
Student Interest in Campus Community Gardens: Sowing the Seeds for Direct Engagement with Sustainability

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Abstract

At a time when environmental problems are growing and biophysical limits-to-growth are apparent, encouraging sustainable behavior is a critical societal objective. Within the college campus sustainability movement this is expressed as the need to broaden student involvement in environmental stewardship initiatives. This chapter proposes that campus community gardens are particularly well-suited to the task of increasing student engagement across the entire campus population, not just among those with a prior interest in sustainability or gardening. To explore this proposition, a survey of undergraduate attitudes about motivations for and interest in gardening at a large, non-land-grant, research university was conducted. Results show that student interest is strongly related to how the campus gardening experience is structured. In particular, interest in gardening is related to clearly defined personal and community benefits. What is most fascinating is that the level of interest is not related to prior gardening experience or to strong pro-environmental attitudes, suggesting that campus gardens and farms may be made to appeal to a wide range of students.

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1 Introduction

In the years since the Talloires' declaration challenged universities to pursue on-campus sustainability initiatives¹ (ULSF 1990), such efforts have grown dramatically, becoming a centerpiece of some university agendas (Egan 2006; Eilperin 2006; Friedman 2006; Smith 2013; Weeks 2006). There are now more than 300 international colleges and universities in the Sustainability Tracking, Assessment and Rating System, which measures campus sustainability performance (Urbanski 2014). Furthermore, over 63 % of college applicants place a strong emphasis in their decision to attend a particular college on the institution's commitment to the environment (Zernicke 2008).

Campus sustainability programs are often outgrowths of the environmental research and teaching already in existence on campus (Shriberg 2000). Initially, such programs focused on large-scale infrastructural and administrative changes, such as energy use efficiencies and water conservation in campus buildings, regulating greenhouse gas emissions, and land preservation (Graedel 2002; Pike et al. 2003). In some cases, campus sustainability efforts were integrated into university mission statements or other frameworks, such as using sustainability principles to guide decision-making and purchasing (Shriberg 2000). In other cases, efforts focused on specific projects, such as decreasing the amount of chemicals used in laboratories (Shriberg 2003).

While these achievements are important, the modest level of student day-to-day behavioral engagement in campus sustainability efforts remains an issue. From the beginning, getting students involved with campus environmental stewardship initiatives has been a prime objective (The Heinz Family Foundation 1995; ULSF 1990) and even a guiding principle (Clugston and Calder 1999; Nixon 2002). Unfortunately, campuses lag in achieving this goal (Calder and Clugston 2003; Wright 2003), placing emphasis on technological, purchasing, and physical-plant interventions while underemphasizing the behavioral and cultural aspects of campus environmental sustainability (Levy and Marans 2012). The National Wildlife Federation's Report Card on Environmental Performance and Sustainability in Higher Education found the biggest missed opportunity was involving students, faculty, and staff in campus sustainability efforts (McIntosh et al. 2011).

¹Composed in 1990 at an international conference in Talloires, France, this is the first official statement made by university administrators of a commitment to environmental stewardship in higher education. The Talloires Declaration is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities.

Where there is student engagement, there is a related issue of self-selection; the active participants are often those with a well-established commitment to environmental issues. Sharp points out that campus environmental groups are generally composed of “passionate, committed students” (Sharp 2002, p. 137), while Zimmerman and Halfacre-Hitchcock note that environmentalism is often viewed as a fringe activity, negatively stereotyped by other students (Zimmerman and Halfacre-Hitchcock 2006). There is clearly a need to provide more opportunities for the broader student population to engage in campus sustainability efforts. But to reach this broader group, efforts to motivate environmental sustainability behaviors will need to be better integrated into everyday educational activities (Lidgren et al. 2006). This is a challenge best addressed by the social sciences. While the natural and physical sciences can present the details and context of the environmental problems being faced, it is the behavioral and educational models of social change that will help to craft the needed societal responses.

1.1 The Importance of Everyday Involvement

DeLind and Link (2004) argue that sustainability cannot be taught effectively in the abstract, needing instead to be experienced and practiced. This echoes the thinking of many campus sustainability scholars who argue that place-based instruction and daily hands-on experience are essential to teaching sustainability. Barlett (2002) writes about the role of a walking tour in building environmental awareness and sense of place. In his recommendations for creating sustainability education, Moore (2005, p. 331) counsels that “pedagogical transformation” is accomplished through “participatory” and “experiential” opportunities. Zimmerman and Halfacre-Hitchcock (2006) highlight the role of connectedness as a key component of student engagement. Alvarez and Rogers (2006) suggest students’ understanding of sustainability is positively transformed by their being embedded in the campus community and by connecting sustainability to place in their educational process. Thus, place-based and engaged learning, coupled with tangible and directly perceivable outcomes, are essential to the task of promoting long-term sustainability behaviors.

The transition from a growth-oriented, consumer focused industrial society to one that operates within biophysical limits will require resourcefulness and behavioral entrepreneurship (De Young 2014). It will be a long-term, evolving process (De Young and Princen 2012) where the more appropriate responses to environmental dilemmas will emerge from on-the-ground, place-based adaptations (Tonn and MacGregor 1998). For this reason, providing students with chances to experiment with sustainability while they are still in the supportive environment of a school setting gives them the opportunity to slowly develop personal environmental proficiency (Kaplan and Basu 2015; Princen 2005, 2009) and to learn to craft solutions that are appropriate for their own communities and cultures (Kaplan 1996; Irvine and Kaplan 2001).

1.2 Creating Fertile Ground for Student Engagement with Sustainability

One example of a campus sustainability initiative that is aimed at engaging the broader student population is a community garden or farm (Barlett 2011). A campus community garden or campus farm is a public space created and maintained by the campus community where participants can plant and harvest vegetables, herbs, and fruit (Dengate et al. 2013). The material and logistical commitment can be modest—a small piece of land, fencing, a source of water, simple tools and some maintenance oversight—but the benefits to environmental awareness and engagement in sustainability initiatives may be significant.

Campus farms and gardens lend themselves well to experiential learning programs. Combining classroom lectures with hands-on agricultural experience is a strategy favored by students (Parr and Trexler 2011) and a documented means of fostering cognitive engagement and interdisciplinary learning (Francis et al. 2011; Mazurkewicz et al. 2012).

Campus gardens are being used in a wide variety of settings to advance environmental education, foster community ties, and improve psychological well-being (Borgman et al. 2014). Community-based gardening and farming initiatives develop social capital and resilience on multiple levels. They create a positive, empowering social atmosphere, help to develop social networks among participants, and encourage community activism (Okvat and Zautra 2011). Such initiatives also have been shown to enhance the psychological well-being and physical health of participants (Johnson 2013). Tending a garden or small campus farm provides a potent counterpoint to the abstract relationship many people have with nature. With just a little time and effort, students can literally taste the fruits of their labors, building a positive and visceral relationship with the natural environment. Research studying the effects of contact with the natural environment has consistently found exposure to nature to be positively correlated with important well-being outcomes such as attentional functioning (De Young 2010; Irvine and Warber 2002; Kaplan and Kaplan 1983, 2003) and stress reduction (Ulrich 1984; Van Den Berg and Custers 2011; Wells and Evans 2003). Other research has found that frequent experience with a natural environment, such as a garden, is linked to an increase in positive environmental attitudes and behaviors (Bradley 1995; Moore 1995; Stewart and Craig 2001).

From an academic perspective, campus gardens can serve as a tool for exploring sustainability topics such as food systems, and global energy and resource use. The research on campus gardens suggest they are a low-threshold way to provide opportunities for student engagement in sustainability efforts while literally getting their hands dirty. On a number of levels—personal, academic and community—a campus community garden can be used to build and reinforce positive connections with sustainability principles and practices, serving as a gateway to broader environmental stewardship concepts and behaviors. Additionally, within contexts in which the primary focus is not environmental sustainability, a campus garden might

facilitate introducing environmental literacy discussions into fields such as public health, planning, engineering, art and business. Environmental educators increasingly recognize that natural environments, such as campus farms, are an excellent context for integrated learning, connecting environmental awareness with other topics.

There are many student garden and farm projects at colleges and universities in the United States. An informal review done ten years ago identified 52 student farm and/or gardening projects (New Farm Program 2005). More recently, Valluri (2010) identified over 100 institutions of higher education that have community gardens on campus. However, most of those programs were not targeting the general student population and were not explicitly part of a campus sustainability program. Many of the existing campus gardens and farms are geared towards specialized training in areas such as industrial agriculture, horticulture or organic farm production. Although the presence of these garden and farm programs provides evidence that such efforts can be easily integrated with existing campuses initiatives, there appears to be room for these programs to involve the wider campus population.

Campus community gardens provide the opportunity for place-based sustainability education that researchers are calling for (Alvarez and Rogers 2006; DeLind and Link 2004; Gruenwald 2003). Place identity and environmental responsibility have been shown to increase with visitation to natural areas on campus and this relationship may also be stronger when the outdoor experience is tied to coursework (Lawrence 2012). Students who become involved in gardening activities that are integrated with campus sustainability initiatives may come to understand the meaning of sustainability in ways that will endure far beyond their college years.

1.3 Measuring Student Interest in Campus Community Gardening

This study is part of a larger initiative aimed at integrating small gardens and a larger campus farm into both a campus-wide sustainability program and an undergraduate curriculum. This study's specific goal is to explore the potential for engaging a broad segment of the campus population in the study and practice of sustainable food systems, especially those students who are not predisposed to environmental issues. Furthermore, while US land-grant universities are actively engaged in promoting sustainable agriculture (Jacobsen et al. 2012) this study was conducted at a large Midwestern research university that is not the state's land-grant school.

The study was designed to measure what motivations exist for becoming involved in campus gardening and to develop guidance on how to set up campus garden and farm programs to appeal to the general student population. At the time this survey was conducted, the campus had a number of sustainability programs (e.g., green building renovations, environmental purchasing guidelines) but had yet to establish either a campus community garden or a campus farm.

2 Methods

2.1 Sample

An email was sent to undergraduate students living in residence halls at a large, non-land-grant, research university in the U.S., seeking participants for an online survey on gardening and environmental attitudes. Younger college students were intentionally targeted since their interest was not likely to be compromised by approaching graduation. A single invitation email was sent to approximately 3700 students. There were 256 respondents (7 % response rate) including 166 freshmen, 58 sophomores, 16 juniors, 13 seniors and three in their fifth year or beyond. Respondents were 40 % male and 56 % female (12 respondents provided no demographic information).

2.2 Measures

The survey instrument included a measure of prior gardening experience, a bank of items assessing both attitudes toward gardening and the environment and interest in gardening behavior, a bank of items measuring motivations for gardening, and several demographic measures (i.e., gender, year in school, campus residence area).

Prior gardening experience was measured with one item. Respondents were asked to rate their agreement with the statement “I know how to start and maintain a garden.” Responses were on a five-point Likert scale from strongly disagree to strongly agree. In all measures reported here, higher mean values indicate higher endorsement for the construct being discussed.

Attitudes towards gardening and the environment were measured with ten items. Respondents were asked to rate their agreement with gardening-related statements such as “I would be willing to start and maintain a garden” and environment-related statements such as “protecting the environment is important to me.” The respondents’ interest in gardening behavior, the dependent variable in this study, was measured by four items, including “I would be interested in starting a garden.” Again, responses were on a five-point Likert scale from strongly disagree to strongly agree.

Motivation for gardening was measured with 18 items designed to assess a spectrum of motivations related to how the garden would align with students’ lives and campus routines. Items asked students to rate their motivation for gardening depending on what would happen to the products of the garden (e.g., donating the produce to a homeless shelter, selling the produce), where the garden was located on campus, how students might access it, and in what ways the garden might be tied into their coursework. The stem question for each motivation item was “Please indicate how interested you would be in gardening if...” This was followed by items such as, “You could eat the vegetables you grew.” Responses were on a five-point Likert scale from not interested at all to very interested.

Separate factor analyses were conducted for the bank of attitude and bank of motivation items in order to reduce the data and identify latent constructs in the responses. These analyses involved principle axis factoring using varimax rotation. Acceptable and reliable factor structure consisted of eigenvalues ≥ 1.0 , item loadings ≥ 0.5 , no double loading ≥ 0.5 and Cronbach’s coefficient of reliability (alpha) ≥ 0.7 . The resulting categories of items were averaged into the new composite categories discussed below.

3 Results

The respondents reported a moderate level of prior *Gardening experience* (mean 3.0), suggesting a range of gardening knowledge and skills among the students.

The factor analysis identified two categories in the first bank of survey items (Table 1). The *Pro-environmental attitude* category is composed of four items measuring how important the environment is, whether gardening is beneficial to the environment, and how often participants are engaging in the pro-environmental behaviors of recycling and energy conservation. Respondents rated the *Pro-environmental attitude* category the highest among all the study measures (mean 3.9). This same factor analysis extracted the study’s dependent variable labeled *Interest in gardening*. This category is composed of four items that indicate a willingness to start a garden and the potential intrinsic enjoyment experienced from gardening. The item “gardening is a boring and tedious activity” negatively loaded on this factor and was reverse coded for the composite measure. On average, respondents were modestly positive about their willingness to garden (mean 3.4).

Table 1 Interest in gardening and Pro-environmental attitude categories

Category names and items included	Mean	S.D.	Alpha and loadings
<i>Interest in gardening</i>	3.4	0.9	0.84
Growing plants would be enjoyable			0.92
I would be interested in starting a garden			0.90
Gardening is a boring and tedious activity ^a			-0.80
I would be more likely to compost food scraps if I had a garden			0.50
<i>Pro-environmental attitude</i>	3.9	0.6	0.71
On average, I think I recycle more than other people I know			0.75
Protecting the environment is important to me			0.75
I make a conscious effort to turn off electrical appliances when not using them			0.70
Gardening benefits the environment			0.60

^aitem reversed

Pairwise comparison of means is significantly different at $p < 0.001$

The second factor analysis identified three categories in the bank of items measuring motivations (Table 2). The *Personal benefits* category is composed of items regarding how participation in gardening might affect the students themselves. This category of items measures the respondents' desire to have the gardens give something back to them in terms of money, dining points, competition or personal space improvements. Overall this category was endorsed at a low to moderate level (mean 2.8). The *Learning opportunities* category is composed of items reflecting students' motivation to garden based on the whether the garden is tied to coursework or other formal educational opportunities. This category had a low to moderate level of endorsement (mean 2.7). The third category extracted in the factor analysis, *Community benefits*, is composed of items that relate to making a positive contribution to society through helping other students, hospital patients or homeless people. While the item "The garden was somewhere on central campus, but not next to your dorm" is not as clearly about community benefits, having the garden on central campus would put it in an easy-to-reach location for most students, perhaps reflecting the desire to make the benefits of the garden available to

Table 2 Motivation categories

Category names and items included	Mean	S.D.	Alpha and loadings
<i>Personal benefits</i>	2.8	1.2	0.90
Could sell your vegetables on campus			0.87
Could sell your vegetables at a local farmer's market			0.85
Received dining points for donating vegetables to residential hall			0.67
Your dorm floor gardened competitively against other floors			0.66
Could grow plants in your own dorm room			0.56
<i>Learning opportunities</i>	2.7	1.2	0.89
Take a class for credit which just taught you how to garden			0.85
Take a class for credit which included growing a garden			0.81
Participate in a one-day workshop in your dorm to learn to garden			0.70
Learn to garden from an elementary age or high school age student			0.61
Mentor a child in a gardening program			0.61
<i>Community benefits</i>	3.1	1.1	0.86
Vegetables were given to homeless shelters			0.86
Flowers were grown for patients at university hospital			0.84
Vegetables were donated to residence hall dining services			0.64
Garden was somewhere on central campus, but not at your dorm			0.54

All pairwise comparisons of means are significantly different at $p < 0.05$

the entire campus community. This category received a moderate level of endorsement (mean 3.1). All pairwise comparisons of motivation category means were significantly different at $p \leq 0.05$.

3.1 Hierarchical Regression

To examine how respondents’ motivations relate to the study’s dependent variable, *Interest in gardening*, after accounting for the variance predicted by the other measures, a hierarchical regression was performed. The demographic variables were entered first. Then the measure of *Gardening experience* and the *Pro-environmental attitude* category were entered to account for respondents’ pre-disposition toward general environmental sustainability and gardening in particular. Finally the three motivation categories were entered to explore their ability to predict the remaining variance in the *Interest in gardening* category (Table 3).

This hierarchical regression model accounted for a significant percentage of the variance in the *Interest in gardening* category (r-squared = 0.62). The demographic measures had no significant contribution. *Gardening experience* and *Pro-environmental attitude* had a significant positive influence (r-squared = 0.21) on the respondents’ *Interest in gardening*. Finally, in combination, the three motivation categories significantly predicted the remaining variance in the *Interest in gardening* dependent variable (r-squared = 0.39). Of the motivational measures, *Personal benefits* and *Learning opportunities* had the strongest relationship ($B = 0.34$, $p < 0.001$ and $B = 0.31$, $p < 0.001$, respectively) with *Interest in gardening*.

Table 3 Hierarchical regression of Interest in gardening category

Predictors	B	Sig. B	Δr^2	F Δ	sig. F Δ
Year in school	0.03				
Gender	-0.08				
Campus residence area	0.00				
			0.02	1.8	
Gardening experience	0.14	***			
Pro-environmental attitude	0.12	**			
			0.21	32.5	***
<i>Motivation categories:</i>					
Personal benefits	0.34	***			
Learning opportunities	0.31	***			
Community benefits	0.14	*			
			0.39	83.1	***
Total R-squared			0.62		

Dependent variable: *Interest in gardening* category

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

4 Discussion

The survey findings suggest that a wide range of students may be interested in participating in a campus community garden, depending on how the garden program is structured. Approximately 40 % of the variance in students' interest in gardening was predicted by their motivations. Thus, a campus garden or farm program that aligns with student motivations is more likely to engage students.

While the students did report an interest in gardening, that interest depended on whether they could see tangible personal benefits from their participation, or if the gardening experience was tied to coursework or other formal learning opportunities. Benefits that accrued to the community was another, although much less powerful, motivator of student interest in campus gardening. Although prior gardening experience and a pro-environmental attitude were significantly related to an interest in gardening, together these two measures were a much weaker predictor than the motivational measures.

4.1 The Influence of Familiarity

The effect of perceived personal benefits and learning opportunities on the students' interest in gardening suggests that they are concerned about how well a campus garden fits into the normal educational experience. Students were more likely to be interested in gardening if the campus garden was physically and programmatically integrated into familiar campus elements or environments, such as residence halls, dining halls, and coursework. Many existing campus garden and farm programs, however, are distant from the main campus or are geared towards specialized training rather than general sustainability education (New Farm Program 2005). The findings reported here suggest that students may be more responsive to a new program if it is designed to provide clearly defined personal benefits and fits the established academic routine.

4.2 The Importance of Community Benefits

Clearly, the built and social environments characteristic of college campuses are extremely slow to change, some of it quite literally set in stone. This may present a barrier to participation for those students who wish to make a visible impact on the campus environment. Since students' interest in gardening was motivated in part by the community benefits provided by the garden, a campus garden may be of more interest to students if it is portrayed as an opportunity to make tangible and noticeable changes to the campus setting (Eatmon et al. 2015; Ralph and Stubbs 2014). In addition, a campus garden or farm program might be advised to highlight the service provided to the campus and/or local community (Barlett 2011), rather than to emphasize, for instance, specific crops produced or their yield.

4.3 The Broad Appeal of on-Campus Agriculture

Higher levels of a pro-environmental attitude was not a powerful predictor of higher levels of interest in campus gardening. This result supports the notion that a campus community garden or farm may appeal to a wide range of students, even to those without pre-existing, high levels of environmental awareness or concern. There is also a possibility that involvement with a campus community garden might serve as a gateway behavior, possibly leading to the development of higher pro-environmental attitudes and/or an interest in other sustainability behaviors (Barlett 2011).

5 Conclusion

This study was small with only a modest response rate. Furthermore, it was conducted early in the development of on-campus gardening and farming initiatives. Since these programs are developing very rapidly the findings reported here should be used cautiously.

Nonetheless, at a time when environmental problems are growing and bio-physical limits-to-growth are apparent, teaching and facilitating sustainable behavior is a critical societal objective. Although a community garden or campus farm may not seem to be the loftiest of sustainability endeavors, they create opportunities for young people to experience the environment in direct and everyday ways. Thus, such opportunities may serve as stepping stones to more dramatic and durable sustainability behavior.

Furthermore, developing campus gardens and farms has the potential to broaden the scope of existing campus sustainability programs beyond common, and often unexciting, infrastructural goals. This would help to address the important goal mentioned earlier, that of preparing students to be environmentally aware, concerned citizens prepared to impact their community.

Finally, the findings reported here suggest that a campus community garden may be an effective way to reach a broad student population, including those individuals who might not otherwise get involved in environmental initiatives. This is perhaps the most important finding being reported. Environmental sustainability will not be possible unless and until it engages individuals from across the entire social spectrum. This would seem to be a daunting challenge yet an initiative as commonplace and easy to develop as an on-campus garden proved capable of appealing to a broad range of individuals. This is a most hopeful outcome.

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James Roush graduated from the University of Michigan with a Bachelor of Arts in psychology in 2005, and received a Juris Doctor from the Wayne State University Law School in 2009. He worked for Bodman PLC from 2009 to 2012, engaged on environmental and commercial litigation matters. He now works for Consumers Energy Company, handling matters related to the US Federal Energy Regulatory Commission.

Kate Kozeliski earned a degree in psychology and a minor in music (non-professional) from the University of Michigan in 2006. She spent a year working as a research assistant for Dr. Susan Gelman at the University's Department of Psychology, supporting a study on language and concept development in young children. Kate then moved to Washington, DC and earned a Master's degree in Infant Special Education from George Washington University. She currently works outside of DC in Falls Church, Virginia as an early childhood special education teacher.