respondents did not adhere to these stereotypes. This supported H_{3A}, which proposed there would be no difference between genders in terms of passive, abstract support. Females were found to be more supportive of the farm and its variety of potential functions and were more likely to interact with it. This type of support was in keeping with the literature, which stated women were more likely to want to learn for learning's sake while men were generally more interested in what they can specifically get out of a particular class (Severiens & Ten Dam 1997). Historically women are more drawn to the arts and social sciences while men are more likely to be in the sciences (Severiens & Ten Dam 1997). Survey results showed, however, that women saw the importance of both social science-related as well as science-related topics being taught in association with the farm, yet there was no difference between genders in amount of importance placed on humanities-related courses, including the arts.

Gender also did not predict willingness to donate time and labor to the built environment or upkeep of the farm. Males are stereotypically more willing or able to do hard labor tasks, such as those referred to in the survey, while women are generally thought to be more willing and able to do lighter tasks (Parry et al. 2005). These stereotypes did not hold amongst survey respondents. This may have been because there was an abundance of young, able and enthusiastic females being statistically compared to older, less-willing-to-do-labor males. Instead of by gender, roles in the garden are often divided up based on physical ability, of which age is often a contributing factor (Parry et al. 2005). Further analyses beyond the scope of this research would have to be done to potentially tease this information out. Findings contradicted H_{3B}, which predicted results would adhere to gender stereotypes.

Age

While age did not predict responses to more abstract variables, such as general support for the farm or its usefulness, it did predict support for variables involving interaction with the farm. Likelihood and willingness to interact with the farm generally decreased as age increased, which was not surprising. This partially supported H_4. Those who are older are generally not physically able or do not have as much desire to visit a farm, help out, or enroll in different types of classes (Parry et al. 2005). Some respondents mentioned in the comments section of the survey that working on the farm was not an option for them because they felt they were too old to be of any help. Respondents who were more willing to do these actions tended to be younger, likely students, who as have been detailed above, were generally more enthusiastic to engage with the farm.

It is important to recognize that OLLIs and other senior visitors may have different needs than other stakeholder groups. A way to be considerate of those who need accommodation would be to provide smooth, even paths to and around the farm. Shaded areas and plenty of seating would also make the physical environment of the farm more comfortable for older visitors. Another way to encourage OLLIs and other seniors to visit the farm and discover the variety of activities and opportunities it has to offer would be to host a gathering or "open farm" day on the same day as an OLLI lecture or function. Offering courses, lectures, or presentations on topics that do not require much of a physical labor component, such as photography, would also make the farm feel more applicable to the needs and interests of more mature age groups. Thus, it is possible for the farm to be accessible to a wide-range of abilities. The educational garden is a project that is specifically being proposed and designed to suit as many different types of people as possible.

Annual Income

Income influenced willingness to donate time and labor toward the built environment and maintenance of the farm, which contradicted predictions made in H_{5A}. The reason why willingness generally decreased as income increased was possibly in part to do with the respondent's position at the university. The lower income groups were probably students, who have proved to be more willing to do work yet by default were less able to make a financial contribution. Those in the medium-high and high-income ranges were probably faculty, OLLIs, and administrators, who were not only generally older and potentially less physically agile but also showed, based upon their position alone, that they were less willing to help.

Willingness-to-pay was solely predicted by income and had nothing to do with level of support for the farm, position at the university, physical proximity, likelihood to visit, gender, or age. Fittingly, those who made the least amount of money were the least likely to donate money. In keeping with survey results, those in the lower income groups were more likely to give their time and labor than money. It would be natural to think, then, that those making the most money would be the most willing to pay, as Liebe et al. (2011) and Meyer and Liebe (2010) initially suggested. Survey results did not reflect this, thus contradicting H_{5B}. Those in the highest income group were least likely to give time, effort, or money, which was in keeping with what Liebe et al. (2011) finally concluded.

Conclusions

Applications and Recommendations

This research highlighted how different stakeholder groups can play different roles in the potential development of an educational farm on the CSUEB Concord Campus. Those who were more active, committed, and local could participate in the actual establishment of the farm while others who expressed passive support yet may not have as much time or live farther away, could contribute in less hands-on ways. The role of women in the development of the farm should not be underestimated, for they have proven they are willing to devote effort to all aspects of the farm.

In order to garner more support from individuals as well as various stakeholder groups as a whole, more work will need to be done to allay any hesitations or doubts about the farm's usefulness. Efforts will need to be made to show the value of links between the farm and certain subject areas, namely the humanities. Administrators were cautious with their support for many aspects of the farm, so more work will need to be done to increase their level of confidence in the farm. As far as financial support for the farm, it was shown that one should not always expect the biggest donations from those who make the most money. Thus, one should not just look to big donors for project funding. Providing an opportunity for those who do make a substantial income to develop an appreciation for the value of the farm, however, could prove beneficial. Creating a grassroots-style fundraising effort aimed at those in the middle- and medium-high income ranges could potentially be the best starting point in generating funding for the farm. It is important, however, to provide other ways of supporting the farm so that those in the lower income levels can also be included in the process. Working with student organizations, such as the university's Associated Students, could be key. They have the volunteer power and often have funds for campus improvement projects. As the results demonstrated and as the literature supported, students tend to be the driving force in projects such as this one.

There are two important steps that need to be completed before proceeding any further with the project. First, collecting local public teacher input is could yield interesting and vital information that might help in the development of the farm. Initial contacts were made but follow-up is needed. Local private schools could also be consulted, for they too could provide useful input as could local service learning groups. Second, site suitability needs to be determined through soil and microclimate analysis. Based upon site suitability results, a financial model can be built, comparing the cost of site amendments and components with stakeholder willingness-to-pay. As the project moves forward, it will be essential to maintain a set of dedicated people who are willing to give their time and effort to seeing the farm develop. Ideally this collection of individuals will come from a variety of stakeholder groups.

Literature Cited

Alaimo, K, Reischl, TM, Ober Allen, J. 2010. Community gardening, neighborhood meetings, and social capital. J Community Psychol 38(4):497-514.

Allen, P, Brown, M. 2006. Growing a program in sustainable agriculture at UC Santa Cruz. Chronicle of the University of California (8):49-64.

Altieri, M. 1989. Agroecology: A new research and development paradigm for world agriculture. Agriculture, Ecosystems & Environment 27(1):37-46.

Armbruster, WJ. 1993. The future of land grant universities and agricultural economists. Rev Agr Econ 15(3):591-602.

Bartolome, JW, Fehmi, JS, Jackson, RD, Allen-Diaz, B. 2004. Response of a native perennial grass stand to disturbance in California's Coast Range Grassland. Restor Ecol 12(2):279-89.

Biernbaum, JA, Thorp L, Ngouajio, M. 2006. Development of a year-round student organic farm and organic farming curriculum at Michigan State University. HortTechnology 16(3):432-36.

Bowler, IR, ed. 1992. *The Geography of Agriculture in Developed Market Economies*. New York: John Wiley & Sons, Inc. p 317.

Blair, D. 2009. The child in the garden: An evaluative review of the benefits of school gardening. J Environ Educ 40(2):15-38.

Brown, K, Jameton, AL. 2000. Public health implications of urban agriculture. J Public Health Pol 21(1):20-39.

Calflora. 2012. Information on California plants for education, research, and conservation. www.calflora.org (accessed February 23, 2012).

California Department of Fish and Wildlife. 2008. California Wildlife Habitat Relationships Life History Accounts and Range Maps. www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx (accessed October 28, 2013).

California State University East Bay Planning and Institutional Research. 2011. Concord Campus Statistics. www.csueastbay.edu/ira/factbook/concordCampus.html (accessed February, 23, 2012).

Cheng JCH, Monroe, MC. 2012. Connection to nature: Children's affective attitude toward nature. Environ Behav 44(1):31-49.

Cook, DG, Trenham, PC, Northen, PT. 2006. Demography and breeding phenology of the California Tiger Salamander (*Ambystoma californiense*) in an urban landscape. Northwestern Naturalist 87(3):215-24.

Crawford, SD. 2001. Web surveys: Perceptions of burden. Soc Sci Comput Rev 19(2):146-62.

Cummins, RA, Gullone, E. 2000. Why we should not use 5-point Likert scales: The case for subjective quality of life measurement. Proceedings, Second International Conference on Quality of Life in Cities: National University of Singapore 74-93.

Dalgaard, T, Hutchings, NJ, Porter, JR. 2003. Agroecology, scaling and interdisciplinarity. Agriculture, Ecosystems, & Environment 100(1):39-51.

Dallimer, M, Tinch, D, Acs, S, Hanley, N, Southall HR, Gaston, KJ, Armsworth, PR. 2009. 100 years of change: Examining agricultural trends, habitat change, and stakeholder perceptions through the 20th century. J Appl Ecol 46(2):334-43.

Duemer, LS. Education origins of the Morrill Land Grant Act of 1862. American Educational History Journal 34(1):135-46.

Dunn, DD, Gibson, FK, and Whorton JW Jr. 1985. University commitment to public service for state and local governments. Public Admin Rev 45(4):503-9.

Dyment, JE, Bell, AC. 2008. Our garden is colour blind, inclusive, and warm: Reflections on green school grounds and social inclusion. 12(2):169-83.

Edwards, CA, Grove, TL, Harwood, RR, Pierce Colfer, CJ. 1993. The role of agroecology and integrated farming systems in agricultural sustainability. Agriculture, Ecosystems & Environment 46(1/4):99-121.

Flicker, S, Savan, B, Kolenda, B, Mildenberger, M. 2008. A snapshot of community-based research in Canada: Who? What? Why? How? Health Educ Res 23(1):106-14.

Francis, CA, Jordan, N, Porter, P, Breland, TA, Lieblein, G, Salomonsson, L, Sriskandarajah, N, Wiedenhoeft, M, DeHaan, R. 2011. Innovative education in agroecology: Experiential learning for a sustainable agriculture. Crc Cr Rev Plant Sci 30(1/2):226-37.

Francis, C, Lieblein, G, Gliessman, S, Breland, TA, Creamer N, Harwood, R, Salomonsson, L, Helenius, J, Rickerl, D, Salvador, R, Wiedenhoeft, M, Simmons, S, Allen, P, Altieri, M, Flora, C, Poincelot, R. 2003. Agroecology: The ecology of food systems. J Sustain Agr 22(3):99-118.

Garcìa-Llorente, M, Martìn-Lopez, B, Nunes, PALD, González, JA, Alcorlo, P, Montes, C. 2011. Analyzing the social factors that influence wiliness to pay for invasive alien species management under two different strategies: Eradication and prevention. Environ Manage 48(3):418-35.

Göksen, F, Adaman, F, Ünal Zenginobuz, E. 2002. On environmental concern, willingness to pay, and postmaterialist values: Evidence from Istanbul. Environ Behav 34(5):616-33.

Graham, H, Bell, DL, Lussier, M, McLaughlin, P, Zidenberg-Cherr, S. 2005. Use of school gardens in academic instruction. J Nutr Educ Behav 37(3):147-51.

Gras, NSB. 1925. *A History of Agriculture in Europe and America*. New York: F.S. Crofts & Co. p 496.

Grey, MA. 2000. The industrial food stream and its alternatives in the United States: An introduction. Hum Organ 59(2):143-50.

Hazzard, EL, Moreno, E, Beall, DL, Zidenberg-Cherr, S. 2011. Best practices models for implementing, sustaining, and using instructional school gardens in California. J Nutr Educ Behav 43(5):409-13.

Hinrichs, CC. 2000. Embeddedness and local food systems: Notes on two types of direct agricultural markets. J Rural Stud 16(3):295-303.

Howard, RW. 1945. *Two Billion Acre Farm: An Informal History of American Agriculture*. Garden City (NY): Doubleday, Doran, and Co., Inc. p 209.

Ikerd, JE. Local food: Revolution and reality. Journal of Agricultural & Food Information 12(1):49-57.

Kelsey, KD, Pense, SL. 2001. A model for gathering stakeholder input for setting research priorities at the land-grant university. Journal of Agricultural Education 42(2):18-27.

Kelsey, KD, Mariger, SC, Pense, SL. 2001. Serving stakeholders at a land-grant university: Forestry professors present their view ten years after Boyer. Journal of Southern Agricultural Education Research 51(1):228-42.

Liebe, U, Preisendörfer, P, Meyerhoff, J. 2011. To pay or not to pay: Competing theories to explain individuals' willingness to pay for public environmental goods. Environ Behav 43(1):106-30.

Lieblein, G, Francis, C, King, J. 2000. Conceptual framework for structuring future agricultural colleges and universities in industrial countries. The Journal of Agricultural Education and Extension 6(4):213-22.

Lieblein, G, Østergarrd, E, Francis, C. 2004. Becoming an agroecologist through action education. Int J Agric Sustain 2(3):147-53.

Mariger, SC, Kelsey, KD. 2003. Determining the research, education, and extension needs of Oklahoma wheat producers. Journal of Southern Agricultural Education Research 53(3):47-58.

Matson, PA, Parton, WJ, Power, AG, Swift, MJ. 1997. Agricultural intensification and ecosystem properties. Science 277:504-9.

McDowell, GR. 2003. Engaged universities: Lessons from the land-grant universities and extension. Ann Am Acad Pol SS 585:31-50.

Meyer, R, Liebe U. 2010. Are the affluent prepared to pay for the planet? Explaining willingness to pay for public and quasi-private environmental goods in Switzerland. Popul Environ 32(1):42-65.

Miller, C. 2003. In the sweat of our brow: Citizenship in American domestic practice during WWII – victory gardens. J Am Culture 26(3):395-409.

Norman, Geoff. 2010. Likert scales, levels of measurement and the “laws” of statistics. Adv Health Sci Educ 15(5):625-32.

Ostrom, M, Jackson-Smith, D. 2005. Defining a purpose: Diverse farm constituencies and publicly funded agricultural research and extension. J Sustan Agr 27(3):57-76.

Ozer, E. The effects of school gardens on students and schools: Conceptualization and considerations for maximizing healthy development. Health Educ Behav 34(6):846-63.

Parr, DM, Trexler, CJ. 2011. Students’ experiential learning and use of student farms in sustainable agriculture education. Journal of Natural Resources & Life Sciences Education 40:172-80.

Parr, DM, Trexler, CJ, Khanna, NR, Battisti, BT. 2007. Designing sustainable agriculture education: Academics’ suggestions for an undergraduate curriculum at a land grant university. Agr Hum Values 24(4):523-33.

Parr, DM, Van Horn, M. 2006. Development of organic and sustainable agricultural education at the University of California, Davis: A closer look at practice and theory. HortTechnology 16(3):426-31.

Parry, DC, Glover, TD, Shinew, KJ. ‘Mary, Mary quite contrary, how does your garden grow?’: Examining gender roles and relations in community gardens. Leisure Studies 24(2):177-92.

Pate, J, Loomis, J. 1997. The effect of distance on willingness to pay values: A case study of wetlands and salmon in California. Ecol Econ 20:199-207.

Pretty, JN. 1995. Participatory learning for sustainable agriculture. World Dev 23(8):1247-63.

Punch, KF. 2003. *Survey Research: The Basics*. Cornwall (Great Britain): SAGE Publications. p 123.

Sallis, JF, Glanz, K. 2006. The role of built environments in physical activity, eating, and obesity in Childhood. Future Child 16(1):89-108.

Schlosberg, D. 2004. Reconceiving environmental justice: Global movements and political theories. Environ Polit 13(3):517-40.

Severiens, S, Ten Dam, G. 1997. Gender and gender identity differences in learning styles. Educ Psychol 17(1/2):79-93.

Sibthorp, J, Schumann, S, Gookin, J, Baynes, S, Paisley, K, Rathunde, K. 2011. Experiential education and lifelong learning: Examining optimal engagement in college students. Journal of Experiential Education 33(4):388-92.

Skinner, EA, Chi, U, The Learning-Gardens Educational Assessment Group. 2012. Intrinsic motivation and engagement as “active ingredients” in garden-based education: Examining models and measures derived from self-determination theory. J Environ Educ 43(1):16-36.

Sloan, HS. 1947. *Farming in America*. New York: Harper & Brothers. p 242.

Smit, J. 2002. Urban agriculture: A powerful engine for sustainable cities. In: Taylor-Ide, D, Taylor, CE (eds.). *Just and Lasting Change*. Baltimore, MD: The Johns Hopkins University Press. p 189-99.

Tilman, D. 1998. The greening of the green revolution. Nature 396(6708):211-12.

Trexler, CJ, Parr, DM. 2006. A Delphi study of agricultural practitioners' opinions: Necessary experiences for an inclusion in an undergraduate sustainable agriculture major. Journal of Agricultural Education 47(4):15-24.

United States Census Bureau. 2010. United States Census 2010. http://2010.census.gov/2010census/popmap/ipmtext.php?fl=06:0616000:061388 (accessed February 23, 2012).

United States Department of Agriculture Natural Resources Conservation Service. 2008. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx (accessed February 23, 2012).

van den Bosch, R. *The Pesticide Conspiracy*. Garden City (NY): Doubleday, Doran, and Co., Inc. p 226.

Warner, KD. 2008. Agroecology as participatory science. Science, Technology, and Human Values 33(6):754-77.

Warnick, BK, Thompson, GW. 2007. Barriers, support, and collaboration: A comparison of science and agriculture teachers' perceptions regarding integration of science into the agricultural education curriculum. Journal of Agricultural Education 48(1):75-85.

Wezel, A, Bellon, S, Doré, T, Francis, C, Vallor, D, David, C. 2009. Agroecology as a science, a movement, and a practice: A review. Agron Sustain Dev 29(4):503-15.

Wilkins, JL, Bowdish, E, Sobal, J. 2000. University student perceptions of seasonal and local foods. J Nutr Educ 32(5):261-68.

Yang, M. 2005. Creating the kitchen patriot: Media promotion of food rationing and nutrition campaigns on the American home front during World War II. American Journalism 22(3):55-75.

Appendix A

Survey Instrument

Microsoft Word Paper Version

Dear Friend of CSUEB,

I'm conducting research about installing an educational farm on the CSUEB Concord Campus. You have been selected to participate in a brief survey about this possibility.

This survey is anonymous and no identifying information will be collected. Results will be used for a Master of Science thesis and shared with California State University administration.

Completing this survey acknowledges the acceptance of the terms of the Informed Consent Form available at: https://sites.google.com/site/csuebconcordeducationalfarm/

Please complete this survey by _______________.

1. What is your POSITION at or CONNECTION with the CSUEB Concord Campus as of Fall 2012?
Campus Community:
   a. Student
   b. Faculty
   c. Staff
   d. Administrator
   e. Member of Scholar Olli
   f. Public Elementary School Teacher
   g. Public Middle School Teacher
   h. Public High School Teacher

2. Which of the following are you AFFILIATED with?
   a. CSUEB Concord Campus
   b. CSUEB Hayward Campus
   c. Concord/Clayton Community
   d. Other (please specify): ___________________________________

3. How MUCH do you support the idea of having an educational farm on the Concord Campus?
←---→
1 2 3 4 5 6 7 8 9 10
Not at all Very much

4. How USEFUL would it be to have an educational farm on the Concord Campus?

←---→

1 2 3 4 5 6 7 8 9 10

Not at all useful Very useful

5. How would you characterize your LEVEL of BACKGROUND/EXPERIENCE with gardening and/or farming?

←---→

1 2 3 4 5 6 7 8 9 10

None A lot

6. Rank each of the following FUNCTIONS of an educational farm, based on their USEFULNESS:

←---→

1 2 3 4 5 6 7 8 9 10

Not at all useful Very useful

__Academic courses with hands-on, practical components
__Growing plants for a campus nursery
__Local K-12 school field trips
__Volunteering & service learning
__Workshops, demonstrations, or short courses

7. If courses (including GE and Major courses, weekend workshops, etc.) were held in conjunction with the educational farm, how LIKELY would you be to enroll/sign-up?

←---→

1 2 3 4 5 6 7 8 9 10

Not at all likely Very likely

8. Rate the importance of each of the following TYPES of COURSES that could be held in conjunction with the educational farm.

←---→

1 2 3 4 5 6 7 8 9 10

Unimportant Very Important

__Quarter-long courses
__Short courses (1-4 weeks)
__Trainings (i.e. teacher trainings)
__Weekend workshops
Other/Comments:____

9. How IMPORTANT would it be to teach each of the following SCIENCE TOPICS in association with an educational farm?

←---→

1 2 3 4 5 6 7 8 9 10

Unimportant Very Important

__Applied Sciences
__Health Sciences
__Life Sciences
__Mathematics
__Physical Sciences
Other/Comments:____

10. How IMPORTANT would it be to teach each of the following HUMANITIES TOPICS in association with an educational farm?

←---→

1 2 3 4 5 6 7 8 9 10

Unimportant Very Important

__Art
__Language
__Philosophy
__Writing
Other/Comments:____

11. How IMPORTANT would it be to teach each of the following EDUCATIONAL/SOCIAL SCIENCE TOPICS in association with an educational farm?

←---→

1 2 3 4 5 6 7 8 9 10

Unimportant Very Important

__Anthropology
__Business/Economics
__Education
__History
Other/Comments:____

12. How IMPORTANT would it be to teach each of the following SKILLS in association with an educational farm?

←---→

1 2 3 4 5 6 7 8 9 10

Unimportant Very Important

__Agricultural pests & beneficials
__Beekeeping (and other related topics, such as candle making)
__Compost/Vermicomposting
__Garden therapy
__Landscape design/Architecture
__Organic gardening/Sustainable agriculture
__Photography
__Pruning
__Scientific illustration
__Theme gardens (i.e. butterfly, songbird, ornamental, school)
Other (please specify):____

13. (Part I) How WILLING would you be to contribute TIME, EXPERTISE, and/or SERVICE LEARNING HOURS to the creation of the following components of the BUILT ENVIRONMENT?

←---→

1 2 3 4 5 6 7 8 9 10

Not at all willing Very Willing

__Assembling greenhouse/hoop house, storage/tool shed
__Building arbors/archways
__Building potting benches/seedling tables (for starting seeds, transplanting young plants, etc.)
__Designing interpretive signs (panels explaining parts of the farm)
__Designing irrigation
__Flower planting
__Installing irrigation

14. (Part II) How WILLING would you be to contribute TIME, EXPERTISE, and/or SERVICE LEARNING HOURS to the creation of the following components of the BUILT ENVIRONMENT?

←--→

1 2 3 4 5 6 7 8 9 10

Not at all willing Very Willing

__Making compost piles
__Making worm bins
__Plumbing for an outdoor sink
__Pouring cement pads for soil mixing
__Seed starting
__Vine installation

15. How WILLING would you be to contribute TIME to the ONGOING MAINTENANCE of an educational farm on the CSUEB Concord Campus?

←--→

1 2 3 4 5 6 7 8 9 10

Not at all willing Very Willing

__Bed digging/forming
__Composting
__Harvesting
__Maintaining irrigation
__Planting
__Weeding

16. What else would you like to see in an educational farm on campus?

17. How LIKELY are you to VISIT an educational farm on the CSUEB Concord Campus?

←--→

1 2 3 4 5 6 7 8 9 10

Not at all likely Very likely

18. How MUCH would you be likely to contribute financially to the development and upkeep of an educational farm on the CSUEB Concord Campus?

__$0/yr
__$20/yr
__$50/yr
__$100/yr
__$250/yr
__$500/yr
__$1,000/yr
__$10,000/yr +

19. What is your gender?

__Female
__Male
__Other
Comments: ____

20. What is your age?

____

21. In which county do you currently reside?

__Alameda County
__Contra Costa County
__Marin County
__Napa County
__San Francisco County
__San Mateo County
__Santa Clara County
__Solano County
__Sonoma County
__Other (please specify):____

22. What is your ethnicity?

__Black, non-Hispanic
__American Indian or Alaska Native
__Asian or Pacific Islander
__Hispanic
__White, non-Hispanic
Other/Comments: ____

23. What is your annual income?

__<$10,000-$30,000
__$30,001-$50,000
__$50,001-$70,000
__$70,001-$90,000
__$90,001-$110,000
__>$110,000
Other/Comments: ____

24. If applicable, please state your major or discipline.

25. Do you have any additional comments?

26. Please include your name and email address if you are interested in this project and would like some follow-up information.