

An Exploratory Analysis of Student-Community Interactions in Urban Agriculture

Julie Grossman, Maximilian Sherard, Seb M. Prohn,
Lucy Bradley, L. Suzanne Goodell, and Katherine Andrew

Abstract

Urban agriculture initiatives are on the rise, providing healthy food while teaching a land ethic to youth. In parallel, increasing numbers of university graduates are obtaining Extension work requiring the effective communication of science in a diverse, urban, low-income setting. This study evaluates a pilot service-learning program, the Community Food Security Scholars program, designed to teach students the complexities of urban food security issues while they acquire basic agriculture production skills. By analyzing student responses in pre- and post-service interviews, the authors evaluated students' interaction with the diverse and economically disadvantaged populations, with which many of the students had little previous experience. Results revealed that although students felt they gained valuable theoretical and experiential knowledge about food access, they also faced challenges interacting with community members, possibly affecting the project's learning outcomes. The evaluation resulted in a new course with enhanced opportunities for cultural competency training and outreach.

Introduction

Tremendous population growth in urban areas throughout the world has spurred discussion about how enough food will be grown to feed people in the future, especially those who are economically disadvantaged or otherwise marginalized. Urban agriculture, defined here as producing plants and animals for food and other uses within and around cities and towns (Veenhuizen, 2006), is becoming an increasingly popular strategy to improve food access within congested urban centers. City-based farms and gardens offer opportunities for urban populations to access locally grown, healthy, affordable food that is produced in an environmentally and economically responsible way. In recent years there has been a sharp increase in the number of urban organizations, communities of faith, and collaboratives that have established urban farms and gardens and associated programming. They use these operations to teach neighborhood residents, especially those who are economically disadvantaged, how to successfully produce and market their own food (Baldwin *et al.*, 2010; Treuhaft, Hamm, & Litjens, 2009). Examples include Just Food in Boston, Massachusetts;

Garden Resource Program Collaborative in Detroit, Michigan; and the Oakland Based Urban Gardens, Oakland, California. Such urban farming and gardening programs offer unprecedented hands-on opportunities for service-learning projects in which students can solidify their agricultural production knowledge while gaining professional skills in community outreach and cultural competency. Here the authors present the evaluation of a service-learning program that linked university students with a community partner dedicated to alleviating hunger and food insecurity in urban neighborhoods through the development of neighborhood gardens.

North Carolina State University

North Carolina State University, located in Raleigh, has 34,000 students and 2,000 faculty members. As one of the leading land-grant institutions in the nation, North Carolina State University has a strong commitment to outreach and Extension. In recent years many agricultural universities and traditionally non-agricultural small liberal arts colleges have seen a sharp increase in the number of students interested in urban and alternative agricultural production. However, many of these students have neither a history of direct food production nor community-based experience. To serve these students, agricultural universities and colleges have expanded the number of academic programs and courses in the fields of sustainable agriculture, organic farming, and agroecology (*Bhavsar, 2002; Grabau, 2008*). North Carolina State University is no exception, with the recent and popular addition of a new agroecology concentration to the already extensive list of traditional agricultural majors. Students enrolling in such programs are often interested in combining academic work with activities that involve putting their knowledge to work in practical applied projects. In an effort to improve learning and motivate students, agriculture educators at colleges and universities have devised creative means to engage students in hands-on learning. Lending support to this strategy is an extensive survey of sustainable agriculture faculty members, suggesting that the primary way students learn about agriculture is through experiences that link classroom to fieldwork (*Parr, Trexler, Khanna, & Battisti, 2007*), a suggestion that has been verified in practice (*Wiedenhoef et al., 2003*). Many of these students will go on to conduct outreach or Extension-related work that requires them to effectively communicate agricultural principles to the public in both rural and urban settings (*Schroeder et al., 2006*).

University graduates seeking employment in urban agriculture organizations may find themselves facing novel challenges when they need to communicate and interact with racially, economically, and culturally disparate populations. Community-based learning experiences may help students become aware of social and environmental issues confronting urban and often economically disadvantaged populations. At many universities, service-learning-based partnerships between students and community organizations have emerged with the dual goals of improving student learning through structured reflection on course content and civic empowerment and actively meeting the needs of the local community (Ash, Clayton, & Atkinson, 2005). At the same time, such projects have also been shown to increase awareness of issues of social justice and societal inequities (Einfeld & Collins, 2008; Eyer, 2002; Hughes, Welsh, Mayer, Bolay, & Southard, 2009). Service-learning is commonly used in environmental science courses to reinforce concepts, develop student values and skills, build student confidence, and address on-the-ground community problems (Leege & Cawthorn, 2008; Ward, 1999). The multidisciplinary nature of service-learning in addressing agricultural issues (Grossman, Patel, & Drinkwater, 2010; Jordan, Andow, & Mercer, 2005; Motavelli, Patton, & Miles, 2007) may provide a unique opportunity to place agriculture students in communities where they can learn critical professional skills, while at the same time helping to increase food security in low-income urban communities.

The State of North Carolina and the City of Raleigh

Across the United States, research has drawn a significant link between obesity, socioeconomic status, and food insecurity, with the burden of disease from obesity falling disproportionately on minorities and the poor (Drewnowski & Specter, 2004). North Carolina is no exception to these trends. Raleigh, the capital and the second-largest city in North Carolina, is one of the fastest growing cities in the United States, with a greater metropolitan area population of 1,749,525.

Community Need

Children and families in North Carolina's lowest income neighborhoods are now facing a public health crisis, as the incidence of obesity and chronic disease is rising at an alarming rate. Data from Wake County, where Raleigh is located, revealed a rate

of 23% overweight among low-income children, an increase of 15% from previous years, and a significantly higher rate than the 17.8% overweight among children across all incomes (*NC-NPASS, 2006*). Recent local mapping projects have shown that Wake County's low-income youth have limited experience with many aspects of health and the local food system, including outdoor education; gardening or farming; advocacy or job training opportunities; fresh, local produce; and nutrition and healthy cooking, as well as limited incentives to learn about these issues (*Andrew, 2010*).

The Inter-Faith Food Shuttle (IFFS), a community partner based in Raleigh, North Carolina, has been placing nutritious food in the hands of hungry people across central North Carolina for more than 20 years, primarily through rescue and redistribution of perishable foods. In 2008, the Inter-Faith Food Shuttle initiated a collaborative community gardening program to address environmental stewardship, comprehensive health, nutrition, physical activity, and food choices of up to 600 at-risk children in Raleigh. The Nutrition, Farm, and Community Gardens Program of the Inter-Faith Food Shuttle responds to an increasing demand for healthy foods in all neighborhoods by creating local sources of fresh fruits and vegetables for underserved communities. With a working farm and five urban community gardens, the Inter-Faith Food Shuttle currently has almost 10 acres in production. Inter-Faith Food Shuttle goals for the gardening program include providing fresh, local fruits and vegetables to community members in need; empowering community members to take control of their own food; building community; improving community health and nutrition; providing gardening education and skills; and creating opportunities for physical activity and youth development.

Community Food Security Scholars Program

In 2008, a service-learning program was initiated at North Carolina State University that democratically engaged students in current food security debates while explicitly linking academic activities to the Inter-Faith Food Shuttle gardening and nutrition programming in economically disadvantaged neighborhoods. Faculty members involved in the project outlined broad goals for student learning that included enhancement of disciplinary knowledge in soil science and agriculture, as well as professional skill development related to teaching, outreach, problem solving, and cultural competency. Since most agriculture students at the university had little previous experience working with diverse and economically disadvantaged groups, the authors were interested in

better understanding challenges involved in working with underserved populations and how these challenges may affect potential learning gains.

In spring 2010, the pilot initiative, named the Community Food Security Scholars program, was designed and implemented to enable students to learn about the complexities of urban food security issues while gaining basic skills in agricultural production. Over the course of one semester, participants were required to (1) contribute 45 hours of service in the Inter-Faith Food Shuttle community gardens in Raleigh under the supervision of the farm manager, (2) participate in five faculty-facilitated group discussions of scholarly work on community gardens and food security and orally reflect on course activities, (3) develop teaching modules to be used by Inter-Faith Food Shuttle staff for their agricultural education programming, and (4) submit written, online responses to three reflection questions.

Data Collection

Program participants were recruited through a competitive process in which students provided a written application, including short essay responses about their education and experiences. Faculty members then chose participants based on interest in program goals, prior volunteer experience, and quality of writing in the application. Priority was placed on individuals with demonstrated successes in previous volunteer activities who also possessed limited gardening experience. This combination of characteristics was sought in order to maximize learning gains from program involvement. Recruitment resulted in 13 participants from six diverse departments, notably agricultural and nutrition sciences. Each student received one course credit and recognition with a certificate at a public closing ceremony. Those completing all program requirements were also presented with a stipend of \$125.

Students' service activities included manual labor, community-building activities, and teaching. Examples of labor included garden bed preparation, planting, harvesting, and weeding. Community-building activities included recruiting residents to participate in gardening and education activities. Educational topics included local food options and distribution of garden produce, including ideas for use in meal preparation. Class discussions and facilitated reflections focused on urban food subsistence patterns, food access, food disparities, and social structures driving urban food insecurity.

Measuring the Impact of the Project

Student perceptions of how they interacted with community members were evaluated based on pre- and post-service interviews with a non-faculty third party. Eight of the 13 students participated in both the pre- and post-interviews. Interview questions concerned the degree to which students felt their project was successful, potential barriers to success, and the overall value of program components. Interviews were recorded, transcribed, and coded for content to reveal themes or patterns in student learning. North Carolina State University's Institutional Review Board approval was obtained for all data collected. The limitations of the results presented here include an inability to make generalizations associated with the small sample size (eight students), the short duration of project assessment (one semester), and lack of a control group. These results are being used primarily to improve overall program impact for future service-based initiatives.

Project Findings

The interviews elicited student perceptions of their interactions with community members, as well as student-reported successes of the community gardening service-learning project. The pre-interview data describes students' *expected* challenges and accomplishments prior to the service experience, while the post-interviews reflect students' *observed* experiences and attitudes. In both pre- and post-interviews, students emphasized the stated Inter-Faith Food Shuttle goals of community member empowerment, increased control of community member food supply, and increased agricultural training to community members. Prior to the service experience, four of the eight students stated that they were uncomfortable taking on a leadership role with economically, racially, and culturally diverse community members. All students were aware that they were entering the community as outsiders and felt that this might be one obstacle to success in the gardens, but none described in the pre-interviews any concrete examples of exactly how it might impact their work. Some student quotes suggesting their trepidation prior to their service experience include:

And I also feel a little bit of guilt, because here I am on the other side of the program taunting "oh community, community, community!" But I step back and say "what community do I belong to?" "How active am I?" "How much gardening do I do on my free time?"

I don't want to say we were breaking down barriers—but it's hard for a small white girl going into this community.

A lot of the older community members [may] look at me like who are you and why are you trying to change my lifestyle?

During the pre-service interviews, all students were enthusiastic about participating in the Inter-Faith Food Shuttle community garden initiative, and some went further to predict how their social identities, as expressed through experiences, race, economic class, or educational background, might actually increase their ability to interact with community members. The identification of social similarities and shared experiences between university students and community members was a reoccurring theme throughout pre-interviews. While all students identified themselves as socially different from the community members, some mentioned that past experience with diverse communities might help them relate. For example, one student remarked that

I live on [the road where one of the gardens is located],
I am as much of a community member as they are.

Between pre- and post-service interviews the gross number of students commenting on the barriers of working with diverse populations remained constant (four students in both pre- and post-interviews). However, students in post-service interviews provided specific examples that demonstrated the negative impact of their social identities on their community work. Students hypothesized that their social position and experiences may have impacted the degree to which community members attended trainings, worked alongside students in the garden, or came to harvest events for garden produce.

Especially since we are all generally light skinned, it is just daunting.

They don't really see our race in their neighborhood very often.

Here we are a group of white kids coming in and telling these predominantly black communities how to run a garden . . . it kills me that perhaps it may be true to a point.

They are like “take my kids, you can take my kids all day long. But for me to get out there and do that, you don’t know what I go through and stuff . . . so it’s hard” [paraphrasing an adult community member].

In addition to the challenges, students also described the ways in which the Community Food Security program components and activities positively affected them and community members, including increased knowledge of food security, gardening, and agriculture; increased food access; and other related topics. Figure 1 shows changes in the three most commonly mentioned categories of the pre- and post-service assessments. The first category, “student to community,” included perceptions of how student activities positively affected the community and helped to achieve project goals. The second category, “community to student,” captured how the community positively affected students socially and academically. The final category, “classroom to student,” outlined the ways in which classroom experiences positively affected the students.

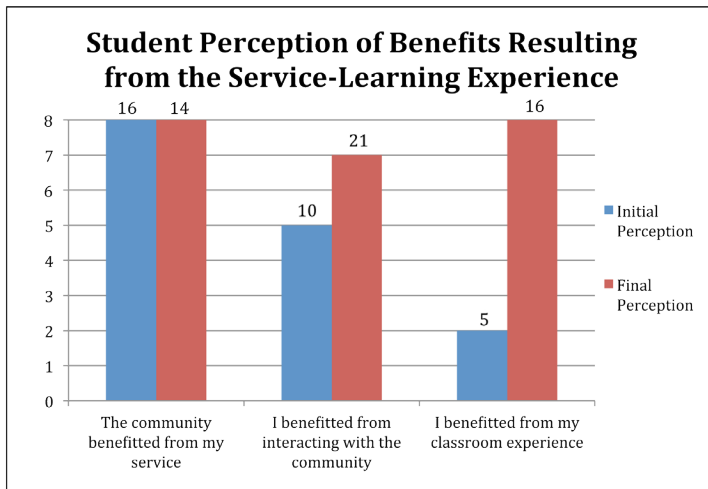


Figure 1. Student Perspective of Benefits Resulting from the Service-Learning Perspective.

Student responses to “In what ways did you benefit, or provide benefit for others, through your service-learning experience?”

Y-axis is number of students commenting on a given benefit; number above column signifies total number of student comments about the benefit recorded during pre- and post-service interviews.

Prior to the experience, students predicted their participation would strongly and positively impact the Inter-Faith Food

Shuttle community garden initiative. Interestingly, more students initially felt that the community gains would outweigh student benefits resulting from program participation, with all eight students initially predicting ways that the community would benefit from student service. Following the experience, all students still felt they had positively impacted the community; however, the total number of comments made regarding their positive impact on the community was slightly reduced from pre- to post-service interviews, indicating that students felt their contributions to the community may have been less than initially expected. Community benefits mentioned by students included basic service for the garden (weeding, planting, etc.), recruiting adult community members to participate in the garden, and teaching children about gardening.

I feel like we maybe stimulated some interest in the gardens and the food just by being around those kids and hanging out with them. One example: when we first started hanging out with them, none of the other kids really wanted to eat the vegetables, but last time I was there they were all munching on things. It was a good feeling. . . .

I hope that I left them with something, mainly I just tried to point out, “oh look at this bug; this is a good bug, this is a bad bug.” Try to put a connection there that this caterpillar is bad because it did this to the cabbage, and this worm is good because it did this to the soil.

I did as much as I could, not as much as I wanted though. Given what we had.

I think we planted a seed, we got the garden started and kept it going. We set an example and left an impression. So, yeah, I think we did that.

In pre-service interviews, five of the total eight students felt that they would benefit from the field experience, and only two students thought that they would benefit from participation in the classroom discussions and reflection. Following the experience, students commented that they gained more in terms of academic learning and professional skill development than they originally predicted, including learning resulting from activities in field and

classroom environments. This was indicated by increases in the number of students mentioning personal benefits resulting from their community work (five students in pre-interviews to seven in post-interviews) and their participation in the classroom portion of the program (two students in the pre-service interviews to all eight in post-service interviews). Benefits that students mentioned receiving from the garden were skills in communication, teaching, leadership, agricultural production, and confidence. From course readings and in-class discussions, students felt that they acquired a greater understanding of local food systems, diversity, and food security. Students stated they benefited from learning about food security, social issues, and gardening through their service-work. About knowledge gained in the classroom, students said:

I think I was heavily influenced by the readings we had, and not that the readings forced me to think that way, but I was exposed to other people's experiences and I could kind of put two things together.

I found the conversations that we had during our meetings difficult . . . they opened my eyes to other people's perceptions and it showed me that I was really naive to not see the differences.

I also liked the educational aspect of the CFS group, because it opened my eyes to many challenges in providing food security.

About knowledge gained through fieldwork about food security, students said:

I also learned that there are many more people out there that would like to see an end to food insecurity and it will take all of us to put it to an end.

I think with all experiences you come out thinking more critically about what purpose you are trying to serve going into any activity: what am I going to accomplish in this, and why?

I am highly motivated to end food insecurity through sustainable agriculture and through this garden I gained some of the skills and am even more knowledgeable about the community. That will make my presence in this field more effective.

About agricultural knowledge gained in the field, students said:

I think, for me personally, [I enjoyed] learning how to garden. It is so easy to talk about it and learn about it in a book, but until you do it. . .

My gardening skills and knowledge about agriculture increased greatly!

A lot of people don't have any idea that potatoes grow underground . . . So I think it is good for [North Carolina State University] students to see how long it takes a tomato plant to grow, and how to prepare a bed, and all the hands-on of gardening.

Well, I almost did this more for me, it was a selfish reason for getting into this program. I've never gardened or farmed before.

In summary, the Community Food Security Scholars program facilitated educational outcomes by constructing a composite learning experience, including classroom discussions, community interaction, and direct garden work. Each individual experience was valuable for students' social and academic growth, but inclusion in a multifaceted framework created opportunities for students to connect lived and observed experiences to the pertinent literature. The result was a more reflexive student leader with increased understanding of food insecurity and the complex strategies needed to make communities more food secure.

Implications for Developing Future Food System Leaders

Cultural Competency

The service-learning program appears to have been useful in helping students understand the challenges facing low-income communities using community gardens as a method to provide healthy and affordable food through environmentally and economically responsible means. Results also presented faculty members with basic information about student-community interactions that is being used to improve future community urban agriculture service-learning projects. As previously described, faculty-highlighted program goals included student development of professional skills related to teaching, outreach, problem solving, and cultural competency. Through informal visits with residents to discuss food production and observe community life, students were able to learn about dietary preferences, as well as the time constraints that may limit community members' ability to work in gardens. Students conveyed this understanding in group classroom discussions and in the final interviews. Students reported learning that garden bed preparation, weeding, harvesting, and other tasks required to produce food were time-consuming and that because many community members are balancing full-time jobs and child-rearing, residents may not have time to participate in these activities despite an interest in acquiring the resulting harvested produce. Such insightful student comments demonstrated increased understanding of challenges faced by the community with regard to food production. This supports others' findings that service-learning can reduce negative stereotypes and increase tolerance for diversity (Eylar & Giles, 1999) while assisting students in understanding the foundations of systemic social inequality (Kendall, 1990). Further, service-learning projects such as the Community Food Service Scholars program often put students in direct contact with culturally and economically diverse populations with whom most lack any direct experience. The personal interactions that occur in the course of a service-learning project can dispel deeply rooted negative attitudes toward disenfranchised individuals (Hughes et al., 2009). The project increased students' knowledge of food security issues and enabled them to experience these issues from the perspective of low-income, inner city residents and a nonprofit organization serving them. However, interviews with students suggested that deeper student learning may have been hindered by lack of preparation to work in economically and

culturally diverse neighborhoods, as well as suggesting a lack of teaching and outreach skills that may have delayed involvement by community members in the gardening activities. All students expressed a desire to improve relationships with community members in order to increase the success of the gardening program.

Of key importance to the study was the pairing of experiential learning in the field with theoretical readings and discussion addressing food security, urban food production, and community challenges. Students used the discussion time to compare their individual experiences in the gardens and used their experience as examples of points brought up in the required readings. Much of the learning resulted from student classroom discussions based on readings focusing on topics such as food deserts, poverty, and food access, allowing students to build links between what they were observing in the field and what they read for course requirements. This connection was supported by data showing the classroom setting to be more valuable for student learning than originally predicted by students (Figure 1).

Knowledge Connectivity

In their final interviews students emphasized the importance not only of community member technical knowledge and skills related to food production, but also of nutritional knowledge and cooking skills that would help individuals prepare healthy meals. The importance of nutritional knowledge and cooking skills is currently being supported by a parallel service-learning initiative in the North Carolina State University Department of Food, Bioprocessing, and Nutrition Sciences in which students teach cooking and nutrition classes in the community as part of a community nutrition course partnering with the Inter-Faith Food Shuttle.

The service experience combined with classroom discussions and reflections served to deepen the understanding about food security challenges facing those marginalized populations producing food in urban environments. The authors recommend the combination of hands-on service with discussion in order to provide opportunities for students to discuss, share, and reflect upon their learning.

Next Steps: Sustaining and Enhancing the Inter-Faith Food Shuttle Program

Based on the findings, pre-service student training has been developed to advance student cultural competency and community teaching skills and to increase student confidence, compassion, and understanding of the challenges facing residents in garden neighborhoods. A new course at North Carolina State University titled “Service-Learning in Urban Food Production Systems” has been designed, informed by results of this study. Diversity and Extension/outreach training are key components of the course. In this course students develop and deliver soil science lessons to individuals, primarily high-school- and middle-school-aged children, in Inter-Faith Food Shuttle gardening communities. Students teach in community gardens for 1 to 2 hours a week for 7 weeks. Lessons include a significant hands-on component in which North Carolina State University students work alongside community members from a variety of economic and cultural backgrounds. Prior to embarking on their community teaching assignments, students are required to participate in 8 hours of training; the course also requires a reflection session midway through the teaching experience.

The authors predict that diversity and community education training, when combined with the practice of educational outreach, may increase participation of both adult and child community members in garden work and educational activities, as well as help achieve faculty teaching and learning goals for North Carolina State University students. The authors have received Institutional Review Board approval for and commenced a new research project evaluating the success of such training in improving student interactions with the community members, improving student confidence, and developing professional skills such as oral communication, leadership, and problem solving. In addition to the pre- and post-service interviews described in this article, field observations and pre- and post-service surveys (with both the service-learning course and a control group course with no service component) have been added to investigate whether students practice the skills they learned in the training.

Conclusion

Regardless of their direct interest in agricultural production, many urban residents are intrigued by and working toward developing sustainable environments in which they can live, work, and play. As urban sustainability initiatives continue to

expand around the United States, there will be an increasing need for personnel skilled in the mechanics of urban agricultural production. Broadly speaking, urban agriculture can be interpreted to include “urban homesteading” trends such as beekeeping and backyard chicken rearing, activities that can easily be expanded to include environmental education initiatives. This expansion of initiatives also creates a critical need for individuals who understand how best to conduct outreach and educational activities with urban and often diverse populations.

Service-learning programs such as the model described here are valuable in that they offer students experience in urban outreach and education prior to finishing their academic programs. However, designing and implementing any type of service-learning program requires the responsibility of challenge and support. When faced with difficulties and failures, especially after careful planning, students may slide into community-blaming tendencies. Without support mechanisms, such as diversity training and open reflection, instructors risk amplifying harmful stereotypes and building barriers instead of leaders.

Through diversity training, students become more aware of the intricate complexities that contribute to community members’ behaviors. The values of collaboration and mutual trust are emphasized, producing students who are as aware of *how* knowledge is shared as they are of the typologies of shared knowledge. Communities are responsive to respectful and reflexive university students who overtly seek opportunities to learn as well as to teach. Collaboration, trust, and respect are foundational for the transformational rapport that guides projects toward success.

Service-learning successes also depend on classroom reflection. Again, foresight is necessary. As in the community, preemptively embedding classroom designs and processes with an ethos of collaboration and mutual trust builds the rapport necessary for students to share honest successes and struggles. Shared experiences offer opportunities to explore, reframe, and reconnect with primary aims: to increase community food security and to build vocational training. Moreover, as students connect their experiences to the literature, they find that for any behavior change initiative, complexity is the norm, not the exception.

The service-learning model the authors have described and continue to actively improve upon benefits students, academic programs, and the community. Students, as discussed, build social and academic capacities. Academic programs, if they adopt a similar

service-learning model, become more adaptable and responsive to student and community needs. Planning, acting, observing, and reflecting creates ever-improving processes and products, while also valuing collaboration. Finally, the community achieves formal and informal recognition in this process. The partition between server and served is blurred. Students and community members learn to co-create knowledge and skills.

References

- Andrew, K. (2010). [Citations from Inter-Faith Food Shuttle Community Assessment]. Unpublished Raw Data.
- Ash, S. L., Clayton, P., & Atkinson, M. (2005). Integrating reflection and assessment to capture and improve student learning. *Michigan Journal of Community Service Learning*, 11(2), 45–59.
- Baldwin, K., Beth, D., Bradley, L., Davé, N., Jakes, S., & Nelson, M. (2010). *Eat Smart, Move More North Carolina: Growing communities through gardens*. Raleigh, NC: North Carolina Department of Health and Human Services, Division of Public Health.
- Bhavsar, V. M. (2002). Certified organic farming principles and practices: A course linking farmers and university students. *Journal of Natural Resources and Life Sciences Education*, 31, 20–24.
- Drewnowski, A., & Specter, S. E. (2004). Poverty and obesity: The role of energy density and energy costs. *American Journal of Clinical Nutrition*, 79, 6–16.
- Einfeld, A., & Collins, D. (2008). The relationships between service-learning, social justice, multicultural competence, and civic engagement. *Journal of College Student Development*, 49(2), 95–109.
- Eyler, J. (2002) Reflection: Linking Service and Learning—Linking Students and Communities. *Journal of Social Issues*, 58(2), 517–534.
- Eyler, J., & Giles, D. (1999). *Where's the learning in service-learning?* San Francisco, CA: Jossey-Bass.
- Grabau, L. J. (2008). Teaching and learning in agronomy: One hundred years of peer-reviewed conversations. *Agronomy Journal*, 100, S-108–S-116.
- Grossman, J. M., Patel, M., & Drinkwater, L. (2010). The Sustainable Agriculture Scholars Program: Enhancing students' summer agro-ecological laboratory employment through structured experiential learning and reflection. *Journal of Natural Resources and Life Sciences Education*, 39, 31–39.
- Hughes, C., Welsh, M., Mayer, A., Bolay, J., & Southard, K. (2009). An innovative university-based mentoring program: Affecting college students' attitudes and engagement. *Michigan Journal of Community Service Learning*, 16(1), 69–78.
- Jordan, N., Andow, D., & Mercer, K. L. (2005). New concepts in agroecology: A service-learning course. *Journal of Natural Resources and Life Sciences Education*, 34, 83–89.
- Kendall, J. (1990). Combining service and learning: An introduction. In J. C. Kendall (Ed.), *Combining service and learning: A resource book for community and public service*, (pp. 1-36). Vol. 1-2, Raleigh, NC: National Society for Internships and Experiential Education.

- Leege, L., & Cawthorn, M. (2008). Environmental service learning: Relevant, rewarding, and responsible. *Journal of College Science Teaching*, 37(6), 32.
- Motavalli, P. P., Patton, M. D., & Miles, R. J. (2007). Use of web-based student extension publications to improve undergraduate student writing skills. *Journal of Natural Resources and Life Sciences Education*, 36, 95–102.
- North Carolina Department of Health and Human Services. (2006). North Carolina Nutrition and Physical Activity Surveillance System (NC-NPASS). Division of Public Health, Nutrition Services Branch.
- Parr, D. M., Trexler, C. J., Khanna, N. R., & Battisti, B. T. (2007). Designing sustainable agriculture education: Academics' suggestions for an undergraduate curriculum at a land grant university. *Agriculture and Human Values*, 24, 523–533.
- Schroeder, M. S., Creamer, N. G., Linker, H. M, Mueller, J. P., & Rzewnicki, P. (2006). Interdisciplinary and multi-level approach to organic and sustainable agriculture education at North Carolina State University. *HortTechnology*, 16(3), 418–426.
- Treuhaf, S., Hamm, M. J., & Litjens, C. (2009). *Healthy food for all: Building equitable and sustainable food systems in Detroit and Oakland*. Oakland, CA: Policylink; Ann Arbor, MI: Fair Food Network; East Lansing, MI: Michigan State University, C. S. Mott Group for Sustainable Food Systems.
- Veenhuizen, R. van. (2006). Cities farming for the future. In R. van Veenhuizen (Ed.), *Cities farming for the future: Urban agriculture for green and productive cities* (pp. 1–17). Ottawa, Canada: RUF Foundation, International Institute of Rural Reconstruction, International Development Research Centre.
- Ward, H. (1999). Evolving a service-learning curriculum at Brown University, or what we learned from our community partners. In Harold Ward (Ed.), *Acting locally: Concepts and models for service-learning in environmental studies* (pp. 65–75). Washington, DC: American Association for Higher Education.
- Wiedenhoef, M., Simmons, S., Salvador, R., McAndrews, G., Francis, C., King, J., & Hole, D. (2003). Agroecosystems analysis from the grass roots: A multidimensional experiential learning course. *Journal of Natural Resources and Life Sciences Education*, 32, 73-79.

About the Authors

Julie Grossman is an assistant professor in the Department of Soil Science at North Carolina State University, specializing in soil microbial processes in organic cropping systems. Grossman earned her bachelor's degree in biology from Simmons College, and both her master's degree and Ph.D. from the University of Minnesota, in soil science and agronomy, respectively.

Maximillian Sherard is an undergraduate student at North Carolina State University pursuing a bachelor's degree in anthropology, and minors in plant biology and agroecology. He has served as an undergraduate student researcher and a teaching assistant in the Grossman service-learning program for 3 years.

Seb M. Prohn is the faculty liaison for Western Carolina University's University Participant Program where he facilitates inclusive post-secondary education experiences for students with intellectual disabilities. Prohn earned his bachelor's degree in sociology from North Carolina State University and master's degree from North Carolina State University's Psychology in the Public Interest program where he is currently completing a Ph.D.

Lucy Kennedy Bradley serves as the North Carolina State University Extension specialist in urban horticulture. Her research interests include community gardening, backyard food production, edible landscapes, sustainable landscapes, and volunteer management. Bradley earned her bachelor's degree from Florida State University, a master's degree in industrial organizational psychology from Purdue University, a master's degree in botany, and her Ph.D. in plant biology from Arizona State University.

L. Suzanne Goodell is an assistant professor of nutrition at North Carolina State University. Her scholarship of teaching focuses on improving the quality of student engagement in learning, both in the classroom and in service contexts. Goodell earned her bachelor's degree in biology from Hardin Simmons University, her master's degree in food and nutrition at Texas Tech University, and her Ph.D. in nutritional science from the University of Connecticut.

Katherine Andrew serves as the director of Nutrition, Farms and Gardens for the Inter-Faith Food Shuttle, a hunger relief organization in North Carolina. Andrew earned her bachelor's degree from the University of Virginia, and her masters of public health in nutrition from the University of North Carolina.