Journal of Agricultural Education, 57(4), 174-185.
https://doi.org/10.5032/jae.2016.04174

The Impacts of a School Garden Program on Urban Middle School Youth

Dennis W. Duncan[1], Ashley Collins[2], Nicholas E. Fuhrman[3], David Alan Knauft[4] and David C. Berle[5]

Abstract

School gardens have been an active part of United States schools since 1890, when the first school garden was established in Roxbury, Massachusetts. Since the turn of the 20th century school gardens have greatly expanded to include inner city schools in some of the largest metropolitan areas of the country. Since the early 1990s, school gardens have continued to rise in popularity and have been incorporated into the curriculum for state departments across the US. The purpose of this study was to determine what aspect (planting, maintaining, harvesting, cooking, etc.) of an urban school garden program had the greatest positive outcome (educational, personal, etc.) on urban middle school youth. A quantitative questionnaire was used to measure the outcomes on students (n = 31) who worked in an urban school garden through the enrollment of their agriscience connections course. Data analysis indicated that the cultivation construct had the greatest positive outcome on urban middle school youth; students who had a family garden were more interested in participating in the school garden; and students greatly enjoyed the culinary aspects of school garden programs, with all construct items having at least 60% of respondents agreeing or strongly agreeing with each statement.

Keywords: Middle school youth; impacts of school gardens; agriscience; culinary

Introduction

School gardens have been used as an experiential teaching laboratory for centuries – often providing students with a designated space where plants (landscape and edible) are grown for the benefit of the students' learning and/or consumption, and range from potted plants and raised beds to composting programs, in-ground plots, and greenhouses (Blair, 2009). According to records the first documented school garden in the US was established in Roxbury, Massachusetts in 1890 and Maria Montessori and John Dewey spoke specifically about gardening and agricultural education for youth and emphasized the practical skills gained from gardening experiences (Hayden-Smith, 2011). In the early1900s educational leaders supported the expansion of school gardens to include rural elementary and inner city schools (Hillison, 1998) and during World Wars I and II school gardens were utilized to grow food for communities and were considered an act of patriotism ("History of Youth Gardens," 2002, para. 2).

Since the early 1990s school gardens have risen in popularity and have been incorporated into the curriculum of state departments of education in California, Oregon, Pennsylvania, New York, Texas, and the District of Columbia to name a few. Garden curricula primarily target

[1] Dennis W. Duncan is a Professor in the Department of Agricultural Leadership, Education, and Communication, 130 Four Towers, The University of Georgia, Athens, GA 30605, dwd@uga.edu
[2] Ashley Collins is a Humane Educator, Dane County Humane Society, 5132 Vogas Rd, Madison, WI 53718, ash2009@uga.edu
[3] Nicholas E. Fuhrman is an Associate Professor in the Department of Agricultural Leadership, Education, and Communication, 135 Four Towers, The University of Georgia, Athens, GA 30605, fuhrman@uga.edu
[4] David Alan Knauft is a Professor Emeritus in the Department of Horticulture, 1111 Miller Plant Sciences, The University of Georgia, Athens, GA 30605, dknauft@uga.edu
[5] David C. Berle is an Associate Professor in the Department of Horticulture, 1111 Miller Plant Sciences, The University of Georgia, Athens, GA 30605, dberle@uga.edu

elementary level students because of the ease of blending school standards and science curriculum (Blair, 2009). Turner, Sandoval, and Chaloupka (2014) discovered that gardens were most common at elementary schools in the West, followed by the Northeast and South, and were least common at schools in the Midwest. Turner, Sandoval, and Chaloupka (2014) also found that gardens were most common at urban elementary schools and least common at schools in small towns and schools in which more students were eligible for free and/or reduced-priced meals. Additionally, school gardens have been incorporated into middle and high school programming through agricultural education courses and core courses in science, math, and language arts.

School garden programs have demonstrated many benefits for students, schools, and their communities – from a kindergarten level program in the Bronx, New York developed to expose urban students to nature and encourage them to "appreciate, respect, and nurture" nature through hands-on science activities (Gopal & Pastor, 2013) to a multicultural school garden program in Australia where researchers observed that students from many different countries and backgrounds were able to share their cultures with other students and that the program offered a "sense of belonging for students newly arrived to the country" through the garden development project (Cutter-Mackenzie, 2009, p. 129). Additionally, a cadre of studies have determined that students who participated in school garden projects and other experiential-based agriculture programming demonstrated increased standardized test scores, applied science concepts to real-world experiences, improved life skills, increased their interest in eating vegetables and showed a heightened interest in nutrition education (Ballentine, 2011; Emekauwa, 2004; Gatto, Ventura, Cook, Gyllenhammer, & Davis, 2012; Graham, Deborah, Lussier, McLaughlin, & Zidenberg-Cherr, 2005; Hicks, Duncan, Womble, & Branch, 2015; Lieberman & Hoody, 1998; Morgan, Warren, Lubans, Saunders, Quick, & Collins, 2009; Quick, Morgan, Collins, Lubans, Saunders, & Warren, 2010; Ratcliffe, Merrigan, Rogers, & Goldberg, 2009; Rich, Duncan, Navarro, & Ricketts, 2009). Lastly, researchers have discovered that parents of students who participate in school garden programs are more likely to volunteer at their child's school because they feel more comfortable approaching and interacting with school personnel (Boyer, McFarland, Zajicek, & Waliczek, 2011). Although there has been a plethora of studies in recent years, the researchers wanted to determine what aspects (planting, maintaining, harvesting, cooking, etc.) of a school garden program had the greatest, positive impact(s) on urban middle school youth in the south.

Theoretical Framework

Two theory bases provided the framework for this study - social cognitive theory and the theory of significant life experience.

Theorized by Bandura in the 1960's, social cognitive theory explains how learners gain knowledge by observing others within their environments and that learning is more of a social act rather than an individual decision. The assumptions of social cognitive theory are: behavior is purposeful and driven by a goal, individuals are self-reflective, learners are able to self-regulate, and reciprocal determinism takes place (Bandura, 1986, 1997). The three factors that allow one to evaluate behavior change within social cognitive theory (reciprocal determinism) are environment, personal factors, and behavior (see Figure 1). Environment refers to the factors that impact a person's behavior and include the physical environment (their physical surroundings) as well as social environment (the people or social situation they are in); personal factors are an individual's self-efficacy towards a behavior; and behavior is the response that the learner receives once they have completed the desired behavior.

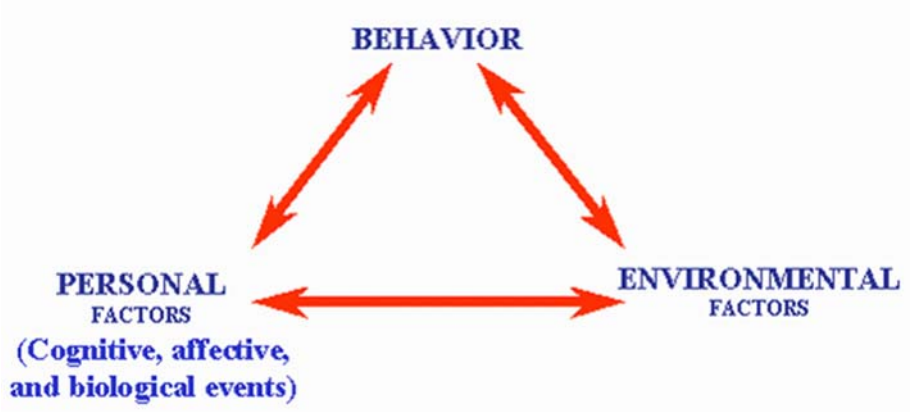

Figure 1: Social Cognitive Theory

Social cognitive theory has been used extensively in classrooms due to its observation aspect through demonstrations and modeling (Schunk, 2012). Observational learning occurs when a learner watches the actions and outcomes of others – this enables them to determine how to complete a task or reach a goal within a similar situation (Social Cognitive Theory, 2010). Modeling occurs when a teacher (the model) demonstrates a behavior that a student is attempting to learn. The model will demonstrate the behavior and the learner will then imitate the behavior; the model then responds to the behavior enacted by the student with positive or negative reinforcement (McLeod, 2011). One may ascertain that school gardens are an excellent outdoor laboratory that provides a rich environment for student comprehension through observation and experiential learning activities and the three factors of social cognitive theory can be observed and evaluated in the school garden.

The theory of significant life experience describes the importance of an impactful experience someone had that altered his/her life choices. It has been widely accepted in the area of environmental education as a theory to support how educating children on ways to protect the environment can alter their environmentally-friendly behaviors later in life (Chawla, 2006). Chawla's research on significant life experience focuses on why experts in the fields of environmental advocacy and education chose to pursue such a career. Chawla primarily utilized qualitative research practices (interviews and focus groups) to determine which "significant life experience… people themselves believe to have shaped their environmental attitudes and actions" (Chawla, 2006, p. 360). According to Monroe (2003) two common themes have influenced the career choices of people within environmental positions: "childhood experiences of natural areas", and "school-based education, particularly opportunities to take action" (p. 121). Both themes directly apply to school garden programs as they are aspects of school-based education that occur in natural areas and encourage students to be active versus passive learners.

One can argue that school gardens are an excellent example of experiential learning. According to David Kolb experiential learning is "an integrative perspective on learning that combines experience, perception, cognition, and behavior" (1984, p. 21). The emphasis on learning processes as opposed to behavioral outcomes distinguishes experiential learning from idealist approaches to traditional education (Kolb, 1984). Kolb's (1984) learning theory is represented in a four stage cycle – concrete experience, reflective observation, abstract conceptualism, and active experimentation (Figure 2).

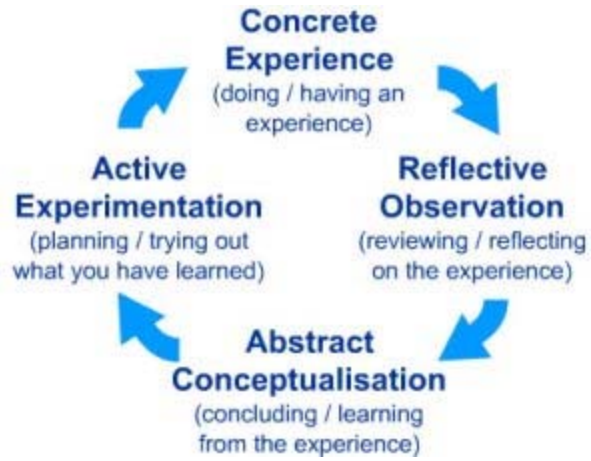

Figure 2: Kolb's Theory of Experiential Learning

Experiential learning is applicable to middle school education as students are at an age where curiosity and experiential learning activities greatly appeal to them. School garden curriculum offers a cadre of opportunities for students to walk through each step of an experiential learning process. For example, in a seed germination experiment a *concrete experience* is provided to the students by actively planting seeds followed by *reflective observation* - how they planted and cared for their seeds. Next, during *abstract conceptualization* students hypothesize what will happen if they use improper watering techniques. Lastly, the final stage - *active experimentation* - involves students conducting watering experiments followed by a reflective period. At the conclusion of stage four the experiential learning process recycles and students have gained new knowledge from the experience. According to McLeod (2013) effective learning occurs once someone has experienced all stages of the cycle and can move on to new experiences and begin the process again.

Purpose and Objectives

The purpose of this descriptive study was to determine what aspects (planting, maintaining, harvesting, cooking, etc.) of a school garden program had the greatest, positive impact on urban middle school youth. The objectives of this study were to: (1) identify the demographic make-up of the study participants; (2) determine if garden cultivation (propagating, planting, caring for, and harvesting) had a positive impact on urban middle school youth; and (3) determine if culinary components (food preparation and consumption of school garden produce) had a positive impact on urban middle school youth.

Methodology

Case Study School

The case study middle school (urban setting) was selected based on its extensive school garden program and the school staff and administrations willingness to participate in the study. Approximately fifty-three teachers worked at the school and 680 students grades six through eight were enrolled when the study was conducted. Forty-eight percent of students identified as African-American, 3% Asian, 12% Hispanic, 5% multi-racial, and 32% white (*Annual Performance Report*, 2014). Sixty-six percent of students enrolled qualified for free or reduced meals at school meaning that they live at or below the poverty line (*School Information*, 2011).

The school garden program is a component of the agriscience connections course, which had 232 students enrolled at the time of the study. Students were enrolled in the course for a 16-

week semester and attended class every other day. While in middle school they had the option of taking agriscience for three semesters; one semester during each grade level. The school garden program consisted of a four plot rotational (in ground planting) field, a fruit orchard, raised beds, vertical herb wall, cafeteria composting facility, greenhouse, and a small chicken coop.

After a thorough review of the literature it was determined that there were no quantitative instruments that measured the detailed aspects of school garden programs that could be utilized by the researcher; therefore, an instrument was developed. The research team followed Dillman's (1993, 2009) suggestions on survey instrument development and recruited a panel of research faculty with extensive experience in survey design and school garden programming. The survey instrument was concise and only one-page front and back – so that it appeared short and not overly time-consuming to participants. A Likert scale was utilized as a response method to statements within each construct (cultivation and culinary) with answer options of Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5). Demographic items included race/ethnicity, age, grade level, and gender of participants, as well as how many semesters each student had been enrolled in the agriscience connections (semester or year-long) course and if he/she were involved in the agricultural-related extracurricular activities provided at the school.

A pilot study was conducted to determine reliability and validity of each construct and items within the instrument. The instrument was reviewed to ensure validity by a committee of research faculty with expertise in survey design and school garden programming as well as the instructor of the agriscience connections course at the case study school. The items were evaluated for language that might confuse participants, formatting errors, and content application (Dillman, 2009). The pilot group utilized was a sixth grade class (N=24) with similar race/ethnicity demographics to the research population.

The first construct (ten items) related to cultivation activities in the school garden (planting, watering, weeding, etc.) and produced a Cronbach's Alpha reliability score of 0.74 after evaluating the data within the Statistical Package for the Social Sciences (SPSS). A reliability coefficient of 0.70 or higher is considered acceptable, so a score of 0.74 suggests a relatively high internal consistency of the construct items and scale reliability (Davis, 1971). The second construct (eight items) related to culinary activities that took place within the school garden program (cooking produce, eating from the garden, etc.) had a Cronbach's Alpha score of 0.86 which suggests a relatively high internal consistency of the construct items and scale reliability. With Cronbach's Alpha scores of 0.74 and 0.86 – no changes were made to the final instrument.

The research team gained approval from the University of Georgia Institutional Review Board (IRB), permission from the case study school and active parental consent to conduct the study. Even though the literature indicates that lower response and approval rates can be expected when consent forms are sent home with students versus given directly to parents (Stein, et al., 2007), time constraints and school policy restricting access to parent contact information prevented us from gaining direct contact with parents. The inability to contact parents during this study and the challenges that followed will be discussed further in the implications and recommendations section.

Parent consent forms were distributed twice to each of the 208 students to insure a statistically sound number of participants. An introductory cover letter was included with the parent consent forms in hopes to increase participation, but as seen in a study completed by Woodruff, Mayer, and Clapp (2006) introductory letters appeared to have little or no significant effect on the parents' willingness to allow their children to participate in the study. As previously mentioned, we did not have access to parent contact information and time was limited so a follow-up with non-respondents was not conducted.

Of the 208 students who received two parent consent forms, 45 students returned the forms to the participating teacher. The 45 students were given a child assent form, as required by IRB and a survey to complete in class while a research member was present. Of the 45 students, 39 were willing to participate in the study and a total 31 returned a fully completed survey instrument resulting in a 15% response rate based on the initial 208 enrolled students. This low response rate will also be discussed further in the implications and recommendations section.

The responses for the completed questionnaires were entered into SPSS for data analysis. Cronbach's alpha was utilized to determine internal consistency - frequencies, percentages, and means were calculated for each applicable demographic item. Frequencies, percentages, means, and standard deviations were calculated within each construct to determine which aspect(s) of the school garden program had the greatest positive impact on the participants and independent sample t-tests were conducted on bivariate demographic items to determine if any significant differences existed between the different groups based on construct scores. Additionally, one-way ANOVA tests were conducted on multivariate demographic items to determine if any significant differences existed between the different groups based on construct scores, and assumptions of the ANOVA test were verified prior to data analysis. Furthermore, these statistical tests were utilized to determine if demographic factors influenced responses within constructs. An alpha level of 0.05 was set a priori for tests of significance.

Objective One - Determine Demographics of the Study Participants.

The average age of participants was 12.25 years; 43% indicated their race as African American, 41% white, 2.6% Asian/Pacific Islander, 7.7% Hispanic, and 5.1% indicated two or more races. A majority of the students were in 6th grade (44.7%), while 28.9% were in 7th grade and 26.3% were in 8th grade. Sixty-five percent of the participants were female, 35% male. While FFA and the Sustainability Garden Corps are widely known clubs throughout the case study school, only 15.4% of students were FFA members and 20.5% was sustainability Garden Corps members. Lastly, 49% of participants indicated that they had a vegetable garden at home. A comparison of participant demographics with the total school population is provided in Table 1.

Table 1

Race/Ethnicity Demographic Comparison between Sample Population and School Population

Race/Ethnicity	Sample Population *(%)*	School Population *(%)*
African American	43.6	48.0
White	41.0	32.0
Alaskan/ Native American	0.0	0.0
Asian/ Pacific Islander	2.6	3.0
Hispanic/ Latino	7.7	12.0
Two or More Races	5.1	5.0

Objective Two - Determine If Garden Cultivation (Propagating, Planting, Caring for, And Harvesting) Had A Positive Impact On Urban Middle School Youth.

To determine the true impact(s) for the garden cultivation construct means scores and percentages for each answer option (strongly disagree to strongly agree) were calculated (see Table 2). Based on percentage levels of answer choices it appears students preferred hands-on activities that involved caring for the garden – 69.2% of students agreed/strongly agreed that "Watering is

really fun," 51.3% of students either agreed/strongly agreed with the statement "I like to watch the seeds grow into plants," and 78.4% strongly disagreed/disagreed with the statement "I don't like having to care for the plants" (which reveals a positive feeling towards caring for the garden). However, students did not seem to favor cultivation tasks that were considered dirty or labor intensive – 51.2% strongly disagreed/disagreed with the statement "I like to look for insects in the garden." The summative mean of the construct was taken (after converting items four and six into positively worded items) and resulted in a mean of 34.8 (*SD=6.69*). This score will be discussed in the conclusions section.

Table 2

Construct One – Cultivation – Responses Reported as Valid Percentages and Means

Construct Items	SD(%)	D(%)	N(%)	A(%)	SA(%)	*M*
Planting the small plants from the greenhouse is really fun	5.1	17.9	25.6	17.9	33.3	4.19
Watering is really fun	5.1	5.1	20.5	17.9	51.3	4.05
I like picking vegetables the best	2.7	8.1	29.7	18.9	40.5	3.86
I like to watch the seeds grow into plants	7.7	15.4	25.6	30.8	20.5	3.41
Sowing seeds is my favorite part of the garden	0.0	12.8	51.3	28.2	7.7	3.31
Pulling weeds is fun	23.1	17.9	15.4	28.2	15.4	2.95
I like moving compost to the garden	25.6	12.8	30.8	20.5	10.3	2.77
I like to look for insects in the garden	33.3	17.9	20.5	15.4	12.8	2.56
I don't like digging in the soil	38.5	25.6	15.4	12.8	7.7	2.26
I don't like having to care for the plants	54.1	24.3	10.8	8.1	2.7	1.81

Note. SD=strongly agree; SA=strongly agree; M=mean

Significant Differences between Groups

One-way ANOVA and independent sample t-tests were utilized to determine if significant differences existed between the impact of garden cultivation and demographic variables. Results indicated no significant differences between race/ethnicity, age, grade level, gender, number of semesters enrolled in an agriscience class, FFA membership or Sustainability Garden Corps membership (all p-values were above 0.05). However, a significant difference did exist between students who had a vegetable garden at home and those who did not (t-value = 2.331; p-value = 0.026).

Objective Three - Determine If Culinary Components (Food Preparation and Consumption of School Garden Produce) Had A Positive Impact On Urban Middle School Youth.

The final objective of the study sought to determine if culinary (food preparation and consumption of school garden produce) had a positive impact on urban middle school youth. To determine the true impact(s) for the culinary construct means scores and percentages for each answer option (strongly disagree to strongly agree) were calculated (see Table 3). Based on percentage levels it appears that students greatly enjoyed the culinary aspects of the school garden program with over 60% of respondents agreeing/strongly agreeing with each positive item. Over 84% of students agreed/strongly agreed that "Cooking in class is fun", 69.3% agreed/strongly agreed with the statement "I like eating the vegetables from the garden", and 61.5% of students agreed/strongly agreed with the statement "I like vegetables more now that I have worked in the school garden." The summative mean of the construct (after converting the statement "I don't like vegetables" to a positively worded item) resulted in a mean of 32.3 (*SD=6.6*). This score will also be discussed in the conclusions section.

Table 3

Construct Two – Culinary – Responses Reported as Valid Percentages and Means

Construct Items	SD(%)	D(%)	N(%)	A(%)	SA(%)	*M*
Cooking in class is fun	0.0	7.7	7.7	10.3	74.4	4.51
I like taking food home to share with my family	5.1	12.8	5.1	17.9	59.0	4.13
I like seeing what I grew in the garden bar at school	2.6	7.7	12.8	28.2	48.7	4.13
I like eating the vegetables from the garden	2.6	2.6	25.6	30.8	38.5	4.00
It is fun to eat what we grow at school	7.7	2.6	20.5	28.2	41.0	3.92
My family likes the vegetables I bring home	10.3	5.1	20.5	15.4	48.7	3.87
I like vegetables more now that I have worked in the CMS Garden	10.3	5.1	23.1	35.9	25.6	3.62
I don't like vegetables	52.6	15.8	18.4	10.5	2.6	1.95

Note. SD=strongly agree; SA=strongly agree; M=mean

Significant Differences between Groups

One-way ANOVAs and independent sample t-tests were utilized to determine if significant differences existed between demographic variables and the impact(s) associated with the culinary aspect of school the garden. Results indicated no significant differences between demographic variables (all p-values were above 0.05).

Conclusions

Overall, the data revealed several positive and encouraging impacts regarding this sample of urban middle school youth in regards to the school garden program. Positive participant outcomes related to both cultivation and culinary components of the school garden program were

determined from the summative means of each construct – the cultivation construct had a summative mean of 34.8 (total summative score of 50) and the culinary construct had a summative mean of 32.3 (total summative score of 40). Though the difference in summative mean scores is relatively small, it is clear that this sample of urban youth prefer to partake in experiential learning activities related to the culinary aspects of the school garden program over growing and harvesting fruits and vegetables. The positive outcomes associated with the results of this study coincide with Quick, et al. (2010) who concluded that "The school garden as an experiential learning approach was highly valued by students, teachers, and parents alike" (p. 128). Ratcliffe, et al. (2009) found similar, positive results with urban youth – students who were involved in the school garden program could correctly identify more vegetables and had a stronger preference for consuming vegetables than students not in the program.

As previously reported there was a significant difference discovered between students who had a vegetable garden at home and those that did not. A higher mean score was calculated for students who answered "yes" to the item: "Does your family have a vegetable garden at home?" compared to the mean score for students who answered "no." This result could be attributed to the fact they had previous gardening experience and were therefore accustomed to the labor-intensive tasks of managing a garden. This finding is tied to social cognitive theory – learners are more comfortable completing a task that they have experience in when working with others than if they are attempting something new. The summative mean scores coupled with the facts that over 50% of respondents agreed/strongly agreed with five of the ten items in the cultivation construct and over two-thirds of respondents agreed/strongly agreed with six of the eight items in the culinary construct reveals that students do enjoy and are positively impacted following their participation in the garden program – previous studies found similar results (Ballentine, 2011; Graham, et al., 2005; Ratcliffe, et al., 2009).

Implications and Recommendations

With a response rate of 15% the results of this study can't be applied to the entire school population nor can they be compared to larger studies with similar research objectives and student demographics; however, the results do inform practice. As previously mentioned time constraints and confidentiality of the student population as defined by the County Board of Education prevented the research team from conducting a follow-up with non-respondents; therefore, controlling for non-response error is lacking.

In regards to the low response rate we believe it may be attributed to the following factors: 1. All students are required to take an agriscience course and because of this fact some of the students may not be interested in the garden program or any activity associated with the garden program; and 2. The case study school is in close proximity to a university with faculty that conduct numerous research studies annually on the school campus; therefore, parents may be disinterested in their child participating in yet another research study. With these two factors in mind it is recommended that future studies target specific groups of students (e.g., actively versus not actively involved in a garden program) so as to gain a more represented sample(s) of students. Additionally, it is highly recommended that future studies seek passive parent consent instead of active parent consent and that direct parent contact be made versus sending home consent forms with students. Passive parent consent consistently has higher response rates than active parent consent (Courser, Shamblen, Lavrakas, Collins, & Ditterline, 2009) and direct contact with parents from the researcher has shown to have a higher response rate than student delivered consent forms (Stein et al., 2007). If school systems deny access to parent contact information it is recommended that a researcher gain school administration approval to distribute consent forms to parents during a school function (school assembly, open house, parent/teacher conferences, etc.). Lastly, it is strongly recommended that the researcher distribute all consent forms to students and/or parents

versus depending on school staff to perform the task. Of the 696 consent forms given to the school for distribution (three per student) only 464 were distributed resulting in an average of two forms per student. This poor distribution was due to school staff taking on the responsibility of distributing forms along with their other responsibilities (teaching twelve classes, advising students, managing a garden program, etc.).

We assumed that the culinary construct would have the greatest positive impact on this population of urban youth – this was confirmed by the mean scores. More research should be conducted on the culinary aspects of school garden programs to determine which activity(s) have the greatest, positive impact on students in relation to eating habits at school, food preparation at home, the desire to educate family on the benefits of eating fruits and vegetables, and overall health.

Boyer et al. (2011) discovered a positive correlation between parent volunteerism in school garden programs and their relationship with teachers and school administrators and students indicated that they enjoy working with adult volunteers. There is great value in identify the impact(s) on families who garden together at school and home – what are unforeseen benefits of a shared experiential learning experience in the school and home garden?

References

Annual Performance Report – Clarke County School District (2014).

Ballentine, J. (2011). Georgia Organics Farm to School Initiative final evaluation report.

Bandura, A. (1986). *Social foundations of thought and action.* Englewood Cliffs, NJ:Prentice-Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: W.H. Freeman and Company.

Blair, D. (2009). The child in the garden: An evaluative review of the benefits of school gardening. *Journal of Environmental Education, 40* (2), 15-38.

Boyer, R., McFarland, A., Zajicek, J., & Waliczek, T. (2011). Growing minds: Gardening and parent involvement in elementary schools. *Journal of Therapeutic Horticulture, 21* (2), 8-26.

Chawla, L. (2006). Research methods to investigate significant life experiences: Review and recommendations. *Environmental Education Research*, *12* (4), 359-374. doi:10.1080/1350462060094284

Courser, M. W., Shamblen, S. R., Lavrakas, P. J., Collins, D., & Ditterline, P. (2009). The impact of active consent procedures on nonresponsive and nonresponse error in youth survey data: Evidence from a new experiment. *National Institutes of Health Public Access, 33* (4), 370-395. doi:10.1177/0193841X09337228

Cutter-Mackenzie, A. (2009). Multicultural school gardens: Creating garden spaces in learning about language, culture, and environment. *Canadian Journal of Environmental Education,14*, 122-135.

Davis, J. A. (1971). *Elementary survey analysis*. Englewood Cliffs, NJ: Prentice Hall.

Dillman, D. A., Sinclair, M. D., & Clark, J. R. (1993). Effects of questionnaire length, respondent-friendly design and a difficult question on response rates for occupant-addressed census mail surveys. *Public Opinion Quarterly, 57* (3), 289-304. doi: 10.1086/269376

Dillman, D. A., Smyth, J. D., Christian, L. M. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method (3rd ed.).* Hoboken, NJ: John Wiley & Sons, Inc.

Emekauwa, E. (2004). *They remember what they touch: The impact of place-based learning in East Feliciana parish.* Rural School and Community Trust, Arlington, VA. Retrieved from http://www.peecworks.org/PEEC/PEEC_Research/S0009D4FB-0084FE88

Gatto, N., Ventura, E., Cook, L., Gyllenhammer, L., & Davis, J. (2012). LA Sprouts: A garden-based nutrition intervention pilot program influences motivation and preferences for fruits and vegetables in Latino youth. *Journal of the Academy of Nutrition and Dietetics, 112*(6), 913-920.

Gopal, J., & Pastor, E. (2013). Indoor-outdoor science. *Science & Children*, *50* (6), 35-41.

Graham, H., Deborah, L. B., Lussier, M., McLaughlin, P., & Zidenberg-Cherr, S. (2005). Use of school gardens in academic instruction. *Journal of Nutrition Education and Behavior, 37* (3), 147-151. doi:10.1016/S1499-4046(06)60269-8

Hayden-Smith, R. (2011). *A brief history of school gardens*. Retrieved from http://kgi.org/blogs/rose-hayden-smith/brief-history-school-gardens

Hicks, S., Duncan, D., Womble, M. & Branch, R. (2015). Examining differences in middle school student achievement on a state mandated examination: Does a full year of agriscience really make a difference? *Journal of Workforce Education and Development. 8*(1).

Hillison, J. (1998). Agriculture in the classroom: Early 1900s style. Journal of Agricultural Education, *39*(2), 11-18. doi:10.5032/jae.1998.02011

History of youth gardens. (2002). Retrieved from http://www.hort.vt.edu/HORT6004/network/schoolgardens.html

Kolb, D.A. (1984). *Experiential Learning: Experience as the source of learning and development*. New Jersey: Prentice Hall.

Lieberman, G. A., & Hoody, L. L. (1998). *Closing the achievement gap: Using the environment as an integrating context for learning.* Paper presented at the State Education and Environmental Roundtable, San Diego, CA.

McLeod, S. (2011). *Bandura – Social learning theory.* Retrieved from http://www.simplypsychology.org/bandura.html

McLeod, S. (2013). *Kolb – Learning styles.* Retrieved from http://www.simplypsychology.org/learning-kolb.html

Monroe, M. C. (2003). Two avenues for encouraging conservation behaviors. *Human Ecology Review*, *10*(2), 113-125.

Morgan, P. J., Warren, J. M., Lubans, D. R., Saunders, K. L., Quick, G. I., & Collins, C. E., (2009). The impact of nutrition education with and without a school garden on knowledge, vegetable intake and preferences and quality of school life among primary-school students. *Public Health Nutrition, 13*(11), 1931–1940. doi:10.1017/S1368980010000959

Quick, G. I., Morgan, P. J., Collins, C. E., Lubans, D. R., Saunders, K. L., & Warren, J. M. (2010). Process evaluation of a primary school garden-enhanced nutrition curriculum. *Australasian Medical Journal*, *3* (1), 128.

Ratcliffe, M., Merrigan, K., Rogers, B., & Goldberg, J. (2009). The effects of school garden experiences on middle school-aged students' knowledge, attitudes, and behaviors associated with vegetable consumption. *Health Promotion Practice Online First,* 1-8. doi:10.1177/1524839909349182

Rich, J., Duncan, D., Navarro, M. & Ricketts, J. (2009). Examining differences in middle school student achievement on a criterion-referenced competency test (CRCT) in Science. *Journal of Agricultural Education*, *50*(4), 14-24. doi: 10.5032/jae.2009.04014

Robinson, C.W., & J. M. Zajicek. (2005). Growing minds: The effects of a one-year school garden program on six constructs of life skills of elementary school children. *HortTechnology,15*(3), 453-457.

School Information (2011). Clarke County School District.

Schunk, D. (2012). Social cognitive theory. *Learning theories: An educational perspective* (6th ed., pp. 117-162). Boston, MA: Pearson Education Inc.

Social Cognitive Theory. (2010). Retrieved from http://www.utwente.nl/cw/theorieenoverzicht/Theory%20clusters/Health%20Communication/Social_cognitive_theory/

Stein, B. D., Jaycox, L. H., Langley, A., Kataoka, S. H., Wilkins, W. S., & Wong, M. (2007). Active parental consent for a school-based community violence screening: Comparing distribution methods. *Journal of School Health*, *77* (3), 116-120. doi: 10.1111/j.1746-1561.2007.00180

Turner, L., Sandoval, A., & Chaloupka, F. (2014). *School garden programs are on the rise in US public elementary schools, but are less common in schools with economically disadvantaged student populations - A BTG Research Brief.* Chicago, IL: Bridging the Gap Program, Health Policy Center, Institute for Health Research and Policy, University of Illinois at Chicago. Retrieved from http://www.bridgingthegapresearch.org/_asset/4q28pc/BTG_gardens_brief_FINAL_March2014.pdf

Woodruff, S. I., Mayer, J. A., & Clapp, E. (2006). Effects of an introductory letter on response rates to a teen/parent telephone health survey. *Evaluation Review*, *30*(6), 817-823. doi: 10.1177/0193841X05285662