



July 2014

Final Summative Report

Red Clay Garden-Based Education
Project

Created for: Florida A&M University

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Center for Public Issues Education
IN AGRICULTURE AND NATURAL RESOURCES

UF IFAS

PIE2011/12-16

Suggested Citation

Odera, E., & Lamm, A. (2014). Final Summative Evaluation Report for the Red Clay Garden-Based Education Project. PIE2011/12-16. Gainesville, FL: University of Florida/IFAS Center for Public Issues Education.

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Acknowledgments

The evaluation team would like to sincerely thank the program coordinators and leaders for their work on the Red Clay Gardening project and their assistance to the evaluation team.

Sandra Thompson, Ed.S., M.ED. – Faculty, Specialist & Program Leader, Community Resource Development Program, Florida A&M University

Lawrence Carter, Ph.D.- Associate Dean of Extension and Outreach for the Cooperative Extension Program, Florida A&M University

The late Damon Miller- Former Program Coordinator, Red Clay Garden-Based Education Program

The evaluation team would also like to thank the site coordinators who directly work with the program participants and were instrumental in carrying out the program's activities.

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Background

The Florida A&M University's Red Clay Garden-Based Education Project began in 2009 as part of a Children, Youth, and Families at-Risk (CYFAR) Sustainable Community Project (SCP). The target audience was 4th and 5th grade students in schools in North Florida. This project was administered through the FAMU's Cooperative Extension Outreach Program which is housed in the FAMU College of Engineering, Sciences, Technology and Agriculture.

The program aimed to increase positive behaviors amongst children by providing a unique environment through which the child can develop positive attitudes and thoughts about themselves, the environment, and healthy behavior. By choosing a natural setting (i.e. school & community after-school programs) the children are able to develop this in a comfortable environment and can spread these positive ideas throughout their community. These improved attitudes should encourage children to change their behavior when interacting with the environment, with others, and regarding their own health. These knowledge, skills, attitudes and behaviors should be transferrable to other areas in the children's' lives and help them to live a productive and positive life even after they are no longer engaged in the project. This project used three schools and a community based site to implement a series of educational programs including an after-school garden-based education program.

An evaluation team from the UF/IFAS Center for Public Issues Education was brought in to evaluate the impacts of the program starting in 2011. Now that the program is concluding, the results from the final year (2013-14) have been reviewed along with the results from the two previous years to identify summative observations about the program. The purpose of the formative evaluation was to determine the progress the Red Clay Garden-Based gardening project was making towards its goals and to target areas for potential improvement during school years 2011-12 and 2012-13. These evaluation results assisted the program staff in tailoring the program to have the strongest impact possible. The purpose of the summative evaluation using data from all three school years (2011-2012, 2012-2013, and 2013-2014) was to determine how effective the Red Clay Garden-Based project was during the time it was funded. A combination of quantitative and qualitative data was collected each year, including pre/posttest surveys, focus groups with student participants, artifacts (2011-12), and teacher/staff assessments (2011-12).

The short term and long term goals of the program are listed below.

Desired Short-Term Results

- **Knowledge acquisition** in 1) Garden Design and Planning Process, 2) Garden Preparation Process, 3) Garden Implementation Process, 4) Harvesting Process, 5) Consumption Process, and 6) Entrepreneurship/Marketing process
- **Development of life skills** in 1) Completing projects, 2) Belief in self, 3) Ownership and responsibility, 4) Working cooperatively with adults, peers and in groups, 5) Gaining academic and cognitive skills, 6) Understanding science and math as concepts inherent to nature and gardening
- **Growing in social and moral development** by the 1) Practice of patience, 2) Practice of compromise, 3) Adoption of beneficial attitudes, preferences and interests, and 4) Adoption of actions that benefit life long health
- **Environment and conservation awareness and development** in 1) Public Health, and 2) Agriculture Education and Entrepreneurship

Desired Long-Term Results

- Improved community awareness to the benefits of gardening, good nutrition, agriculture education and entrepreneurship
- Participants' interests, attitudes and behaviors change
- Eco-actions implemented
- Participants' learning and behaviors are reinforced
- Participants' implement sustainable environment activities that benefit the bio-region
- Improvement in participants' cooperative relationship with all categories of adults, peer and in working groups

Garden Curriculum

A garden teaching curriculum was developed for this project by Amelia Davis of FAMU and enhanced with materials from the Texas A&M Junior Master Gardener Handbook Level 1. Each garden site followed this curriculum with small changes were made as needed. The first lesson focused on building awareness about the importance of agriculture and how people rely on agricultural products for much of their everyday life. The second lesson exposed the participants to what a garden is, how to build a raised garden bed, and what minerals plants need. This lesson also showed the participants how to keep a gardening journal and emphasized the nutritional importance of eating fruits and vegetables. The third lesson dealt with composting and taught the participants why composting is important, explained different ways of composting, and discussed how soil is made up of different layers. The fourth lesson focused on fertilizers and pesticides and their benefits for plants as well as describing the plant life cycle. The fifth lesson described the necessary elements that plants must have to grow, and exposed the students to different types of natural habitats. Lesson six dealt with global warming, lesson seven was about nutrition, and lesson eight wrapped up all the previous lessons.



Figure 1: Participants interact during a gardening education session

Summative Observations

The evaluation team examined the results and outcomes from 2012-2014, spanning three school years. The key programmatic goals were to increase the participants' 1) knowledge, 2) develop skills they can carry throughout their lives, 3) improve their social and moral development, and 4) increase their awareness of the environment and conservation. The evaluation team chose to examine these goals through measuring participants' a) changes in environmental interest and behavior, b) improvement in socio-emotional relations, c) improved attitudes towards health and preference towards healthy food, particularly produce, and d) improvement in knowledge about gardening as well as math and science concepts.

Key Challenges

The Red Clay Garden-Based Education Project has faced some challenges during implementation. The largest was the sudden loss and passing of Damon Miller, the overall program coordinator in the middle of school year 2012-2013. The loss of his leadership and coordination expertise led to challenges faced by the staff that was unforeseen. While the gardening program continued, data collection was strained and difficult, and outcomes during the 2012-2013 and 2013-2014 were weaker than in 2011-2012.

Consistent data collection was a real challenge faced by the evaluation team during the 2012-2013 and 2013-2014 school years, as pre-tests were given twice in place of posttests, artifact data was unavailable, the control group was not tested, and supplementary data from teachers and staff members were not collected. Additional challenges in 2012-2013 of missing pages in the quantitative survey made the t -test results of that year dependent on very few participants.

In addition to data collection and logistical challenges, the program faced challenges partially attributable to an ambitious program design. The grant proposal and initial program design aimed to make behavioral and attitudinal changes in participants in areas not completely controlled by the program. Public health knowledge, environmental behavior, and preferences towards eating healthy food were aspects that were not easily controlled by the program and heavily influenced by outside factors, as well as factors outside of the participants' control. However, gardening specific outcomes around knowledge attainment were supported by the program, suggesting the program's initial aims were overly ambitious. The evaluation team designed the evaluation to follow the original goals of the program, but during the implementation of the program some of the activities changed and this may explain some of the outcomes determined through the evaluation process.

Aspects of the original program design that may have led to attitudinal changes, such as keeping a reflective journal and giving presentations about their experiences to others, did not occur. These activities, had they occurred, may have provided more time for students to reflect upon their experiences and may have led to stronger changes in attitude towards health, the environment, and healthy eating.

Environmental Interest and Behavior

The evaluation team was not able to provide evidence that the Red Clay Gardening project influenced participants' involvement in environmentally friendly behaviors. This was measured using the eco-behavior index in the quantitative survey instrument. This index asked participants to indicate how frequently they engaged in recycling, composting, or turning off water or lights when not in use. The hands on, school-based nature of the gardening project did not result in an increase in frequency in these activities. This result can be understood since participants at home or at school may not have the ability to influence decisions to engage in these activities.

The quantitative survey instrument also assessed participants' interest in the environment and conservation by asking them how strongly they agreed to attitudinal statements about protecting and caring for the environment. In the first year the evaluation team was involved in the project (2011-2012), there was a statistically significant positive increase in participants' scores on this index. However, in the two following years there was no significant change. Perhaps in school year 2011-2012, participants were educated on how their behavior impacts the environment and what they can do to help the environment. A stronger emphasis on this topic in school year 2011-2012 and not in subsequent years could explain this outcome. Therefore, evidence is mixed as to whether or not the program increased participants' interest in the environment and conservation.

Socio-emotional Relations

The evaluation team only found limited evidence suggesting participants' socio-emotional relationships improved as a result of the program. An index was created in the quantitative survey to examine the socio-emotional relationships of participants with each other and adults, as well as attitudes about their own skills such as listening and being responsible. Additionally, questions during the focus group were asked about whether participants felt comfortable expressing their true feelings with adults.

The working with others index only showed statistically significant positive change in the first year the evaluation team was involved (school year 2011-2012), and had no significant change in the following two years. Perhaps the importance of working positively with others was emphasized during this year and not subsequent years. The life

skills index aimed to measure participants' positive feelings about themselves. There was no evidence this positively changed as a result of the program.

Focus group results were mixed as to whether students felt comfortable or not sharing what they think and feel in front of adults and whether their participation in the garden has changed this level of comfort. While participants' enjoyed having the adults available to answer questions and gain knowledge about gardening, others felt they could not speak candidly about what they thought in front of adults. Therefore, there is some evidence to suggest that participants were comfortable with the informational relationship they had with the gardening staff, but that deeper mentorship and/or emotional connection was not accomplished through the program.



Figure 2: Participants at Bond Elementary interact with site coordinator

Health and Nutrition

The evaluation team found mixed evidence as to whether the program improved participants' attitudes towards healthy food, although the program did not influence their overall attitudes about engaging in a healthy lifestyle. Two indices in the quantitative survey were used to assess participants' overall attitudes towards health as well as their preferences towards healthy food. The attitudes towards health index showed no change across all three years. While public health concepts were mentioned as one of the program's goals, findings suggest that this topic was not covered, or covered in enough detail, to create a change in participants' behaviors and attitudes about overall health.

Changes in attitudes surrounding healthy food and consuming vegetables showed mixed results across all three years. While participants discussed the importance of fruits and vegetables for a healthy diet while in focus group settings, when given individual survey instruments, they did not indicate positive change in their attitudes towards healthy food. This could perhaps reflect the tendency for individuals to display their agreement with socially desirable attitudes (in this case, appreciating and eating vegetables) while in a social setting (the focus group).

Therefore, findings are mixed as to whether or not the program impacted participants' attitudes towards enjoying and recognizing the importance of eating vegetables.

Knowledge

Knowledge about the gardening process as well as improvement in science and math related concepts relevant to gardening were other goals of the program. There are findings to indicate this goal was reached by the program. The index measuring knowledge about gardening specific items only increased during school year 2012-2013, however additional individual knowledge test items were given to participants and these items improved each year. School year 2013-2014 had the highest overall change in improvement on the knowledge test items. This test included items asking participants to identify anatomy of a plant as well as basic math and science concepts related to plants and the environment. Participants improved the most on items asking them to identify various parts of plant anatomy. This suggests that the program has transferred basic plant knowledge to the participants. Additionally, focus group data suggests participants retained information about the planting, weeding, and harvesting process and were able to describe these to the evaluation team each year.

Key Successes of the Program

The program was able to target and serve the population they initially set out to reach, minority students in low-income areas in 4th and 5th grade. In all three years the program primarily served this demographic. Some of the key successes of the program included the increase in knowledge attainment by students across all three years. Participants particularly increased their knowledge related to gardening specific information, such as plant anatomy and planting, weeding, watering and harvesting produce. Additionally, participants expressed high praise for the program and indicated their enjoyment in participating in the gardening program during focus groups with the evaluation team.

Another major success this program has achieved is additional funding and Extension support services for half of the sites to continue beyond the CYFAR grant program, contributing to the long-term sustainability of this intervention. The gardening team was open to evaluation results through a formative process each year and made programmatic adjustments to the garden sites per evaluation recommendations each of the three years.

Evaluation Methods for School Year 2013-14

Evaluation results for the 2013-14 school year can be found below. Formative evaluation reports from the 2011-12 and 2012-13 school year can be found in the appendices (Appendix A and Appendix B). During the 2013-14 school year, the evaluation team measured participant knowledge level, life skill attainment, cognitive skills, and attitudes/preference changes over time associated with the project. This was measured through use of a quantitative survey instrument developed by the evaluator (see Appendix C and Appendix D). The instruments included a short series of questions for each of the program objectives, and were created with the young age of the participants in mind. Previous instruments developed to measure knowledge, attitudes, and behavior related to science and math specific gardening concepts were used to validate the instruments. The instruments were reviewed by a panel of experts and approved by the University of Florida Institutional Review Board.

While separate pre and posttest survey instruments were developed, the pre-test instrument was administered to the participants in place of the posttest unintentionally, therefore some of the specialized posttest questions were not asked. These included questions about:

- Frequency of participating in the garden
- Enjoyment of writing in a gardening journal
- Enjoyment of giving a gardening presentation
- Use of computers to enhance the learning experience
- Selling vegetables after harvest
- Parental involvement in the gardening project

The survey asked the participants to answer questions that covered five different themes related to the programmatic objectives: eco-behavior, environmental and conservation issues, working with other people, life skills, attitude towards health, preference towards healthy food, and overall knowledge about science and math related to gardening. Questions within each theme were combined and averaged to create an overall index score for each thematic area. Responses to individual questions were structured on a 5-point Likert-type scale, using either attitudinal responses (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*) or frequency responses (1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the Time*, 5 = *Always*).

2013-14 School Year Evaluation Results

Survey Results

Demographics

Basic demographic information about participants was collected through pre and posttest surveys. All participants who took either a pre or posttest survey were included. The majority of the students fell in the target range of 4th and 5th grade students (94.9%; $n = 150$), and most ranged from 9-11 years old. Slightly more boys than girls participated, perhaps owing to the fact that one class at Bond Elementary was an all-boys class. Most are African-American/Black (69.6%) or Hispanic (13.9%). Full demographic information can be seen in Table 1.

Table 1: Demographics

	<i>N</i>	<i>n</i>	%
Grade	158		
2 nd		1	0.6
3 rd		5	3.2
4 th		71	44.9
5 th		79	50.0
6 th		1	0.6
9 th		1	0.6
Age	155		
7		2	1.3
8		4	2.6
9		49	31.6
10		61	39.4
11		32	20.6
12		7	4.5
Gender	159		
Male		99	62.3
Female		60	37.7
Race	158		
Black		110	69.6
Hispanic		22	13.9
White		15	9.5
Native American		15	3.2
Other/Multiracial		4	2.5
Asian		2	1.3

Eco-Behavior

The first index included in the survey was eco-behavior. Participants were asked how often they engaged in specific behaviors related to environmental conservation. Participants could score an average between 1 and 5, with 5 indicating the highest involvement in environmental conservation behaviors. At the beginning of the program, the overall average score was 3.28 and decreased slightly to 3.23 by the end of the program, although this change was not statistically significant when assessed through a dependent samples *t*-test (Table 2).

Individual behavior scores for each item were also calculated before and after the program implementation. Before and after scores were compared using dependent *t* tests to examine the statistical significance of change over time. The individual behavior with the highest positive change at the conclusion of the program was composting food scraps at school. The strongest negative change was for the item “I turn off the water when I brush my teeth” which decreased by .54 points and was statistically significant. Most home related environmental behaviors had a slight negative change from before and after the program, while all school related behaviors had a slight positive increase.

Table 2: Eco-Behavior

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Eco-Behavior (n = 69)	3.28 (.82)	3.23 (1.01)	-.05 (.77)
I compost food scraps at school	2.33 (1.56)	2.69 (1.72)	.36 (1.60)
I recycle cans or bottles at school	2.91 (1.43)	3.14 (1.54)	.23 (1.46)
I recycle paper or magazines at home	2.93 (1.62)	3.06 (1.63)	.13 (1.70)
I recycle paper or magazines at school	2.84 (1.64)	2.94 (1.66)	.10 (1.94)
I recycle cans or bottles at home	3.41 (1.38)	3.28 (1.57)	-.13 (1.47)
I turn off the light when I am not in the room	4.29 (1.04)	4.01 (1.23)	-.28 (1.37)
I compost food scraps at home	2.85 (1.63)	2.48 (1.69)	-.37 (2.01)
I turn off the water when I brush my teeth	4.56 (.92)	4.01 (1.40)	-.54 (1.49)**

Note: Scale: 1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the Time*, 5 = *Always*; ** = $p \leq .01$

Interest in environment and conservation

The second index was interest in the environment and conservation. This index included items about participants' attitudes towards the importance of plants and animals as well as attitudes towards engaging in environmentally protective behavior. At the beginning of the program, participants scored an average of 4.09 and after the program, decreased slightly to 3.98, however this change was not statistically significant (Table 3).

The individual item with the highest positive change was "doing things for the environment is a waste of time." This item had a statistically significant positive change of .66 points. However, since this item was framed in a negative way (but was reverse coded for the overall index score), a positive change indicates an increase in an undesirable attitude. Perhaps students were confused by the structuring of the question, or perhaps their attitudes did in fact change. It is worth noting that for items which had lower overall scores before the program began improved the most with time, while items which were already strong at the beginning of the program did not improve. The second highest positive change was for the item "I am worried about animals that are going extinct," which had a statistically significant positive change of .41 points. The highest negative change, while not statistically significant, was the item "plants are important to have in our environment." However, this item also had the overall strongest average when compared to all others items.

Table 3: Interest in Environment and Conservation

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Interest in Environment and Conservation (<i>n</i> = 69)	4.09 (.45)	3.98 (.57)	-.11 (.51)
Doing things for the environment is a waste of time (RC)	1.47 (.91)	2.13 (1.49)	+.66 (1.61)**
I am worried about animals that are going extinct	3.81 (1.22)	4.22 (1.17)	+.41 (1.42)*
I think my own actions might harm the environment	2.91 (1.52)	3.28 (1.39)	+.36 (1.72)
Trying to protect the environment is my responsibility	3.94 (1.08)	3.80 (1.19)	-.14 (1.24)
I think people should build more parks for animals	4.25 (1.01)	4.09 (1.51)	-.16 (1.44)
I feel like there are many things I can do to protect the environment	4.47 (.78)	4.26 (.87)	-.21 (.94)
Plants are important to have in our environment	4.70 (.72)	4.44 (1.05)	-.26 (1.29)

Note: Scale: 1= *Strongly Disagree*, 2= *Disagree*, 3= *Neutral*, 4= *Agree*, 5= *Strongly Agree*; RC- Reverse Coded for use in overall index score; * = $p \leq .05$; ** = $p \leq .01$

Working with Others

The third index examined participants' ability and comfort with working with others. This index included items assessing how often participants engaged in various behaviors such as being honest in front of adults and enjoying working with others. The average score before the gardening program was 3.71 and increased to 3.88 by the end of the program (Table 4). The highest positive change was for the item "I work with other kids in the garden" (+.41) and "I say what I think and feel in front of adults" (+.35). While neither of these was statistically significant, they were directly tied to program goals. The highest negative outcome was for the item "I like to work with others" which decreased by .49 and was statistically significant. However, this item was also the highest overall item at the beginning of the program.

Table 4: Working with Others

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Working with Others (n = 65)	3.71 (.76)	3.88 (.81)	+.17 (.80)
I work with other kids in the garden	3.81 (1.41)	4.22 (1.28)	+.41 (1.72)
I say what I think and feel in front of adults	2.98 (1.46)	3.34 (1.44)	+.35 (1.83)
I say what I think and feel in front of other kids	3.69 (1.31)	3.98 (1.32)	+.30 (1.89)
I work with adults in the garden	3.83 (1.44)	4.08 (1.45)	+.25 (1.76)
I like to work with others	4.29 (1.10)	3.79 (1.32)	-.49 (1.65)*

Note: Scale: 1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the time*, 5 = *Always*; * = $p \leq .05$

Life Skills

Participants' overall life skills were also assessed. This index included items such as believing one is a good listener and a responsible person. At the beginning of the program, participants had an average score of 4.30 and it decreased to 3.99 by the end of the program (Table 5). This change was statistically significant at the .01 level. All sub items of the index also demonstrated a negative change. The one reverse coded item showed a statistically significant positive change, but since this was a negative item a positive change indicates an increase in a negative attitude. However, it should be noted that while there were decreases in each item in the life skills index, all of these items were rated highly amongst participants before engaging in the program.

Table 5: Life Skills

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Life Skills (n=65)	4.30 (.62)	3.99 (.75)	-.31 (.81)**
I get angry quickly when someone disagrees with me (RC)	2.19 (1.41)	2.81 (1.57)	+.63 (1.88)*
I am responsible	4.41 (1.01)	4.31 (.94)	-.10 (1.17)*
I ask questions if I don't understand something	4.33 (.96)	4.13 (1.15)	-.20 (1.29)
I respect adults	4.74 (.58)	4.45 (.86)	-.29 (.96)
I am a good listener	4.28 (.97)	3.97 (1.04)	-.31 (1.26)

Note: Scale: 1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the Time*, 5 = *Always*; RC- Reverse Coded for use in overall index score; * = $p \leq .05$; ** = $p \leq .01$

Attitude towards Health

Participants' attitudes toward health were also measured. The attitude towards health index included items examining participants' overall attitude about living in a healthy environment, as well as their behavior of going to the doctor and engaging in physical exercise daily. Before the program, participants scored an average of 4.39 and after the program they scored an average of 4.35 (Table 6). This difference was not statistically significant. The individual items for this index changed very little, with the highest positive change for the item "I do physical exercises every day" which increased by only .08 points, and the highest negative change for the item "I go to the doctor for a checkup every year," which decreased by .18 points. All index items as well as the overall index average were relatively high at the beginning of the program.

Table 6: Attitude towards Health

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Attitude towards Health (n = 64)	4.39 (.58)	4.35 (.83)	-.04 (.79)
I do physical exercises every day ¹	4.00 (1.18)	4.08 (1.13)	.08 (1.33)
Living in a healthy environment is important ²	4.63 (.74)	4.58 (.91)	-.05 (.94)
I go to the doctor for a checkup every year ¹	4.55 (.92)	4.37 (1.18)	-.18 (1.18)

Note: Scale¹: 1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the Time*, 5 = *Always*; Scale²: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*.

Preference towards Healthy Food

Participants were then asked about their preference towards healthy food. The preference towards healthy food index included items about attitudes towards fresh foods and attitudes towards green vegetables. Before the program, participants had an average score of 3.58 and after the program they scored an average of 3.62, for a small increase of just .04 points (Table 7). These changes were not statistically significant, nor were any of the individual index items. The two highest positive changes occurred for the items asking participants about their attitudes about home grown foods being fresher than processed food and whether they eat green vegetables every day. The highest negative change occurred for the item "I think it is important to eat green vegetables," which decreased by .13 points but was the highest overall individual item.

Table 7: Preference towards Healthy Food

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Preference towards Healthy Food (n=65)	3.58 (.71)	3.62 (.74)	+.04 (.84)
Homegrown fresh foods are better than processed food ²	3.65 (1.21)	3.89 (1.13)	+.24 (1.27)
I eat green vegetables every day ¹	3.15 (1.16)	3.35 (1.32)	+.21 (1.46)
It is important to eat green vegetables every day ²	3.70 (1.27)	3.85 (1.09)	+.15 (1.45)
I eat fast food every day (RC) ¹	2.82 (1.30)	2.95 (1.35)	+.13 (1.17)
I think it is important to eat green vegetables ¹	4.10 (1.13)	3.97 (1.33)	-.13 (1.61)

Note: Scale¹: 1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the Time*, 5 = *Always*; Scale²: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*; RC- reverse coded for use in overall index.

Overall Knowledge

The last set of questions examined the overall knowledge of the participants across a variety of topics, including the cleanliness of organic vegetables and the importance of keeping a gardening journal. The overall index changed only slightly in a negative direction, decreasing from 4.01 to 3.97 for just a .04 point decrease (Table 8). This change was not statistically significant, nor was any of the individual index items. The highest positive change occurred for the item “measuring the planting distance between plants when gardening is important.” This item increased from an already high 4.27 to 4.39 by the end of the program. The highest negative change occurred for the item “keeping a journal is an important part of a gardening project.” This item decreased from 4.25 to 3.91. It should be noted that while the item “organic vegetables are dirty” increased by .11 points, since this item was negatively worded, a positive increase indicates an increase in a negative attitude.

Table 8: Overall Knowledge

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Knowledge (<i>n</i> = 68)	4.01 (.49)	3.97 (.65)	-.04 (.77)
Measuring the planting distance between plants when gardening is important	4.27 (.90)	4.39 (.87)	+1.12 (1.24)
Organic vegetables are dirty (RC)	2.58 (1.27)	2.69 (1.39)	+1.11 (1.99)
The color of vegetables is very important	2.80 (1.47)	2.73 (1.41)	+0.09 (1.48)
Insects are good for a garden	4.11 (1.06)	4.06 (1.09)	-.05 (1.49)
Knowing the best time to harvest vegetables is important	3.64 (1.37)	3.73 (1.32)	-.06 (1.28)
Keeping a journal is an important part of a gardening project	4.25 (.89)	3.91 (1.20)	-.34 (1.54)

Note: Scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*;

Knowledge Items

Finally, participants were asked a series of knowledge questions which had either correct or incorrect responses. The items with the overall highest change tended to be questions that asked the participants to identify different plants parts in a picture. The lowest positive change occurred for math word problems in which participants had to solve an answer and indicate the correct response in a multiple choice format. The overall lowest scores for the posttest were found for those questions asking students to identify the scientific abbreviation for Potassium, locating where photosynthesis occurs in a plant, and a math questions which required students to transform one unit (feet) into another (inches) to solve the problem (Table 9). If the test had been a graded exam, the students would have scored an average of 44.5% at the beginning, and an average of 77.9% at the end.

Table 9: Knowledge Items (n = 69)

	<i>% Correct Before</i>	<i>% Correct After</i>	<i>% Change</i>
What are the names of the different plant parts? (Flower)	23.2	81.2	58.0
What are the names of the different plant parts? (Seeds)	36.2	89.9	53.7
What are the names of the different plant parts? (Leaf/Leaves)	34.8	85.5	50.7
What are the names of the different plant parts? (Fruit/Tomato)	36.2	85.5	49.3
What are the names of the different plant parts? (Root)	40.6	89.9	49.3
What are the names of the different plant parts? (Stem)	37.7	82.6	44.9
What does the K in NPK stand for? (Potassium)	7.2	49.3	42.1
Where does photosynthesis happen? (Leaf)	24.6	50.7	26.1
If you had 2 pounds of squash and the market value of squash is \$1.39/pound, how much could you expect to sell your squash for? (\$2.78)	56.5	81.2	24.7
What does H ₂ O mean? (Water)	71.0	88.4	17.4
What do plants make? (Oxygen)	72.5	89.9	17.4
If you have 12 feet of soil to transplant collards, and the plants have to be 18 inches apart to get maximum growth, how many can I plant? (8)	42.0	53.6	11.6
If I put 9 seeds in the ground and only 1 plant grows for every 3 seeds, how many plants will grow? (3)	73.9	85.5	11.6
If a plant grows 2 inches every week, how many inches tall will it be after 4 weeks? (8)	66.7	76.8	10.1

2013 – 14 School Year Focus Group Results

Two focus groups with participants were conducted in May 2014 to better understand their personal experiences as a group working in the garden. Questions were asked about what they learned and their assessment of their experiences in the garden. The questioning route for the focus groups included the following questions:

- What did you think about the gardening project?
- What kinds of plants did you grow?
- Did you sell your products?
- What are the benefits of growing your own vegetables instead of buying them at the store?
- What is your favorite food?
- Do you think it is important to eat green vegetables?
- Did you have to come up with a plan for the school/community garden?
- Did you ever get frustrated when you were working in the garden?
- Do you feel like you can say what you think and feel in front of adults?
- Do you feel more comfortable talking with adults because of the gardening project?
- Did you like giving presentations in front of others?
- Did you have to give a presentation during the gardening project?

The focus groups were transcribed and then analyzed for common themes. Individual quotes and exchanges were categorized into different, commonly occurring themes that are summarized below. FG1 refers to focus group #1 conducted at Greensboro Elementary and FG2 refers to focus group #2 conducted at Bond Elementary in an all-boys class.

Gardening Process

Much of the discussion during the focus groups centered on what the participants learned and experienced through the gardening process itself. They described aspects they enjoyed about gardening as well as technical gardening knowledge they gleaned from participation.

Enjoyable aspects

The participants described a variety of aspects of the gardening program that they particularly enjoyed. They enjoyed harvesting the crops, weeding, learning about planting, and taking the produce home. Overall, the participants described their experience as “fun.” Below are some quotes to illustrate the aspects of the program the participants enjoyed:

- [It was fun] Because we had to dig for potatoes. (FG1)
- [I] had fun picking the potatoes. (FG1)
- What I like about the garden is that we got to plant...we got to plant vegetables and some that we like and got to have fun with it. (FG2)
- It was good because we had got to see all the plants that grow, the fruits and veggies that had grown. (FG2)
- It was fun they taught me how to plant. (FG2)
- It was fun because you got to take most of the weeds and after tossing them, and we got to pick cabbages. (FG2)

- Um, well, the um, the thing I liked about the garden is we got to like take the fresh ones home and stuff, like the watermelon and the cabbage and stuff. (FG2)

Participants also described that they had favorite foods they grew in the garden and gave reasons for why they were their favorites. Participants described enjoying eating the fruits and vegetables for their taste.

- Potatoes! (sounds of agreement)...It was yummy when I ate them. (FG1)
- I like broccoli. (FG1)
- Strawberries...Because they juicy. (FG2)
- On Sundays I like eating collard greens. (FG2)
- Watermelon and strawberries and other things...Because they sweet. (FG2)
- Strawberries because you can put chocolate on it. (FG2)
- Carrots because I liked to eat it. (FG2)

Technical knowledge gleamed

Participants also discussed the technical knowledge they learned about gardening as a result of the program. In particular, they discussed how they learned about planting as well as how they retained new science concepts through keeping a gardening notebook.

- What I learned about them is that when you dig, when you plant the plant in the ground, when you are supposed to put a little space from one side to the other side and don't pat it down so you don't suffocate it. And you supposed to have like a foot apart from each other so they have room to grow. (FG2)
- When you plant you got to open up a hole and break the plant apart and give it room to spread its roots to get nutrients and you got to put some soil on top and water so it won't die. (FG2)
- Yea we had a notebook, we had to write down this week, next week. I'd be like "don't eat junk foods, drink milk." (FG2)
- We used our notebooks for the um diameter around the um plant. Um yea. Around the place where we put the plants. (FG2)
- Um, we take notes about how to make the plants and make um and what you need to make plants. (FG2)
- They taught us new words and taught like what words and taught us to write definitions of words like photosynthesis and other words that we had learned for the garden. (FG2)
- The words global warming, photosynthesis, agriculture and.....(FG2)
- We use our notebooks to write down our answers and questions, like definitions to words. (FG2)



Figure 3: Example of notebook used during gardening project

Benefits of Vegetables

Another dominant theme that emerged was the benefits of vegetables. Participants discussed various ideas about how growing one's own vegetables can be beneficial. They mentioned how homegrown vegetables are fresh and safe and can bring economic and health benefits to the grower.

Freshness and safety

Below are quotes that demonstrate how participants felt about how homegrown vegetables being both fresher and safer to consume than those purchased at a store.

- You know what they are put inside, you know about chemicals. (FG1)
- They're fresher. (FG1)
- Instead of buying them from a store you get them at home fresh. (FG2)
- You know they don't use the pesticides, so they be fresh.(FG2)
- When you make your own vegetables and you don't have to try to find out what happened to them because you grew them. (FG2)
- At the store, some were rotten but you can tell if it's ripe or if it's not ripe. (FG2)

Economic benefit

Participants also felt that homegrown vegetables can save money for the grower. Below are quotes which demonstrate this theme.

- You make your own money, you work for your own self, you get to be the boss. You can plant the plants during certain seasons and know they came from you. (FG2)
- You saving you your money because you make your own. (FG2)

Promotion of health

Participants discussed the various health benefits one can receive from eating fresh fruits and vegetables. They discussed general health concepts, such as how produce consumption can aid them in growing stronger, healthier, and taller. Many participants gave vague responses and while they mentioned nutrients or minerals, did not seem clear on how these promote a healthy body. Below are three conversational exchanges which took place during the two focus groups.

- It makes you healthy. (FG1)
- Because they're good for you. (FG1)
- They are good for your teeth. (FG1)
- They have some iron. Minerals. (FG1)
- Not sure. (FG1)

In focus group two, participants discussed nutrients more specifically, particularly that they can help build strength and height. Participants were responding to the question "do you think it is important to eat green vegetables?"

- Yes!! More nutrients....no! (FG2)
- I don't know. (FG2)
- Because it makes you strong and healthy. (FG2)
- Yea, it makes you strong and healthy. (FG2)
- It has nutrients. (FG2)
- It helps you grow taller. (FG2)
- It makes you stronger and have um good health. (FG2)

However, some respondents in focus group two did not have specific examples but rather a more vague understanding of how produce is beneficial to one's health. This exchange also was prompted by the question "do you think it is important to eat green vegetables?"

- It makes you strong and healthy. (FG2)
- I would say yes, because when you eat a lot of vegetables it like makes you healthier to where you can live a better life. (FG2)
- I say, I don't know. (FG2)
- Most of the times it is. (FG2)
- Sometimes. (FG2)
- Me? I put neutral, I don't know. Yea. Neutral. I don't know. (FG2)
- I said yea because you'd be healthy and have strong bones. (FG2)
- Helps you stay in shape and have health. (FG2)

Comfort with Adults

Participants were asked about their comfort speaking with adults about what is on their minds. While some participants felt comfortable doing this, others did not. Quotes grouped together represent exchanges in conversation that took place during the focus groups.

- But you can't [talk to adults] cause you going to get slapped! (laughter) (FG1)
- I was not raised to do that. (FG1)
- As long as you don't say anything bad there's no reason to be afraid. (FG1)
- Moderator: Do you feel more comfortable talking to adults because of gardening program? (FG1)
- Yes. (FG1)
- Moderator: Why do you feel more comfortable? Why do you think that is? (FG1)
- Because if you say what you feel out loud than the other kids might make fun of it. (FG1)
- No, because even though you have an opinion on how you want it to be done, there's an easier way or how it might go better or something, but grownups say this is the way how we can do it and we just go with it. (FG2)

Curiosities and Stories

Participants also told stories or explained to the moderator things of interest to them that they remembered about their gardening experience. These stories and details fell into two major categories, stories about *insects and animals* as well as their experiences with the *hands on nature of gardening*.

Insects and animals

Participants expressed their interest in insects and small animals they encountered in the garden. When prompted to discuss things they enjoyed or did not enjoy in the garden, or when asked to give stories they would like to share about their experience in the garden, they often discussed their interactions with insects. Below are quotes from the participants about their interactions with insects (and one frog) in the garden. In some cases, participants enjoyed these experiences, in other instances they discussed that they did not enjoy these experiences, however stories were often told in a teasing manner with smiles on their faces, indicating a general enjoyment of these experiences.

- I was picking up a potato and I pulled the plant, and there was a spider! (FG1)
- Digging the potatoes then I found some worms...They were gross and they were slimy! (FG1)
- When we was weeding, I got gnats in my face. (FG2)
- We was weeding, it was like five big buckets and it was like me and [Dave] and we was wedding together and it was a big green bug that had jumped on me! and I hurt my chest. I had killed it and I was like whoa, and then it was a tick and it had jumped on me and I had squished it. And there was a whole bunch of them. (FG2)
- And there was a whole bunch of spiders. (FG2)
- And there were a whole bunch of caterpillars. (FG2)
- I went and put a frog in the compost pile! (FG2)

The following was an exchange that occurred between two participants in focus group two.

- We was gardening I saw a worm and then that's when Jabari picked it up. (FG2)
- Yep, I remember that. (FG2)
- Jabari, he picked it up and said he'll look at it. I was like no put it down! It'll have germs on it. (FG2)

Hands on nature of gardening

The hands on nature of gardening were also mentioned through stories the participants told. In some cases getting their hands dirty was considered fun and exciting, while it was mentioned as unenjoyable and frustrating by others. Other stories illustrated various aspects participants remembered about the garden which involved hands on activities.

- I was watering the plants and everybody's pants got wet. (FG1)
- We were picking out onions and when I pulled it out it was a small one! (FG1)
- When we picked an onion my friend said ooh that smell good, so I had gave him the onion. (FG2)

Other discussions focus on dirt and getting dirty while in the garden.

- We threw dirt at each other. (FG1)
- Moderator: Were you having a fight with dirt or were you just playing? (FG1)
- Playing. (FG1)
- Um, well like when we was weeding, it was too much weed so I was like who wanna help me with this side of the weeds, and that's when he said "I do" and then he threw dirt on me! (FG2)
- One time, we went to the garden and then um we were pulling out plants my friend [Andrew] we had gloves on and they were soily and wet and we went and he said eww, and he had running around flinging the gloves trying to get the water out and he slipped and fell in the dirt! (FG2)
- I didn't like to get my hands dirty. (FG1)

Appendix A- 2011-2012 Report

Introduction

The Florida A&M University's Red Clay Garden-based Education Project began in 2009 as part of a Children, Youth, and Families at-Risk (CYFAR) Sustainable Community Project (SCP). The target audience is 4th and 5th grade students in schools in North Florida. This project is administered through the FAMU's Cooperative Extension Outreach Program which is housed in the FAMU College of Engineering, Sciences, Technology and Agriculture.

The program aims to increase positive behaviors amongst children by providing a unique environment through which the child can develop positive attitudes and thoughts about themselves, the environment, and healthy behavior. By choosing a natural setting (i.e. school & community after-school programs) the children are able to develop this in a comfortable environment and can spread these positive ideas throughout their community. These improved attitudes should encourage children to change their behavior when interacting with the environment, with others, and regarding their own health. These knowledge, skills, attitudes and behaviors should be transferrable to other areas in the children's' lives and help them to live a productive and positive life even after they are no longer engaged in the project.

The project used three schools and a community based site to implement a series of educational programs including an after-school garden-based education program. To assess the effectiveness of this program, survey data was collected from both the students who participated in the program as well as from the staff members administering the program. Also, a focus group was conducted with the student participants to assess how the students perceived the program. Lastly, artifacts and tracking logs kept by the program staff were reviewed. The information gathered was to assess the progress in which the project has advanced towards its short term and long term goals. The short term and long term goals are listed below.

Desired Short Term Results

- **Knowledge acquisition** in 1) Garden Design and Planning Process, 2) Garden Preparation Process, 3) Garden Implementation Process, 4) Harvesting Process, 5) Consumption Process, and 6) Entrepreneurship/Marketing Process
- **Development of life skills** in 1) Completing projects, 2) Belief in self, 3) Ownership and responsibility, 4) Working cooperatively with adults, peers and in groups, 5) Gaining academic and cognitive skills, 6) Understanding science and math as concepts inherent to nature and gardening
- **Growing in social and moral development** by the 1) Practice of patience, 2) Practice of compromise, 3) Adoption of beneficial attitudes, preferences and interests, and 4) Adoption of actions that benefit life long health.

- **Environment and conservation awareness and development** in 1) Public Health, and 2) Agriculture Education and Entrepreneurship

Desired Long-Term Results

- Improved community awareness to the benefits of gardening, good nutrition, agriculture education and entrepreneurship
- Participants’ interests, attitudes and behaviors change
- Eco-actions implemented
- Participants’ learning and behaviors are reinforced
- Participants’ implement sustainable environment activities that benefit the bio-region
- Improvement in participants’ cooperative relationship with all categories of adults, peers and in working groups

Background Information

Record of Activity

Damon Miller is the overall program coordinator and works with four different site coordinators that together manage the FAMU Red Clay Garden Project. Each site coordinator structures all of the activities at each site and goes with the children to the garden during their visits. Amos Murray is the site coordinator at Greensboro Elementary, Andrew Jackson is the coordinator at Bond Elementary, Charles Givens manages the site at Port St. Joe, and Ardis Miller is the site coordinator at the Miccosukee Boys and Girls Club. For the school year 2011-2012, the FAMU Red Clay Garden Project began on September 1, 2011 and ended on May 30, 2012. Figure 1 demonstrates the times of the week that the site coordinators visited the students.

Figure 1: Schedule of Site Visits

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9:00am		Bond Elementary		Bond Elementary		
10:00am						Port St. Joe (3 rd Saturday of each month)
11:00am						
12:00pm						
1:00pm		Greensboro Elementary		Greensboro Elementary		
2:00pm						
3:00pm						
4:00pm		Miccosukee Boys and Girls Club		Miccosukee Boys and Girls Club		

		(4:30pm)		(4:30pm)		
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The Red Clay Garden staff kept records of activities throughout the school year to keep track of the planting, harvesting, and educational activities that the participants participated in. These records include the types of vegetables that were harvested at each site. Table 1 shows the types of vegetables that were harvested at each of the four sites. Table 2 shows the types of educational topics that were covered at each site, and how many times the site coordinators reported discussing this topic with the participants over the course of the school year. These tables show that all of the sites planted a variety of different vegetables, but that Bond Elementary and Greensboro Elementary covered many more educational topics than did Port St. Joe and Miccosukee Boys and Girls Club.

Table 10: Types of vegetables grown

Vegetable	Miccosukee Boys and Girls Club	Greensboro Elementary School	Port St. Joe	Bond Elementary
Broccoli	✓			✓
Cabbage		✓		
Collards	✓	✓		✓
Corn			✓	
Cucumbers		✓	✓	✓
Eggplant			✓	
Green beans			✓	✓
Green peppers		✓	✓	
Hot peppers		✓	✓	✓
Lettuce		✓		
Mustard greens	✓	✓		✓
Okra	✓		✓	
Onions	✓	✓		✓
Peppers	✓			✓
Potatoes			✓	
Squash		✓	✓	✓
Tomatoes	✓	✓	✓	✓
Turnips	✓	✓		✓



Figure 2: Students at Greensboro Elementary with their harvest

Table 11: Educational topics discussed

Topic	Micosukee Boys and Girls Club	Greensboro Elementary School	Port St. Joe	Bond Elementary
Plant identification	✓	✓✓	✓	✓✓
Plant classification		✓		✓
Plant physiology		✓✓		✓✓
Plant life cycle		✓	✓	✓
Soil structure	✓	✓		✓
Water cycle		✓		✓
Nutrients		✓		✓
Photosynthesis		✓✓✓	✓	✓✓✓
Harvesting strategies		✓		✓
Following plant label instructions		✓		✓
Nutrition/Health		✓✓		✓✓✓✓
Communication Skills		✓		✓

Goal setting		✓✓		✓✓
Acting responsibly		✓		✓



Figure 3: Students at Miccosukee planting

Garden Curriculum

A garden teaching curriculum was developed for this project by Amelia Davis of FAMU and enhanced with materials from the Texas A&M Junior Master Gardener Handbook Level 1. It can be seen in Appendix A. Each garden site followed this curriculum with small changes made as needed.

The first lesson focused on building awareness about the importance of agriculture and how people rely on agricultural products for much of their everyday life. The second lesson exposed the children to what a garden is, how to build a raised garden bed, and what minerals plants need. This lesson also showed the children how to keep a gardening journal and emphasized the nutritional importance of eating fruits and vegetables. The third lesson dealt with composting and taught the students why composting is important, explained different ways of composting, and discussed how soil is made up of different layers. The fourth lesson focused on fertilizers and pesticides and their benefits for plants as well as describing the plant life cycle. The fifth lesson described the necessary elements that plants must have to grow, and exposed the students to different types of natural habitats. Lesson six dealt with global warming, lesson seven was about nutrition, and lesson eight wrapped up all the previous lessons. A general outline of activities based upon this curriculum can be seen in Appendix B.

Pre and Post Test Survey of Student Participants

Introduction

To measure participant knowledge level, life skill attainment, cognitive skills, and attitudes/preference changes over time associated with the project quantitative survey instruments were developed by the evaluator (see Appendix C for the pre-test and Appendix D for the post-test). The instruments included a short series of questions for each of the objectives, and were created with the age of the participant in mind. Previous instruments developed to measure knowledge, attitudes, and behavior related to science and math specific gardening concepts were used to validate the instruments. The instruments were reviewed by a panel of experts and approved by the University of Florida Institutional Review Board (#2011-U-0955).

The pre-test was administered to the participants in written form at each of the four project sites by the program staff in September, 2011. The post-test was administered in the same way in May, 2012. Descriptive and inferential statistics were used to analyze the data in SPSS.

Demographics

Demographic information was collected. The majority of students (79.7%) fell in the target age range of 4th and 5th grade students. More details about the gender, race, age, and grade of participants can be seen in Table 3.

Table 12: Demographics

	<i>N</i>	<i>n</i>	%
Grade	192		
1 st		3	1.6
2nd		4	2.1
3rd		15	7.8
4th		76	39.6
5th		77	40.1
6th		5	2.6
7th		4	2.1
8th		4	2.1
9th		4	2.1
Age	199		
5		1	0.5
6		3	1.5
7		2	1.0

8	10	5.0
9	30	15.1
10	51	25.6
11	68	34.2
12	20	10.1
13	5	2.5
14	4	2.0
15	4	2.0
16	1	0.5
Gender	200	
Male	101	50.5
Female	99	49.5
Race	197	
Black	149	75.6
White	25	12.7
Hispanic	18	9.1
Asian	3	1.5
Native American	2	1.0

Results

Participation and Activities

Participants were asked how often they participate in the garden. The results reflect the schedule kept by the site coordinators with participants indicating they most commonly participated in the garden one to two times a week (Table 4). This results shows that only a few teachers engaged their students in garden work outside of scheduled time.

Table 13: Frequency of participating in the garden (n = 69)

Frequency	%
5 times a week	8.7
3-4 times a week	15.9
1-2 times a week	59.4

Less than once a week

15.9

Other questions were asked of the participants regarding activities they engaged in during the gardening project. Only 22% (n = 69) of participants reported they kept a gardening journal and only 14% (n = 71) gave a presentation about the garden in front of other people. The curriculum introduced by FAMU suggested these activities, however, few actually engaged. For those that did participate in the activities, the survey asked them to identify how much they enjoyed participating. The results are displayed in Table 5 and Table 6 and show that most participants enjoyed these activities. In addition, only 4% (n = 71) used computers to help with the gardening project and only 15% (n = 47) had their parents come with them to the garden.

Table 14: Enjoyment of writing in a gardening journal (n = 15)

	%
I liked it a lot	66.7
I kind of liked it	6.7
I thought it was okay	20.0
I didn't like it	6.7
I hated it	0

Table 15: Enjoyment of giving a gardening presentation (n = 13)

	%
I liked it a lot	53.8
I kind of liked it	7.7
I thought it was okay	38.5
I didn't like it	0
I hated it	0

The survey asked the participants to answer questions that covered five different themes related to the programmatic objectives: eco-behavior, environmental and conservation issues, working with other people, life skills, attitude towards health, preference towards healthy food, and overall knowledge about science and math related to gardening. Questions within each theme were combined and averaged to create an overall index score for each thematic area. Responses to individual questions were structured on a 5 point Likert-type scale, using

either an attitudinal responses (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree) or frequency responses (1 = Never, 2 = Occasionally, 3 = Sometimes, 4 = Most of the Time, 5 = Always).

Eco-Behavior

The first theme was eco-behavior. In this theme the participants were asked how often they engaged in specific behaviors associated with environmental conservation. At the initiation of the program, the overall average score for participants on the eco-behavior index was 3.33 (see Table 7). After the conclusion of the program, the average score was largely unchanged at 3.34. This result demonstrates the program did not have an effect on the behaviors that children engaged in related to the environment.

Table 16: Eco-Behavior

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>t</i>
Overall Eco-Behavior (n = 71)	3.33 (0.86)	3.34 (0.80)	.01
I recycle cans or bottles at school	2.63 (1.56)	3.15 (1.48)	+.52**
I recycle cans or bottles at home	3.31 (1.38)	3.59 (1.37)	+.28
I recycle paper or magazines at school	2.73 (1.65)	2.99 (1.58)	+.26
I turn off the light when I am not in the room	4.49 (0.98)	4.54 (0.94)	+.05
I recycle paper or magazines at home	3.31 (1.46)	3.17 (1.49)	-.14
I compost food scraps at home	3.08 (1.62)	2.82 (1.59)	-.26
I compost food scraps at school	2.41 (1.62)	2.08 (1.44)	-.33
I turn off the water when I brush my teeth	4.70 (0.70)	4.37 (1.06)	-.33*

Note: Scale: 1= Never, 2= Occasionally, 3= Sometimes, 4= Most of the Time, 5= Always; *= $p \leq .05$; **= $p \leq .01$

Individual behavior scores for each item were also calculated before and after the program implementation (see Table 7). Before and after scores were compared using dependent *t*-tests to examine the statistical significance of change over time. The individual behavior that changed the most was recycling cans or bottles at school, increasing .52 points after the program's implementation, indicating a statistically significant change at the .01 significance level. This represents a change from participants reporting they occasionally engaged in eco-behaviors to stating they sometimes engaged in them. Participants also reported recycling cans or bottles at home more often after the treatment, increasing from 3.31 to 3.59. However, this change was not statistically significant. Some results indicated a drop in engagement in some behaviors. One surprisingly negative change in behavior that is statistically significant is turning off the water when brushing one's teeth. However, this response had a high mean before the program, at 4.70 points and, while it decreased, the response category remained in the same frequency category ("Most of the Time").

Interest in the Environment and Conservation

The second theme examined was the overall interest in the environment and conservation. The change in the overall theme score was positive and statistically significant (see Table 8). The initial score before the program began was 4.14 indicating that the participants agreed with most of the statements. After the program, participants had an overall score of 4.28, for a total change of .15 points. While this is a small change, the statistical significance of the change means that one can attribute 95% confidence that these results are not due to chance. One of the questions was reverse coded when it was included in the overall index score. This question was “Doing things for the environment is a waste of time.” The very low score, therefore, represents a positive attitude towards helping the environment since the question was asked in a negative way.

Table 17: Interest in Environment and Conservation

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>t</i>
Interest in Environment and Conservation (n = 71)	4.14 (.53)	4.28 (.49)	+ .15*
I think my own actions might harm the environment	3.31 (1.41)	3.72 (1.32)	+ .41*
I am worried about animals that are going extinct	3.80 (1.21)	4.20 (1.01)	+ .40**
I think people should build more parks for animals	4.15 (1.17)	4.24 (1.01)	+ .09
Trying to protect the environment is my responsibility	4.07 (.99)	4.14 (.95)	+ .07
I feel there are many things I can do to protect the environment	4.51 (.79)	4.54 (.71)	+ .03
Doing things for the environment is a waste of time (RC)	1.51 (1.04)	1.48 (.95)	- .03
Plants are important to have in our environment	4.68 (.73)	4.59 (.82)	- .09

Note: Scale: 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree; * = $p \leq .05$ ** = $p \leq .01$

Individual scores for each item were also calculated before and after the program implementation (see Table 8). Before and after scores were compared using dependent *t*-tests to examine the statistical significance of change over time. The individual statement reflecting the most change was “I think my own actions might harm the environment.” Participants reported a 3.31 level of agreement before the gardening project and a 3.72 level of agreement afterwards. This change is statistically significant at the .05 level. Participants reported they were also more worried about animals going extinct, increasing their agreement by .40 points, which was statistically significant at the 99% confidence level. Interestingly, despite being a part of a gardening project dealing with plants and vegetables, the participants reported a negative change in agreement that plants are important to have in the environment, however this was not statistically significant, and the mean level of agreement before the gardening project was very high (4.68).

Working with Others

The third theme examined was working with others. Prior to the program, participants reported a 3.43 index theme score, indicating they sometimes participated in actively working with others and saying their true thoughts around other people (see Table 9). After the program, the average index score increased to 3.73, which indicates a slight shift from “sometimes” doing the activities to doing the activities “most of the time.” This change is statistically significant at the 95% confidence level.

Table 18: Working with Others

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>t</i>
Working with Others (n = 71)	3.43 (.82)	3.73 (.81)	+.30*
I work with other kids in the garden	3.27 (1.53)	4.03 (1.37)	+.76**
I work with adults in the garden	3.61 (1.53)	3.96 (1.40)	+.35
I say what I think and feel in front of adults	2.63 (1.33)	2.87 (1.44)	+.24
I like to work with others	4.35 (.94)	4.45 (.82)	+.10
I say what I think and feel in front of other kids	3.28 (1.45)	3.34 (1.35)	+.06

Note: Scale: 1= Never, 2= Occasionally, 3= Sometimes, 4= Most of the Time, 5= Always; *= $p \leq .05$; **= $p \leq .01$

Individual scores for each item were also calculated before and after the program implementation (see Table 9). Before and after scores were compared using dependent *t*-tests to examine the statistical significance of change over time. The action with the most positive change in response after the program was working with other children in the garden. This change is highly significant at the .01 confidence level and increased from 3.27 to 4.03, which represents a change from reporting that the participants “sometimes” engage in this behavior to reporting that they work with other children in the garden “most of the time.” Overall, participants’ levels of liking to work with others did not increase by much (.10 points), yet it was high when they began the program. The results showed participants are generally more comfortable saying what they think and feel in front of other children rather than adults and that they do work with adults “most of the time” in the garden.

Life Skills

The next theme examined was life skills. Participants were asked a series of questions about their listening skills, ability to control emotions, approach others with questions, and feelings of responsibility. Before the gardening project, the participants had an average score of 4.29, which indicated they felt they do these activities “most of the time” (Table 10). After the gardening project, their scores increased by .09 points, to reach an index value of 4.38. This is a small change and is not statistically significant. While the highest change was in feeling that one was responsible (a positive increase of .19 points), this nor any of the other life skills behaviors were statistically significant.

Table 19: Life Skills

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>t</i>
Life Skills (n = 71)	4.29 (.61)	4.38 (.56)	+.09
I am responsible	4.37 (.95)	4.56 (.69)	+.19
I ask questions if I don't understand something	4.39 (.95)	4.52 (.73)	+.13
I respect adults	4.63 (.80)	4.73 (.73)	+.10
I am a good listener	4.20 (.84)	4.23 (.78)	+.03
I get angry quickly when someone disagrees with me (RC)	2.14 (1.41)	2.11 (1.20)	-.03

Note: Scale: 1= Never, 2= Occasionally, 3= Sometimes, 4= Most of the Time, 5= Always; RC – Reverse Coded for use in overall index score

Attitude towards Health

Attitude towards health was the next theme captured in the survey (Table 11). This construct also had only a small, statistically insignificant change after the program was implemented. The participants reported an initial average index score of 4.20 and at the end of the school year it increased to 4.29. However, these changes are not statistically significant and could be due to chance alone. Participants reported they go to the doctor slightly more frequently for yearly checkups, but this change (+.18 points) was also not statistically significant.

Table 20: Attitude Towards Health

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>t</i>
Attitude Towards Health (n = 71)	4.20 (.75)	4.29 (.75)	+.09
I go to the doctor for a checkup every year ¹	4.00 (1.32)	4.18 (1.21)	+.18
I do physical exercises everyday ¹	3.99 (1.12)	4.08 (1.09)	+.09
Living in a healthy community is important ²	4.61 (.73)	4.59 (.82)	-.02

Note: Scale¹: 1= Never, 2= Occasionally, 3= Sometimes, 4= Most of the Time, 5= Always; Scale²: 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree

Preference towards Healthy Food

The next theme examined was preference towards healthy food. Before the gardening program, participants scored an average of 3.58 on the preference towards healthy food index (Table 12). At the end of the school year, this score had increased .08 points to 3.66. This is not statistically significant and represents only a slight shift in agreement level and frequency of performing specific activities.

Table 21: Preference towards Healthy Food

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>t</i>
Preference Towards Healthy Food (n = 71)	3.58 (.73)	3.66 (.65)	+.08
I eat fast food everyday ¹ (RC)	2.99 (1.24)	2.63 (1.28)	-.36*
I eat green vegetables everyday ¹	3.28 (1.15)	3.41 (1.12)	+.13
I think it is important to eat green vegetables ¹	4.15 (1.20)	4.18 (1.03)	+.03
It is important to eat green vegetables everyday ²	3.73 (1.16)	3.69 (1.18)	-.04
Homegrown fresh foods are better than processed food ²	3.73 (1.17)	3.63 (1.11)	-.10

Note: Scale¹: 1= Never, 2= Occasionally, 3= Sometimes, 4= Most of the Time, 5= Always; Scale²: 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree; *= $p \leq .05$

The individual activity participants reported the most change within was eating fast food (see Table 12). This question was reverse coded into the index, and since it is a negative behavior, the decrease in response to this statement represents a healthy change. Before the program, participants reported eating fast food everyday “sometimes” and after the program “occasionally.” The average change was -.36 points and is statistically significant at the .05 level. The participants reported that they eat green vegetables daily more often, but this increase was not statistically significant.

Overall Knowledge

The final theme examined overall knowledge the participants gained from the program. At the end of the school year, participants reported a slight decrease in their index scores for overall knowledge. Before the program, they scored 3.94 and afterwards, a 3.90 (Table 13). This is a decrease of .04 points, but is statistically insignificant, quite small, and likely due to normal variations in responses. The individual item with the highest change was “knowing the best time to harvest vegetables is important” which had a positive increase of .14 points. The question “organic vegetables are dirty” was reverse coded into the index. Since a high response to this question represent a negative opinion about organic vegetables, the statistically significant increase of .35 after the program represents an increase in a negative view of organic vegetables and a confusion about organic vegetables being “dirty.”

Table 22: Overall Knowledge

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>t</i>
Overall Knowledge (n = 71)	3.94 (.70)	3.90 (.58)	-.04
Knowing the best time to harvest vegetables is important	4.31 (.94)	4.45 (.84)	+.14
Some insects are good for a garden	4.14 (1.15)	4.23 (1.03)	+.09
Measuring the planting distance between plants when gardening is important	4.18 (1.10)	4.17 (.93)	-.01
Keeping a journal is an important part of a gardening project	3.75 (1.13)	3.68 (1.05)	-.07
The color of vegetables is very important	3.62 (1.36)	3.54 (1.31)	-.08
Organic vegetables are dirty (RC)	2.37 (1.25)	2.72 (1.06)	+.35*

Note: 1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree; *= p ≤ .05

Finally, participants were asked a series of knowledge questions that had either correct or incorrect responses (Table 14). By the end of the school year, the participants reported a statistically significant increase in their understanding of the meaning of H₂O. The pre-test results indicated only 67.6% (n = 71) of the students answered this question correctly. The post-test results showed the participants increased their amount of correct responses to this question by 18.3%, with a total of 85.9% of the students answering this question correctly. This was statistically significant at the .01 level.

Table 23: Knowledge Items (n = 71)

	<i>% Correct Before</i>	<i>% Correct After</i>	<i>% Change</i>
What does H ₂ O mean? (Answer: Water)	67.6 (.47)	85.9 (.36)	+18.3**
What do plants make? (Answer: Oxygen)	63.4 (.49)	80.3 (.40)	+16.9*
If I put 9 seeds in the ground and only 1 plant grows for every 3 seeds, how many plants will grow? (Answer: 3)	66.2 (.48)	80.3 (.41)	+14.1*
What are the names of the different plant parts? (Answer: Flower)	19.7 (.40)	33.8 (.48)	+14.1
What are the names of the different plant parts? (Answer: Fruit/Tomato, etc.)	31.0 (.47)	45.1 (.50)	+14.1
If you had 2 pounds of squash and the market value of squash is \$1.39/pound, how much could you expect to sell your squash for? (Answer: \$2.78)	57.7(.50)	69.0 (.47)	+11.3

If a plant grows 2 inches every week, how many inches tall will it be after 4 weeks? (Answer: 8)	69.0 (.47)	80.3 (.41)	+11.3
What are the names of the different plant parts? (Answer: Seeds)	39.4 (.49)	49.3 (.50)	+9.9
What are the names of the different plant parts? (Answer: Stem)	36.6 (.49)	45.1 (.50)	+8.5
Where does photosynthesis happen? (Answer: Leaf)	35.2 (.49)	42.3 (.50)	+7.1
What are the names of the different plant parts? (Answer: Leaf/Leaves)	42.3 (.50)	46.5 (.50)	+4.2
What are the names of the different plant parts? (Answer: Root)	43.7 (.50)	46.5 (.50)	+2.8
What does the “K” in NPK stand for? (Answer: Potassium)	5.6 (.23)	7.0 (.21)	+1.4
If I have 12 feet of soil to transplant collards, and the plants have to be 18 inches apart to get maximum growth, how many can I plant? (Answer: 8)	45.1 (.50)	42.3 (.50)	-2.8

Note: * = $p \leq .05$; ** = $p \leq .01$

Participants also had a statistically significant increase in understanding that plants make oxygen. Before the program only 63.4% ($n = 71$) of participants answered this question correctly, and after the program 80.3% ($n = 71$) answered it correctly. These results were statistically significant at the 95% level.

An increased number of participants were able to answer a basic math question (If I put 9 seeds in the ground and only 1 plant grows for every 3 seeds, how many plants will grow?) after the program concluded. Fourteen percent ($n = 71$) more of the participants answered this question correctly after the gardening project than before, a statistically significant change.

If the survey had been a graded test, the students would have scored an average of 44.5% prior to the program and an average score of 62.8% upon the conclusion of the program. Since some of the gardening projects included an entrepreneurship portion, a single open-ended question asked the participants to identify who they could sell their vegetables to if they were selling them. The responses included:

- Family (12)
- Random/anyone (11)
- Farmer/market (10)
- Friend (9)
- Store (7)
- Neighbor (6)
- Donate or give to the needy (3)
- Teacher/school (2)

Change in Behavior Based on Demographic Characteristics

Cross tabulations were run to determine whether participant changes were dependent upon key demographic factors and/or school they attended. Table 15 exhibits changes in participant index scores based on age category (7 years and under; 8-9 years; 10-11 years; and 12 years and above). Out of the seven themes, the five themes with the highest positive change occurred within the 8-9 year old group. Negative changes occurred primarily within those outside the target age range - those who were younger (7 and under) or older (12 and above) than the targeted age range. This finding suggests the program is properly targeted at the correct age group.

Table 24: Changes in Index Value Based on Age

	7 and under (n = 4)	8-9 (n = 17)	10-11 (n = 42)	12 and above (n = 8)
Eco-Behavior	+ .44 (1.70)	- .12 (.60)	+ .03 (.76)	- .11 (.67)
Environment/ Conservation	+ .25 (.14)	+ .27 (.58)	+ .09 (.47)	+ .04 (.54)
Working with Others	- .10 (1.48)	+ .16 (.94)	+ .34 (1.00)	+ .60 (.64)
Life Skills	+ .10 (1.00)	+ .38 (.81)	0 (.47)	- .03 (.50)
Attitude Towards Health	- .17 (.43)	+ .18 (1.08)	+ .10 (.63)	0 (.50)
Preference Towards Healthy Food	- .55 (.81)	+ .36 (.83)	+ .07 (.60)	- .20 (.60)
Knowledge	- .13 (1.22)	+ .21 (.85)	- .14 (.51)	+ .03 (.53)

Changes in index scores over time were also examined by gender to determine if the program is more effective with one gender than the other (Table 16). Females had a higher change in index scores than boys in five of the seven themes (eco-behavior, environment/conservation, attitude towards health, preference towards healthy food, and knowledge). Males scored higher in working with others and in life skills. The greatest differences between males and females were found within the eco-behavior index (females scored .29 points higher than males) and the knowledge gain index (females scored .25 points higher than males). Males scored .15 points higher than females on the life skills index and .06 points higher on the working with others index. It is interesting to note the males exhibited higher changes within the themes indicated social changes than the females. This finding may suggest males seem to benefit from a hands-on approach to working with others and developing life skills through the gardening project, while females learn more of the information related to math, science, and health.

Table 25: Changes in Index Value Based on Gender

	Male (<i>n</i> = 45)	Female (<i>n</i> = 26)	Difference (Male-Female)
Eco-Behavior	-10 (.81)	+19 (.65)	-.29
Knowledge	-.13 (.67)	+12 (.61)	-.25
Preference Towards Healthy Food	0 (.70)	+21 (.66)	-.21
Life Skills	+15 (.70)	0 (.43)	+15
Working with Others	+32 (1.06)	+26 (.82)	+06
Attitude Towards Health	+07 (.67)	+12 (.86)	-.05
Environment/Conservation	+13 (.50)	+14 (.49)	-.01

Changes in index values were compared across the four different garden locations showing the programming at the different locations each had strengths and weaknesses (Table 17). Bond Elementary had some of the most consistently high changes in index scores in eco-actions, attitude towards health, and preference towards healthy food, but the lowest index change in life skills and knowledge. Port St. Joe had three of the lowest index scores, all three of which indicated negative change. These included environment and conservation, attitude towards health, and preference towards healthy food. However, Port St. Joe also had the highest positive change in working with others and in knowledge gain. Life skills increased the most amongst those in the Miccosukee Boys and Girls Club yet working with others at Miccosukee decreased. Greensboro had consistent, mild positive change in all areas except in eco-behavior.

Table 26: Change in Index Value Based on Location

	Miccosukee Boys and Girls Club (<i>n</i> = 8)	Bond Elementary (<i>n</i> = 36)	Greensboro Elementary (<i>n</i> = 22)	Port St. Joe (<i>n</i> = 5)
Eco-Behavior	+06 (1.24)	+13 (.67)	-.22 (.74)	0 (.86)
Environment/Conservation	+05 (.60)	+08(.38)	+31 (.57)	-.11 (.58)
Working with Others	-.15 (1.17)	+44 (.99)	+16 (.93)	+60 (.47)
Life Skills	+45 (1.11)	+02 (.37)	+10 (.69)	+04 (.57)
Attitude Towards Health	-.13 (.50)	+22 (.48)	+02 (1.10)	-.20 (.56)
Preference Towards	-.35 (.95)	+19 (.48)	+13 (.83)	-.36 (.65)

Healthy Food				
Knowledge	-.04 (.90)	-.10 (.50)	+.04 (.80)	+.08 (.68)

In general, the group at Miccosukee is doing well in fostering life skills, but is low in most everything else, particularly in fostering preference towards healthy food. Bond Elementary is doing a good job fostering eco-behavior changes, attitude towards health, preferences for healthy food, and working with others. However, those teaching at Bond may not be emphasizing increasing knowledge amongst their students. Greensboro is doing moderately well on all categories and is increasing their students' feelings about the environment and conservation. However, engagement in eco-behaviors may not be emphasized in this school. Finally, Port St. Joe is showing high increases in working with others and a slight increase in knowledge gain, but negative changes in healthy attitudes and preference and concern for the environment and conservation. Port St. Joe did not report that they discussed healthy attitudes and preference or issues related to the environment and conservation and this may be part of the reason the participants did not increase in these areas. All of the locations had low index changes in knowledge gain.

Comparison of Experimental and Control Groups

A control group was used to ensure any notable changes were due to the program and not confounding factors such as typical classroom education throughout the year. The control group consisted of a classroom of students who were of comparable age, grade, and demographics to the students engaged in the gardening project. The control group did not participate in the gardening project. Differences in pre to posttest scores were compared between the gardening group and the control. An analysis of this type is especially useful in determining whether the changes in behaviors and attitudes occurred amongst students in general, perhaps due to standard classroom learning, or if the control and experimental groups were different. Differences suggest the gardening project had an effect on changing the behaviors and attitudes of the students engaged in the program.

An Analysis of Covariance was conducted using SPSS to assess whether the difference in scores between the pre-test and post-test surveys on each of the seven themes were related to whether or not the student was in the control group or in the experimental group. The ANCOVA test allows for one to control for things likely to be highly correlated to the dependent variable. A p -value of less than .05 represents a significant difference exists between the control group and the experimental group on a given construct.

The results from the test indicated working with others, life skills, and preference towards healthy food were all significant at the 95% confidence level. The other four themes: eco- actions, environmental conservation, attitude towards health, and knowledge gain, were not statistically significant. The results from the ANCOVA test can be seen in Table 18.

Table 27: ANCOVA results comparing index change between experimental and control groups

Theme	ΔM Control	ΔM Experimental	F	p
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	(n = 13)	(n = 71)		
Working with Others	-.51 (1.00)	.30 (.97)	5.92	.02*
Preference Towards Healthy Food	.43 (.87)	.07 (.69)	5.47	.02*
Life Skills	.31 (.88)	.09 (.61)	4.14	.05*
Eco-Behavior	-.28 (.81)	.00 (.78)	1.96	.17
Environment/Conservation	-.01 (.73)	.13 (.49)	1.60	.20
Attitude Towards Health	-.26 (1.10)	.09 (.73)	1.70	.20
Knowledge Gain	-.13 (.82)	-.04 (.66)	.11	.74

Note: * = $p \leq .05$

Of the three themes that are statistically significant in their difference, two had higher score gains within the control group, indicating that it was the control group rather than the experimental group with a significant positive change in index scores. Only Working with Others was significantly higher for the experimental group. Overall, the results indicated the children involved in the gardening project are learning to work with others in a more positive way than those not involved in the project, but this is the only significant change occurring.

Staff Members' Assessment of Garden Project

Twelve staff members actively engaged in the Red Clay Garden project provided feedback on their experiences related to the garden project. Fifteen open-ended questions were asked through an online survey and the responses were coded for dominant themes.

Adult involvement

- While some parents attended garden parties, overall, the staff would like to see more parental participation in the gardening program.
- Mr. Miller acted in a helpful, patient way and answered questions from the students.
- At times, students worked one on one with specific adults.
- If adults are not focused on managing the students, they can become unruly and not listen to instructions.
- Most staff reported that the students interacted with the Community Resource Development team and other adults in a respectful and positive way.
- Students went to the adults with questions about garden topics such as:
 - Timing and growth of vegetables
 - Fertilizer use
 - Purchasing seeds
 - The effect of weeds on the garden

- Water requirements of different plants
- Students used the adults' expertise to ask for clarification on how they carried out the activities in the garden and followed the examples of the adults.

Hands on Experience

- The children very much enjoyed the hands on learning approach as did their teachers.
- The staff felt the students will be able to take the learning experiences they had in the garden and apply them to their lives in the future, such as in the business world or in starting their own gardens.
- Working hands on provided an opportunity for students to share their experiences with one another.
- The students learned about composting by helping create the compost and applying it as fertilizer.
- Working hands on gave the children the opportunity to learn how to manage a garden. Specifically the children did the following garden management activities:
 - Choosing the location of the garden
 - Planning the size of the garden by drawing a plan
 - Selecting the vegetables
 - Removing rocks and debris from the garden in preparation for planting
 - Organizing the spacing between plants
 - Planting
 - Initiating the repair of a fence to keep out wildlife
 - Watering
 - Weeding
 - Removing bugs
 - Using gardening tools
 - Harvesting
 - Selling the crop
 - Taking vegetables home

Knowledge Gain

- Students showed a high level of excitement about learning new things about plants and the environment including:
 - how to identify different plants and vegetables.
 - how to sell what they grew.
 - healthy eating.
 - the importance of composting
- Some participants have applied their knowledge already by beginning gardens of their own at home.
- The students have discussed many topics amongst one another such as:
 - The best climate for growing different types of vegetables
 - Different types of insects
 - How quickly the plants were growing (or not)
 - How to carry out different activities in the garden

- The visibility of the garden project amongst the students spread awareness in their communities about different opportunities for local food production and sales.
- Some students expressed an interest in agricultural studies and asked about FAMU programs in this field.
- Students and community members were exposed to the ease in which vegetables can be produced for home consumption.

Community Involvement

- Several staff did not feel that the community was very engaged in this project.
- Students shared what they learned about gardening with members of their communities and their parents.
- The community was involved in receiving some of the vegetables, since students either brought vegetables home to their parents or sold vegetables to members of the community.
- Some community members made inquiries about gardening at the schools where the gardening was taking place.
- Some students encouraged their families to start gardens at home, increasing community awareness about producing vegetable at home.
- The visibility of the gardens and the market days for buying the students' vegetables increased community awareness about gardening for food production.
- There was a lack of promoting gardening, healthy eating, or environmental issues beyond the extent of the gardening projects at schools; some staff felt it could be promoted more widely to benefit the community more broadly.

Students' Pride and Responsibility

- Many staff reported the students took initiative in a variety of activities, such as letting the front office know when a fence needed repairing, watering the garden, weeding, checking for insects, and asking questions when they were curious about different topics.
- Students were proud of themselves for the harvest they produced and especially that they could bring the vegetables home to their families or sell them for money.
- Students helped one another to follow directions, catch up on assignments if a student was absent, and corrected each other to ensure activities were conducted appropriately.
- Students had a strong sense of ownership of their gardens and demonstrated it in the following activities:
 - Referring to the garden as "their" garden.
 - Guarding their garden from harm from other students.
 - Asking whether their garden was better than other gardens.
 - Expressing concern for anything that went wrong with their garden.
- Students shared notes that they took in their journals and shared vegetables they harvested if a student was absent during these activities

Organizational Issues

- When the program is followed, the staff believe it is successful and effective.

- However, without clear directions given to participants about how to engage in specific activities, confusion occurs. Clarity and direction on what activities to do while in the garden should be given before engaging in the project.
- There is too little money and resources to carry out the project effectively.
- One garden had a difficult time growing at all.
- Some staff believed the program had no interest in promoting self-esteem and nutrition amongst the children. Being clear about the goals of the project is important.
- Most sites carried out an organized system to determine how garden activities were managed. Examples of organizational systems include: keeping a weekly chart, assigning rows to individual students, and rotating who participates in certain activities (such as planting, harvesting, etc).
- It can be difficult to commit time to the garden project while preparing the students for standardized testing, (i.e. FCAT).

Nutrition

- Children's interest and excitement to eat green vegetables increased after they grew them on their own.
- Staff believed the program taught children about good nutrition and that the students influenced their families, particularly by bringing vegetables home.
- Some staff thought the community became more aware of the benefits of good nutrition as a result of watching the children plant vegetable gardens.
- At one site, an extension coordinator spoke to the children about nutrition specifically.
- At another site, the vegetables harvested from the garden were prepared at the school for both the students and their parents to enjoy.
- The project has shown students and their parents how to eat healthy in an inexpensive manner.
- While some staff thought that the program promoted good nutrition, one staff member thought that children's nutritional patterns remain unchanged.
- One staff member thought it could be beneficial to contact city and county administrators to spread word of this program as a way to promote healthy eating on a wider scale.

Entrepreneurship

- Students participated in market days where they sold the produce grown in the garden to local community members. These market days were very successful and enjoyable for all.
- One staff member believed that selling produce prepared the students for the business world in the future.
- Knowing that they can sell the produce for money encouraged the students to work hard while in the garden.
- The garden project showed community members that it is possible to grow vegetables and sell them for money.
- Staff members discussed different avenues for selling produce with the students.

- One staff member thought that spreading this program and its message throughout the city or county could encourage entrepreneurship amongst adult residents as well.
- One staff member suggested setting up a small farmers market for the children to foster selling the vegetables.

Expansion

- Staff would like to see the program expanded and/or resources increased to allow more students to be involved.
- Students themselves expressed a wish that a summer program like this was available for them when they are on summer break from school.
- The presence of vegetable gardens has expanded in communities as some students have begun their own gardens at home.
- Other schools not currently engaged in the gardening program have expressed interest in beginning their own programs.
- One staff member suggested promoting vegetable gardens throughout the region, not just for students, but for households.

Focus Group with Student Participants

A focus group with sixteen 4th graders was conducted on May 24, 2012. The goal of the focus group was to engage the children in discussions about their gardening project to capture rich, in-depth data surrounding their experience. A moderator guided the participants through a series of questions specifically addressing the programmatic goals as well as questions that highlighted the children's own perceptions of working in the garden and their overall experience with the program. Themes were identified based on the program's goals.

Student Knowledge Acquisition

From the conversations amongst the students, the following themes regarding knowledge acquisition emerged: (1) *knowledge about the benefits of gardening*, (2) *knowledge about different plant forms, characteristics, and processes*, and (3) *knowledge about selling vegetables*.

Knowledge about the benefits of gardening

Students were asked whether they knew of any benefits to growing their own vegetables as opposed to purchasing them in a store. Students believed growing their own food saves them money and that it has health benefits, such as not having processed materials. It also provides a way to exercise. They are aware that eating vegetables provides benefits to them nutritionally, and they mentioned different ways of eating vegetables. The following exchange shows some of what the students' beliefs related to the overall benefits of gardening.

- Moderator: So what do you guys think, do you think there are benefits to growing your own vegetables rather than buying them in a store?
- I believe that it saves money.
- Yea, it like helps you because you get to save money and the food doesn't have all that processed

material that you like get from stores.

- Um one thing, um it saves you money, two things, you get exercise and you outside, and another thing, it's free!

The students are also aware that eating green vegetables is good for their health. When asked about whether the students thought it was important to eat green vegetables, they gave the following response exchange:

- Moderator: What about eating vegetables? Do you think that it's important to eat green vegetables?
- Yes!
- Yes. Because they helps your body. Like gives your body, like, energy like good energy, not like candy but like healthy energy.
- [Laughter]
- Candy gives you a whole bunch of energy, it's just not healthy.
- Cuz some plants can help you live like longer or they can like help your health, like carrots can help you see.
- They can give you energy.

Some students have learned new ways to prepare and consume the vegetables they brought home to their families from the garden.

- I know how to eat my vegetables. My mom makes fondue and we just eat our vegetables like that.
- What's fondue?
- It's like melted cheese with a whole buncha other stuff inside. Like The Melting Pot.
- It's Italian!
- I just eat my vegetables raw because it's better. When you cook them they have a different taste to them like carrots, when you cook them they taste sweeter.
- Yea
- Or a easy way to eat broccoli, is with cheese!

Knowledge of different plant forms, characteristics and processes

The students also discussed how to differentiate between plants and the process of planting vegetables. Many of the students mentioned they learned that some plants are poisonous; particularly mushrooms, and that care must be taken when coming in contact with them. Also, the students mentioned that they learned that plants grow at different rates and in different directions (upwards or downwards). However, there was some confusion about what plants release, when one student mentioned that plants release nitrogen and no other student corrected her. The following conversation demonstrates students' knowledge of the process of planting an onion bulb correctly.

- Moderator: What did you learn?

- I learned how, that I learned how, to plant like I used to plant uh, call it a onion, on the wrong side. I couldn't identify it so I learned how to plant it on the right side
 - Moderator: You learned to plant things on the right side.
 - [Laughter]
 - Moderator: What do you mean by that?
 - Cuz they look just like the same side, it's like a onion seed, the same side, and you plant it on the side with the little root which you can hardly see.
 - He means the seed, the root is already coming out of the seed and you got to plant it like that.
 - Moderator: Like plant it with the root down?
 - Plant it with the root facing upward it will grow downward or it just won't grow at all
- In another exchange a student described learning about how some plants grow in different directions:

- I learned that most plants, like I learned that most plants like, I learned that most plants take longer to grow than other plants. Because some of them have a slower process. And I also learned that some plants grow upside down and some plants grow actual like they supposed to grow they don't grow confusing.

Selling vegetables

The students reported they did not engage in selling their vegetables. However, they did have many ideas on how to make a profit selling their vegetables. They mentioned that one could sell vegetables in a stand, have sales to attract customers, sell seeds, and watch or care for other people's gardens in order to make a profit. The following is an exchange detailing students' ideas on how to conduct sales to attract customers. There may have been some confusion over what constitutes a profit versus having many customers.

- Moderator: Does anyone else know any other ways to make a profit when you have vegetables?
- Um...they buy one get to have one off.
- Buy one get one free.
- Moderator: Having sales.
- Get one half off.
- Moderator: Do you know how to make a profit?
- Like try to grow them you best, and then sell them at the price that maybe your customers think of like ok you say, we selling for \$8. They say hmm I really don't think that these good bout \$8 they might be about \$6 or \$7. You might make a profit and more people might come, if you let your customers like, do good pricing and stuff.

Development of Life Skills

During the focus group, students were asked questions pertaining to their development of life skills. From this discussion, the following themes emerged, *pride*, *solving problems*, and *working with adults*.

Pride

Students felt a sense of accomplishment and pride in growing their own vegetables. Below is an

exchange between students about how they felt proud they were able to grow their own vegetables.

- “Because you have your own experience to grow your own foods to see how other farmers do it and you don’t have to like get food from them, you can grow your own food and know what you doing. You can learn.”
- “Yea, you feel more proud when you do it yourself. You feel happier.”

Another student when asked to tell any story she wanted about her gardening experience, said the following:

- Well I want to say one thing. Like that like I really enjoyed watering them because I learned new things about different plants, and how like, what type of soil that would be good to like, what you, I just learned a lot about what you should know about planting before you plant and that that we actually had a successful planting thing. I’ve been trying to plant for years and it never works. It was a good experience.

Solving problems

Students also reported examples of solving dilemmas (e.g., how to successfully water a garden bed with the presence of wasps, and how to retrieve a key that had fallen into the irrigation bucket without getting wet), in order to complete their assigned gardening tasks. However, their teachers considered this horse-play.

- Moderator: Do you have a story or anything you’d like to share?
- We had one plant it was like a sort a key to turn the faucet on-
- Oh no!
- And you fill it up! But when we moved it, the water skeed everywhere and then we was really really wet and then we was cold and frozen. The key dropped when the water was running, the key dropped in the bucket, and the water was spraying really heavy! We had to put our hand in the bucket to try to get the key. So we came back to class and Ms. Campbell asked us why were we really wet?
- She was like what happened!
- We was like dang did y’all go to the pool or water plants?

Working with Adults

The children reported mixed results about whether they enjoyed working with adults. Overall, they feel the same level of comfort when speaking to adults as they did before the gardening project began. Some students reported feeling intimidated to speak to the adults in their lives, while others held a different view and thought adults can help you solve problems.

- Moderator: What about you in the back here? Did you like working with the adults?

- I loved it because they really helped us learning how to plant and how to teach us which plants are which. Lots of things.
- Moderator: What about you? Did you like working with the adults or not as much?
- Yes, because some stuff I didn't know they could teach me, and I could ask them about it.

Many students reported they are more comfortable speaking with other children rather than adults about different topics, because other children are likely to understand their point of view. However, not everyone shared this view. One respondent said:

- I don't think that you should talk to each other, I think you should talk to adults, because well, it's actually better because if you tell them instead of keeping it on the inside whatever you don't like you can tell them and maybe they can change it, or you can actually have a solution to your problem instead of keeping it inside. Because if you keep it inside it can just make it worse but if you tell them it will probably you know change.

Overall, the children felt unchanged when it came to their comfort speaking to adults:

- Moderator: Do you think now that you've done this gardening project, do you think that you're more comfortable talking with adults or do you think you're the same?
- The same!
- I was already comfortable.
- Moderator: You were already comfortable?
- Yea, it wasn't hard.

Academic and Cognitive Skills

Another goal of the gardening project was to increase the students' academic and cognitive skills relating to gardening, math, and science. From the focus group, two themes emerged around *note taking* and *reasoning skills*.

Note Taking

The students were asked to describe their experiences when it came to taking notes about what they did in the garden. Students recalled using notebooks to list the crops that they grew, document their gardening activities, and write about their findings. Some did not like taking notes, and thought that the hands on nature of the activities in the garden made it pointless to take notes.

- Moderator: Um, what did you guys think of keeping notes in a notebook like that?
- I think it was inefficient
- Nooo!
- Moderator: Why did you think it was inefficient?
- Because you have growing process. Why would you write down notes? You have growing process right in front of you.
- You want to know about the process.

- [Mumbling, talking over each other]
- You have growing process right there in front of you why do you want to write notes? If you write down notes-

Other students saw the benefit of note taking as a way to provide records of information and procedures that could be followed at a later date.

- Well, when you like look, when you if you write down notes you can know that you, um whatever you did, like if you took notes you can always look back. Like if you took the notes on what to do like how to actually start growing any type of plant you can always look back to how to grow that plant you always know the same process to grow the other ones and you don't have to think about what you doing. You can just use your notes.

Still others thought it can help with recalling the specific activities carried out in the garden and may aid in classroom work. However, this student confused the concepts of observation with data interpretation.

- [Note taking] might be important because you might not know if your observation is wrong or right. Because if you like write some like like you do like an experiment on the plant and then the next day you might come out wrong because that's what our teacher did with us um, my science teacher, because she had like yea like some water and like some roots and some plants and um thang, and then like the next day she told us to write a observation on it and then like I think some of us like some of our observation came out wrong.

Reasoning Skills

Another theme that emerged from the students' conversations was the children's reasoning when faced with a question posed by fellow students that they could not easily answer. They drew upon information that they knew to try to come up with a satisfactory answer to these questions. These conversations demonstrated the children's ability to draw information about different situations and apply them to the question at hand, even when the conclusions were incorrect. One situation detailed a discussion about why broccoli appears similar to trees:

- Why does broccoli look like trees?
- Yea why does it look like a tree?
- Maybe they genetically engineered
- Moderator: Why do you think they look like trees? Did you guys learn about that?
- Because they have like a stalk and then you go up and then it's like leaves, look like branches go out and then green stuff sprouts.
- (shhh!)
- Moderator: Did you guys learn why it looks like that way?
- No!

- Maybe it's just genetically engineered to look like that!
- It's not genetically engineered!
- Why would it be engineered?
- This is plants, not science.
- Plants are science!
- But not genetical science.
- You can genetically engineer orange juice and not get oranges, just the flower.
- How do you think they get seedless watermelons?
- I always wondered...

Another conversation emerged around the question as to why some plants grow upwards and some grow downwards. While the students were unable to decisively choose an answer, they reasoned out a few different options:

- Moderator: Why [do] some plant grow [up] and some plants grow down?
- Cuz some plants need less oxygen than others and some plants need a little sunlight.
- And other plants like need a lot of sunlight.
- Some plants grow down because they might need something that's in the soil rather than something that's in the air.
- Oh! Uh, sometimes there's like deep minerals that plants really need in the soil so they have to grow down instead of up.
- Or they grow down to protect itself, like like, if a squirrel or a rabbit comes for a carrot they can't dig for it.

Social and Moral Development

Regarding the programmatic goal of growing in social and moral development, the theme of *sharing* emerged from the students' discussions about the gardening project.

Sharing

When the students were asked about benefits to growing a vegetable garden, they mentioned the ability to share their vegetables with other people, including donating vegetables to charity, were benefits of keeping a vegetable garden. They also mentioned sharing vegetables with their teacher partly due to their affection for her.

- Moderator: Are there any other reasons besides saving money, or helping learn how to grow things on your own or eat your own food? Do you have any others?
- It gives you and your child, or whoever you have with you experience so they can do it.
- And you can share!
- You can share the vegetables with somebody.
- Moderator: Oh. You can share with other people?
- You can donate it.

During the focus group session, some students had a hard time focusing and there were frequent interruptions of one another. On the other hand, some of this interruption was due to adding details to another's story, or expressing emotion or excitement at the story being told. The students appear to enjoy one another and to work closely with one another in the garden.

Environmental and Conservation Awareness

One theme emerged regarding awareness of the environment and conservation. This theme was *interest in living creatures found in the garden*.

Interest in living creatures in the garden

The students demonstrated a strong interest and excitement about the different types of insects and other creatures that they saw in the garden. These included worms, crickets, spiders, frogs, millipedes, and wasps. The children reported being surprised to see these, and often their descriptions elicited excited squeals, laughs, and conversation amongst the other students. While some of the students seemed to think these creatures were “gross,” it appears that the students were exposed to insects and frogs and thought that this was an interesting and sometimes funny part of their gardening experience. The following dialogue displays one student describing seeing a spider in the garden:

- Moderator: Did anything [in the garden] surprise you?
- While I was picking I saw different bugs and stuff, I saw worms and crickets, and I saw my worst enemy, which is a spider!
- Dun dun dunn!!!
- [Laughter]

Another student described seeing a frog while gardening, which elicited giggles and excited reactions from the other students:

- Moderator: What did you learn, did anything surprise you?
- Yea, when we was pulling out the weeds we saw a huge frog in the little bed thingy!
- [Laughter]
- You saw a frog?
- Yea!
- It was a big ol frog?
- Yes!
- Ooooh!
- It was like this big!

Implications and Recommendations

Overall, the Red Clay Garden Program run by Florida A&M University is operating in an appropriate manner. Staff members have been able to access and actively engage teachers and students in on-site gardening, and are reaching the targeted amount of students within an appropriate age range. While there are some participants outside the target range at community locations, it is difficult to tell students they are not allowed to participate. Therefore, while those outside the target range are not reacting to the program at the same level, their participation is tolerable. When interpreting the evaluation results, this should be taken in to consideration.

In addition, the administrators of the Red Clay Garden Program have used their current success to secure additional funding for gardening programs similar to this one. They are currently managing school-based gardens at four additional schools not mentioned within this report. The importance of the program to the schools and communities is apparent in their willingness to engage and indicates the program has the potential to continue beyond the end of the current funding cycle.

The evaluation plan and results outlined above were conducted in a formative fashion with the expectation that gaps in outcomes be identified so the staff can target their future efforts on areas needing improvement. The following implications and recommendations are, therefore, divided by objective and intended to provide solutions to the identified weaknesses within the program.

Knowledge Acquisition

Evidence is lacking that the participants gained the knowledge this program intended. While the staff reported they believed the participants had learned about a variety of concepts, survey results show overall knowledge related to gardening (such as the importance of measuring the planting distance between plants and keeping a gardening journal) remained unchanged after the gardening project. The participants also scored poorly on the individual knowledge items, only improving their responses to very basic knowledge questions, such as knowing what H₂O stands for and knowing that plants produce oxygen. The participants had better scores on basic arithmetic questions than questions involving more complicated steps, such as converting units. Only half of the students could consistently describe the anatomy of a plant correctly, despite working directly with plants in the garden. The focus group results showed that while the participants learned some things about plant form and processes, basic information such as identifying the root of an onion, understanding the concept of making a profit, and knowing that plants produce oxygen were not understood.

To improve knowledge gain the staff of the program could focus more explicitly on explaining plant physiology and the growing process. Teachers and the site coordinators should think of creative ways to involve the participants in learning how to identify different areas of anatomy in plants and why each area is important along with the function it serves. Quizzes, drawings, or other activities could be incorporated into what the participants are currently doing in the garden to enhance this area of learning. Participants did report interest in learning about these processes and being excited to see plants grow, so it is likely they will enjoy an extra focus on knowledge acquisition to satiate their growing curiosity about how plants grow.

In addition, since entrepreneurship and marketing is a goal of the program, time could be spent focusing on what it means to make a profit by conducting a real or mock market day for students when they can apply the concepts they are learning in a hands-on way. Staff participating in market days reported these were a successful and fun activity for all who were involved. Spreading market days to all sites could help improve knowledge about businesses and profits for those participants.

Life Skills

An increase in life skills is another area in which there is little evidence showing change or improvement related to the program. The index score for life skills did not improve after participation. However, participants believed they exhibited high levels of life skills, indicated by their high self-scoring on items such as “I am responsible” and “I am a good listener,” prior to the program which did not allow for much growth. While the index scores are unchanged, staff reported the participants had a high sense of ownership and responsibility in the gardening project. Also, both participants in the focus group and staff reported the students had a strong sense of pride and accomplishment when they were able to grow their own vegetables.



Figure 4: Participants from Miccosukee proudly display their harvest

One of the sub goals of gaining life skills was the acquisition of academic and cognitive skills. The focus group showed the students were able to apply reasoning skills to situations in the garden. The focus group participants described the process of keeping a gardening journal even though the majority of the participants

reported in the survey they did not keep a journal (78%), use a computer for the gardening project (96%) or give a presentation (86%) about their garden, all important parts of accomplishing life skills. Yet, students did enjoy participating in these activities. Gardening staff could work towards improving this goal by placing an emphasis on the importance of keeping a journal, using computers, and giving a presentation about their experience in the garden. This can be done when they are at the site or through direct advice to the cooperating teacher.

Working with adults was another component of gaining life skills, and when asked whether they worked with adults in the garden, the participants reported they “usually” worked with adults in the garden. However, when asked whether their parents ever came with them to work in the garden, 85% said their parents did not work with them. Participants in the focus group had mixed feelings about working with adults in the garden. Some thought the presence of adults was an asset and helped them to get their questions answered, while others were apathetic towards having adults in the garden. Staff mentioned desiring to have more parental involvement, and students that did experience parental involvement enjoyed their participation. Perhaps garden staff could organize a few “garden days” with parents, in a way that one staff member has done (see Appendix E) by sending a flier to parents about a work-day in the garden.

Social and Moral Development

There is evidence the social and moral development goal is being met. Working with others was the only statistically significant construct that was higher amongst the experimental group than the control group, and had statistically significant change as a result of the program. Therefore, there is good reason to believe the gardening project is encouraging social and moral development amongst participants. Staff reported the participants helped one another to complete tasks in the garden and they showed respect to the adults that come to help them. The participants in the focus group described sharing vegetables with others, including their family and teacher, as an enjoyable part of the program. When asked in the post-test what one could do with their vegetables, many reported they could share the vegetables with family, friends and neighbors.

However, another part of the social and moral development goals included the adoption of actions and behavior that benefit life long health. The preference towards health and preference towards healthy food indices did not increase as a result of the program, and were not higher amongst the experimental group. Therefore, the staff of the garden project may want spend more time emphasizing the importance of healthy behaviors and nutrition. One staff member suggested having a time in which the children and their parents actually learn how to prepare the vegetables that the participants bring home, and perhaps this could be a way to learn how to prepare vegetables in a healthy way. Participants in the focus group only reported eating vegetables with cheese, fried, or raw, but many other ways of incorporating vegetables into regular dishes or as side dishes are possible.

Environmental and Conservation Awareness and Development

There is some evidence the environmental and conservation awareness and development goal is being met. While the eco-actions index remained unchanged, participants reported a statistically significant difference in participating in recycling cans or bottles while at school. Also, there was an increase in the index scores of

interest in environment and conservation issues as a result of the program. Particularly, participants are concerned about the impacts of their own actions on the environment, and are especially worried about animals going extinct. This worry parallels what the participants in the focus group described as a high interest in the living creatures they encountered in the garden. While the garden staff cannot control the actions the students take on their own or while at home, they could focus on encouraging this behavior. Also, since participants reported they learned how to compost, perhaps the program could expand to include a consistent recycling program for the students to participate in and expand their composting efforts.

Finally, perhaps more activities could take place that allow the participants to learn more about insects and animals, of which they seem particularly curious and interested. By making the connection between protecting the environment and sustaining life amongst these animals, perhaps they may further gain an appreciation for environmental care and conservation and this may encourage them to participate in eco-actions in their own lives outside of the classroom.

Gender

One of the interesting findings of this evaluation was boys responded better than girls in improving their life skills and ability to work with others.. These results point to the possibility the garden project may have particular benefits for boys, to improve their social skills and learn through a hands-on approach. This may be particularly helpful to boys who often consider classroom work to be “uncool” and may change their behaviors working with others while differentiating themselves from girls. While girls are often socialized in a way that encourages their communication and social skills, boys are often socialized differently. This improvement in boys’ social skills may be a unique benefit of this program, as it is often boys who struggle with more behavioral issues at school.

Recommendations for Individual Sites

Miccosukee Boys and Girls Club

In general, Miccosukee is doing well in fostering life skills, but is low in most everything else, particularly preferences towards healthy food and attitude towards health. One suggestion for increasing attitudes towards health is to incorporate eating the vegetables while the students are attending the Boys and Girls Club. Perhaps the site can take a day or two after harvest to prepare some of the food into a snack for the children, or have an end of the year garden produce party, similar to how many classrooms have end of the school year parties with food, music, and games. Also, discussing the benefits of nutrition more



Figure 5: Miccosukee participants learning to plant

explicitly might help increase the children’s preference for healthy foods and attitude towards health. Their records do not show that the site coordinators focused on many of the educational topics the other sites incorporated. Clearly, since Miccosukee is not a classroom, incorporating structured educational topics is not as easy. However if the site coordinators chose to focus on some of these topics, perhaps through games, drawings, or other “fun” ways, the participants may show increased knowledge over time.

Bond Elementary

Bond Elementary had some of the most consistently high changes in index scores in eco-behavior, attitude towards health, and preference towards healthy food. However, Bond Elementary had the lowest index changes in life skills and knowledge gain. Bond Elementary seems to have covered a wide variety of educational topics, so perhaps a way to increase the low knowledge index score would be to reinforce the topics that are already being discussed. Bond had low index score changes in life skills as well, yet they covered topics such as communication, goal setting, and acting responsibly. Perhaps a hands-on approach to learning these skills could be emphasized, such as role playing or giving the children a scenario and asking how they would act responsibly in the situation. Also, the students could discuss what goals they would like to accomplish in their garden and visually chart their success from month to month on a poster or chart with prizes to increase motivation.

Greensboro Elementary School

Greensboro Elementary is doing moderately well on all categories and is increasing their students’ feelings about environment and conservation in particular. However, participation in eco-behavior actions may not be emphasized in this school. Staff at this site appears to be covering a wide range of educational topics. To increase the knowledge score, perhaps they could reinforce previously knowledge learned during each week by reviewing what the students have learned before going on to new topics. Eco-behavior is the one specific area in which Greensboro had a slight negative index change. Perhaps the site coordinators could incorporate recycling at the school or discuss with the students ways to recycle and compost at home.



Figure 6: Greensboro Elementary participants

Port St. Joe Elementary

Port St. Joe Elementary had three of the lowest index scores, all indicating a negative change. These included environment and conservation, attitude towards health, and preference towards healthy food. However, Port St. Joe is showing increases in working with others and a slight increase in knowledge attainment. Perhaps Port St. Joe could focus on discussing healthy attitudes and preferences. In particular, since the average age of participants at this site is older than at other sites, perhaps the students could learn how to cook the vegetables themselves. Also, to increase healthy attitudes, the students could make presentations to others about various aspects of nutrition they find particularly interesting. Finally, incorporating environmentally friendly actions, such as recycling, into the gardening project could positively influence the student's eco-behaviors. Also, Port St. Joe did not cover as many of the educational topics as Bond Elementary and Greensboro Elementary, and while this site meets the least frequently, incorporating resources for learning, such as recommending books, magazines, videos, or websites about gardening and science for the students to learn when they are not at the site could be helpful for increasing knowledge.

Wider Impacts

The staff reported they felt the community was more aware of nutrition, entrepreneurial activities based on gardening, and the benefits of keeping a garden for personal use. There have been reports, both from participants and from staff that some students have begun gardens of their own at home with their families. Children themselves expressed desire to be able to be involved in a program like this during the summer months when they are not in school. Teachers expressed desire to be able to have more classrooms involved in the gardening project, and there was no negative feedback about the program, except for one staff member who felt the program could have been better organized. The staff had high praise for the program, and even thought that expanding the program into the wider community would be well received by community members.

Appendix B- 2012-2013 Report

Executive Summary

Red Clay Garden-Based Education Project, Florida A&M University
October, 2013

Introduction

Florida A&M University's Red Clay Garden-based Education Project is a five year program that began in 2009 funded by the Children, Youth, and Families at-Risk (CYFAR) program. The purpose of the program is to increase positive behaviors and knowledge amongst children by providing a unique environment in community and school gardens through which children can develop positive attitudes and thoughts about themselves, the environment, and healthy behavior.

The purpose of this evaluation was to determine the progress the FAMU gardening project is making towards its goals and to target areas for potential improvement. The evaluation aims to assist the program staff in tailoring the program to have the strongest impact possible. A combination of quantitative and qualitative data was collected, including pre/post-test surveys and two focus groups with student participants.

Findings

- **Demographics**
 - The majority of students (93.5%; $n = 185$) fell in the target grade range of 4th and 5th grade students, and most ranged from 9-11 years old (93.9%; $n = 184$). Most of the students are African-America/Black (71%), which supports the program's goals of serving minority populations.
- **Knowledge acquisition**
 - The overall knowledge index was the only index with a statistically significant positive change from before to after the program's implementation. In particular, evaluation data suggested that students have acquired knowledge about (1) the importance of insects, (2) plant physiology, and (3) overall benefits of growing produce. Participants demonstrated little to no gains in specific math questions related to gardening activities.
- **Life Skills**
 - The pre and post-test survey data showed no significant gains in the life skills index or working with others index. Participants also reported mixed feelings about their comfort working with adults and willingness to share what they think and feel in the presence of adults.
- **Social and Moral Development**
 - Participants' overall attitude towards health remained largely unchanged, although they do recognize the importance of eating vegetables as a way to regulate energy, promote muscle growth, regulate weight, and maintain overall health.
- **Environmental and Conservation Awareness and Development**
 - There were no significant gains in eco-behavior or interest in the environment and conservation.

Recommendations

A key recommendation for the Red-Clay Garden-Based Education Project is to develop a robust, agreed upon evaluation data collection plan with both the evaluation team and gardening staff. The unforeseen passing of the program coordinator led to unanticipated challenges, including lack of coordination and data collection at all gardening sites and with the gardening staff, as well as record keeping of activities, which has limited the evaluation findings.

A programmatic suggestion for the program staff is to emphasize life skills beyond gardening knowledge if these are intended outcomes. This includes incorporating opportunities for children to engage with adults in meaningful conversations and activities where they have an opportunity to work collaboratively. Doing so would allow the children to establish trust with adult partners and encourage the development of adult/youth partnerships. In addition, children should be encouraged to work in teams as part of the program. Perhaps a team activity could be built into the program where students are working on a yearlong project with fellow classmates that result in a combined presentation so they get the experience of working with and relying on others. Lastly, participants could be encouraged to engage creatively in their learning process by expressing their feelings and learning outcomes through artistic means to further emphasize knowledge gains. Suggested activities include the following:

- Allow participants to take disposable cameras into the garden to capture their favorite experiences.
- Ask the participants to create small skits or plays where they act out different gardening scenarios.
- Keep class scrapbooks documenting the experience in the garden.
- Ask the participants to give presentations to others on how to start their own garden.
- Ask each participant to complete a profile of their favorite vegetable, including nutritional information, recipes using the vegetable, and how to best grow that vegetable.
- Engage the participants in a jeopardy style game about science and math related to the garden.
- Incorporate math and entrepreneurship knowledge into the lessons by asking participants to come up with a business plan for their garden.

Background

The Florida A&M University's Red Clay Garden-based Education Project began in 2009 as part of a Children, Youth, and Families at-Risk (CYFAR) Sustainable Community Project (SCP). The target audience is 4th and 5th grade students in schools in North Florida. This project is administered through the FAMU's Cooperative Extension Outreach Program which is housed in the FAMU College of Engineering, Sciences, Technology and Agriculture.

The program aims to increase positive behaviors amongst children by providing a unique environment through which the child can develop positive attitudes and thoughts about themselves, the environment, and healthy behavior. By choosing a natural setting (i.e. school & community after-school programs) the children are able to develop this in a comfortable environment and can spread these positive ideas throughout their community. These improved attitudes should encourage children to change their behavior when interacting with the environment, with others, and regarding their own health. These knowledge, skills, attitudes and behaviors should be transferrable to other areas in the children's' lives and help them to live a productive and positive life even after they are no longer engaged in the project.

This project used three schools and a community based site to implement a series of educational programs including an after-school garden-based education program. To assess the effectiveness of this program, survey data was collected from both the students who participated in the program. Also, two focus groups were conducted with the student participants to assess how the students perceived the program. The information gathered was to assess the program in which the project was advanced towards its short term and long term goals. The short term and long term goals are listed below.

Desired Short-Term Results

- **Knowledge acquisition** in 1) Garden Design and Planning Process, 2) Garden Preparation Process, 3) Garden Implementation Process, 4) Harvesting Process, 5) Consumption Process, and 6) Entrepreneurship/Marketing process
- **Development of life skills** in 1) Completing projects, 2) Belief in self, 3) Ownership and responsibility, 4) Working cooperatively with adults, peers and in groups, 5) Gaining academic and cognitive skills, 6) Understanding science and math as concepts inherent to nature and gardening
- **Growing in social and moral development** by the 1) Practice of patience, 2) Practice of compromise, 3) Adoption of beneficial attitudes, preferences and interests, and 4) Adoption of actions that benefit life long health
- **Environment and conservation awareness and development** in 1) Public Health, and 2) Agriculture Education and Entrepreneurship

Desired Long-Term Results

- Improved community awareness to the benefits of gardening, good nutrition, agriculture education and entrepreneurship
- Participants' interests, attitudes and behaviors change
- Eco-actions implemented
- Participants' learning and behaviors are reinforced
- Participants' implement sustainable environment activities that benefit the bio-region

- Improvement in participants' cooperative relationship with all categories of adults, peer and in working groups

Introduction

Florida A&M University's Red Clay Garden-based Education Project is a five year program that began in 2009 funded by the Children, Youth, and Families at-Risk (CYFAR) program. The purpose of the program is to increase positive behaviors and knowledge amongst children by providing a unique environment in community gardens through which children can develop positive attitudes and thoughts about themselves, the environment, and healthy behavior.



Figure 7: Participants at Greensboro Elementary School

The purpose of this evaluation was to determine the progress the FAMU gardening project is making towards its goals and to target areas for potential improvement. The evaluation aims to assist the program staff in tailoring the program to have the strongest impact possible. A combination of quantitative and qualitative data was collected, including pre/post-test surveys and two focus groups with student participants. Garden Curriculum

A garden teaching curriculum was developed for this project by Amelia Davis of FAMU and enhanced with materials from the Texas A&M Junior Master Gardener Handbook Level 1. It can be seen in Appendix A. Each garden site followed this curriculum with small changes made as needed.

The first lesson focused on building awareness about the importance of agriculture and how people rely on agricultural products for much of their everyday life. The second lesson exposed the children to what a garden is, how to build a raised garden bed, and what minerals plants need. This lesson also showed the children how to keep a gardening journal and emphasized the nutritional importance of eating fruits and vegetables. The third lesson dealt with composting and taught the students why composting is important, explained different ways of composting, and discussed how soil is made up of different layers. The fourth lesson focused on fertilizers and pesticides and their benefits for plants as well as describing the plant life cycle. The fifth lesson described the necessary elements that plants must have to grow, and exposed the students to different types of natural habitats. Lesson six dealt with global warming, lesson seven was about nutrition, and lesson eight wrapped up all the previous lessons. A general outline of activities based upon this curriculum can be seen in Appendix B.

Methods

To measure participant knowledge level, life skill attainment, cognitive skills, and attitudes/preference changes over time associated with the project, quantitative survey instruments were developed by the evaluator (see Appendix C). The instruments included a short series of questions for each of the program objectives, and were created with the young age of the participants in mind. Previous instruments developed to measure knowledge, attitudes, and behavior related to science and math specific gardening concepts were used to validate the instruments. The instruments were reviewed by a panel of experts and approved by the University of Florida Institutional Review Board.

While separate pre and post-test survey instruments were developed, the pre-test instrument was administered to the participants in place of the post-test unintentionally, therefore some of the specialized post-test questions were not asked. These included questions about:

- Frequency of participating in the garden
- Enjoyment of writing in a gardening journal
- Enjoyment of giving a gardening presentation
- Use of computers to enhance the learning experience
- Selling vegetables after harvest
- Parental involvement in the gardening project

The survey asked the participants to answer questions that covered five different themes related to the programmatic objectives: eco-behavior, environmental and conservation issues, working with other people, life skills, attitude towards health, preference towards healthy food, and overall knowledge about science and math related to gardening. Questions within each theme were combined and averaged to create an overall index score for each thematic area. Responses to individual questions were structured on a 5-point Likert-type scale, using either attitudinal responses (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*) or frequency responses (1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the Time*, 5 = *Always*).

Results

Survey Results

Demographics

Basic demographic information about participants was collected through the pre & post-test surveys. All participants who took either a pre or post-test survey were included. The majority of students (93.5%; $n = 185$) fell in the target grade range of 4th and 5th grade students, and most ranged from 9 - 11 years old (93.9%; $n = 184$). Other demographic information can be seen in Table 1.

Table 28: Demographics

	<i>N</i>	<i>n</i>	%
Grade	185		
3 rd		4	2.2
4 th		123	66.5
5 th		50	27.0
6 th		1	0.5
7 th		1	0.5
8 th		3	1.6
10 th		2	1.1
12 th		1	0.5
Age	184		
8		2	1.1
9		72	39.1
10		77	41.8
11		24	13.0
12		3	1.6
13		1	0.5
14		2	1.1
16		2	1.1
17		1	0.5
Gender	186		
Male		101	54.3
Female		85	45.7
Race	182		
Black		130	71.4
White		26	14.3
Hispanic		23	12.6
Native American		1	0.5
Other/Multiracial		2	1.1

Eco-Behavior

The first index was eco-behavior. In this theme the participants were asked how often they engaged in specific behaviors associated with environmental conservation. At the initiation of the program, the overall average score for participants on the eco-behavior index was 3.50 (Table 2). After the conclusion of the program, the average

score decreased to 3.25. When compared using a dependent *t* test, this change was found to be statistically significant at the .05 level.

Individual behavior scores for each item were also calculated before and after the program implementation. Before and after scores were compared using dependent *t* tests to examine the statistical significance of change over time. The individual behavior that changed the most positively was composting food scraps at school. This was also the only item with a positive change after the program's initiation. All other items had negative change, indicating a lower level of engagement after the program than before. The individual items with statistically significant negative change included recycling behaviors at home. This result may be due to over-reporting prior to program engagement, a common limitation of pre/post-test evaluation designs. Individuals engaged in educational experiences often "do not know what they do not know" and overestimate their engagement. Once they learn about the specific activity, through participation, they are more aware of their actual engagement and report a lower, more accurate, level of engagement in the activity on the post-test than on the pre-test. That being said, many of the participants should be aware of recycling, turning off the water and turning off the lights. They may not have been aware of composting activities.

Table 29: Eco-Behavior

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Eco-Behavior (<i>n</i> = 61)	3.50 (.83)	3.25 (.98)	-.25 (.85)*
I compost food scraps at school	2.48 (1.56)	2.84 (1.60)	+.36 (1.79)
I recycle cans or bottles at school	2.93 (1.55)	2.89 (5.12)	-.05 (1.55)
I compost food scraps at home	3.02 (1.62)	2.80 (1.59)	-.21 (1.84)
I turn off the light when I am not in the room	4.61 (.97)	4.33 (1.14)	-.28 (1.19)
I recycle paper or magazines at school	2.97 (1.57)	2.67 (1.58)	-.30 (1.53)
I turn off the water when I brush my teeth	4.75 (.87)	4.44 (1.18)	-.31 (1.30)
I recycle cans or bottles at home	3.72 (1.29)	3.33 (1.48)	-.39 (1.50)*
I recycle paper or magazines at home	3.54 (1.58)	2.72 (1.69)	-.82 (1.93)*

Note: Scale: 1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the Time*, 5 = *Always*; * = $p \leq .05$; ** = $p \leq .01$

Interest in Environment and Conservation

The second index was interest in the environment and conservation. This index included items about participants' attitudes towards the importance of plants and animals and engaging in actions that are helpful to the environment. At the beginning of the program, participants had an overall score of 4.07, indicating they have expressed a positive level of interest in the environment and conservation (Table 3). At the conclusion of the

program, the average score was a 4.25, an increase of 0.18 points. However, this change was not statistically significant when compared using a dependent *t* test.

Almost all individual items had a slight positive increase after the program. The greatest positive increase was “I think my own actions might harm the environment.” The only item with a negative change was “I feel like there are many things I can do to protect the environment” which had a negative change of 0.03 points. The item “doing things for the environment is a waste of time” decreased by .07 points, but was reverse coded, meaning that the slight negative mean change indicates a shift towards a more positive attitude. No individual items of the index had a statistically significant change from before to after the program indicating the program did not influence participants’ interest in the environment or conservation.

Table 30: Interest in Environment and Conservation

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Interest in Environment and Conservation (<i>n</i> = 30)	4.07 (.50)	4.25 (.49)	+0.18 (.59)
I think my own actions might harm the environment	3.03 (1.67)	3.60 (1.40)	+0.57 (2.24)
Plants are important to have in our environment	4.63 (.89)	4.90 (.40)	+0.27 (.87)
Trying to protect the environment is my responsibility	4.23 (1.01)	4.50 (.68)	+0.27 (.74)
I am worried about animals that are going extinct	3.97 (1.19)	4.07 (.91)	+0.10 (1.40)
I think people should build more parks for animals	4.20 (.76)	4.23 (1.01)	+0.03 (.89)
I feel like there are many things I can do to protect the environment	4.57 (.77)	4.53 (.73)	-0.03 (1.00)
Doing things for the environment is a waste of time (RC)	2.13 (1.41)	2.07 (1.51)	-0.07 (1.31)

Note: Scale: 1= *Strongly Disagree*, 2= *Disagree*, 3= *Neutral*, 4= *Agree*, 5= *Strongly Agree*; RC- Reverse Coded for use in overall index score

Working with Others

The third index examined was participants’ ability to work with others. This index included items requesting participants to describe how often they engage in various behaviors such as being honest in front of adults and enjoying working with others. The average score for working with others before the program began was a 3.55 and after the program, it increased 0.18 points, to an average of 3.73 (Table 4). However, this change was not statistically significant when examined using a dependent *t* test. Almost all items within the working with others index showed a moderate increase after the program, except for the item “I like to work with others,” which showed a moderate decrease of 0.23 points. The only statistically significant individual item change was “I work with other kids in the garden” which increased from 3.47 before the program to 4.17 after the program.

Table 31: Working with Others

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Working with Others (n = 30)	3.55 (.85)	3.73 (.70)	+.18 (.80)
I work with other kids in the garden	3.47 (1.59)	4.17 (1.02)	+.70 (1.51)*
I work with adults in the garden	3.80 (1.65)	4.17 (1.29)	+.37 (1.63)
I say what I think and feel in front of adults	2.77 (1.59)	2.80 (1.67)	+.03 (1.88)
I say what I think and feel in front of other kids	3.10 (1.69)	3.13 (1.72)	+.03 (1.87)
I like to work with others	4.63 (.76)	4.40 (.93)	-.23 (1.17)

Note: Scale: 1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the time*, 5 = *Always*; * = $p \leq .05$

Life Skills

Participant's overall life skills were also assessed. To measure engagement in life skills, items such as self-identifying as a good listener and a responsible person were used. At the beginning of the program the participants had an average score of 4.45 and at the end of the program an average of 4.28, a decrease of 0.17 (Table 5). This decrease was not statistically significant, indicating no change. None of the individual items making up this index showed statistically significant changes over time.

Table 32: Life Skills

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Life Skills (n = 29)	4.45 (.49)	4.28 (.62)	-.17 (.68)
I ask questions if I don't understand something	4.48 (.99)	4.52 (.79)	+.03 (1.15)
I get angry quickly when someone disagrees with me (RC)	2.59 (1.57)	2.62 (1.59)	+.03 (1.92)
I respect adults	4.86 (.35)	4.66 (.67)	-.21 (.68)
I am a good listener	4.66 (.55)	4.34 (1.08)	-.31 (1.07)
I am responsible	4.86 (.44)	4.52 (.87)	-.35 (.97)

Note: Scale: 1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the Time*, 5 = *Always*; RC- Reverse Coded for use in overall index score

Attitude towards Health

Participants' attitude towards health was also measured. The attitude towards health index included items examining participants' overall attitude about living in a healthy environment, as well as their behavior of going to the doctor and engaging in physical exercise daily. Before the program, participants scored an average of 4.19 and after the program, an average of 4.16, indicating a .03 point decrease (Table 6). This decrease was not statistically significant, nor were any individual items indicating no change. Both "living in a healthy environment is important" and "I go to the doctor for a checkup every year" decreased slightly, and "I do physical exercises every day" had no change.

Table 33: Attitude towards Health

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Attitude towards Health (n = 31)	4.19 (.77)	4.16 (.72)	-.03 (.96)
I do physical exercises every day ¹	3.90 (1.14)	3.90 (1.22)	.00 (1.39)
I go to the doctor for a checkup every year ¹	3.90 (1.45)	3.87 (1.38)	-.03 (1.68)
Living in a healthy environment is important ²	4.77 (.43)	4.71 (.78)	-.06 (.96)

Note: Scale¹: 1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the Time*, 5 = *Always*; Scale²: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*.

Preference towards Healthy Food

Participants were then asked about their preference towards healthy food. The preference towards healthy food index included items about attitudes towards fresh foods and attitudes towards green vegetables. Before the program, participants had an average score of 3.61 and after the program they had an average score of 3.66 (Table 7). This slight positive change was not found to be statistically significant indicating no change. The highest positive change occurred for the item "It is important to eat green vegetables every day." This change was statistically significant at the 0.05 level when compared using a dependent *t* test. Since eating fast food every day is a negative behavior, an increase in this item represents an unhealthy behavior change.

Table 34: Preference towards Healthy Food

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Preference towards Healthy Food (n=31)	3.61 (.80)	3.66 (.78)	+.06 (.71)
It is important to eat green vegetables every day ²	3.58 (1.43)	4.13 (1.09)	+.55 (1.39)*
I eat fast food every day (RC) ¹	2.97(1.54)	3.52 (1.34)	+.55 (1.84)
Homegrown fresh foods are better than processed food ²	3.51 (1.34)	3.94 (1.53)	+.42 (1.95)
I eat green vegetables every day ¹	3.68 (1.22)	3.71 (1.35)	+.03 (1.17)

I think it is important to eat green vegetables ¹	4.23 (1.18)	4.06 (1.29)	-.16 (1.34)
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Note: Scale¹: 1 = *Never*, 2 = *Occasionally*, 3 = *Sometimes*, 4 = *Most of the Time*, 5 = *Always*; Scale²: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*; * = $p \leq .05$; RC- reverse coded for use in overall index.

Overall Knowledge

The last set of questions examined the overall knowledge of the participants across a variety of topics, including the cleanliness of organic vegetables and the importance of keeping a gardening journal. The average score for the knowledge index before the program was 3.82 and after the program it increased to 4.10, a 0.28 point positive change. This change was statistically significant at the .05 level. While none of the individual items showed a statistically significant change, the item with the highest positive change was “Insects are good for a garden” which increased from 3.60 to 4.43 (a 0.83 positive change).

Table 35: Overall Knowledge

	<i>Mean Before the Program (SD)</i>	<i>Mean After the Program (SD)</i>	<i>Mean Change (SD)</i>
Overall Knowledge (n = 30)	3.82 (.67)	4.10 (.58)	+0.28 (.62)*
Insects are good for a garden	3.60 (1.38)	4.43 (.94)	+0.83 (1.46)
The color of vegetables is very important	3.37 (1.45)	3.93 (1.39)	+0.57 (1.72)
Measuring the planting distance between plants when gardening is important	4.07 (1.01)	4.27 (1.23)	+0.20 (1.54)
Keeping a journal is an important part of a gardening project	4.13 (1.14)	4.20 (1.13)	+0.07 (1.39)
Knowing the best time to harvest vegetables is important	4.53 (.68)	4.50 (.86)	-.03 (.96)
Organic vegetables are dirty (RC)	2.80 (1.47)	2.73 (1.41)	-.07 (1.46)

Note: Scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, 5 = *Strongly Agree*; * = $p \leq .05$

Knowledge Items

Finally, participants were asked a series of knowledge questions which had either correct or incorrect responses. The three knowledge items with the highest positive change after the program included questions that dealt with identifying the root, seeds, and leaves of a plant (Table 9). The ability to identify a root increased by 38.3%, the ability to identify seeds by 36.7%, and the ability to identify leaves by 29.4%. Unless specifically marked, all items had a response of 68 participants both before and after the program began.

Table 36: Knowledge Items

	<i>% Correct Before</i>	<i>% Correct After</i>	<i>% Change</i>
What are the names of the different plant parts? (Root)	33.8	72.1	38.3
What are the names of the different plant parts? (Seeds)	32.4	69.1	36.7
What are the names of the different plant parts? (Leaf/Leaves)	41.2	70.6	29.4
Where does photosynthesis happen? (Leaf)	20.6	47.0	26.4
If you have 12 feet of soil to transplant collards, and the plants have to be 18 inches apart to get maximum growth, how many can I plant? (8)	38.2	61.8	23.6
What are the names of the different plant parts? (Stem)	29.4	51.5	22.1
What does the K in NPK stand for? (Potassium)	7.4	29.4	22.0
What are the names of the different plant parts? (Fruit/Tomato)	42.6	60.3	17.7
What are the names of the different plant parts? (Flower)	22.1	38.2	16.1
What does H ₂ O mean? (Water) (Before $n = 68$; After $n = 67$)	64.7	73.1	8.4
What do plants make? (Oxygen)	80.9	86.8	5.9
If a plant grows 2 inches every week, how many inches tall will it be after 4 weeks? (8)	69.1	73.5	4.4
If I put 9 seeds in the ground and only 1 plant grows for every 3 seeds, how many plants will grow? (3)	64.7	67.6	2.9
If you had 2 pounds of squash and the market value of squash is \$1.39/pound, how much could you expect to sell your squash for? (\$2.78) (Before $n = 68$; After $n = 25$)	63.2	60.0	-3.2

If the knowledge items had been an exam, the students before would have scored an average of 43.6% before the program and a 61.5% after the program. (Note: due to an error in the survey distribution, most students were not

given the question “If you had 2 pounds of squash....” This question was removed from the average for the post-test average results).

Focus Group Results

Two focus groups with student participants were conducted in May 2013 to better understand their personal experiences as a group working in the garden. Questions were asked about what they learned and their assessment of their experiences in the garden. The questioning route for the focus groups included the following questions:

- What did you think about the gardening project?
- What kinds of plants did you grow?
- Did you sell your products?
- What are the benefits of growing your own vegetables instead of buying them at the store?
- What is your favorite food?
- Do you think it is important to eat green vegetables?
- Did you have to come up with a plan for the school/community garden?
- Did you ever get frustrated when you were working in the garden?
- Do you feel like you can say what you think and feel in front of adults?
- Do you feel more comfortable talking with adults because of the gardening project?
- Did you like giving presentations in front of others?
- Did you have to give a presentation during the gardening project?

The focus groups were recorded, transcribed, and then analyzed for common themes. Individual quotes and exchanges were categorized into different, commonly occurring themes that are summarized below. FG1 refers to focus group #1 and FG2 refers to focus group #2.

Knowledge acquisition

Participants discussed what they learned in their gardening experience. Overall, they discussed both applied gardening knowledge as well as more abstract scientific knowledge. When reviewing applied gardening knowledge, participants discussed learning about specific gardening best practices, such as the logistics of planting vegetables, appropriate spacing, planting during correct seasons, and watering. Regarding abstract scientific knowledge, participants discussed how keeping a garden can provide benefits for animals and insects. They also discussed the ecological dependence plants, animals and insects have on one another, as well as how plants can help maintain clear air quality. Some discussed the concept of photosynthesis as a topic they had learned about.

Applied gardening knowledge

The moderator asked the question “What did you learn about planting?” to the participants in both focus groups. Some of their response included they learned that “when the sun out you got to stick your hand down in the soil to see if it is dry and water them” (FG2), “if you put too much water on the plants then it will die” (FG2), and I learned “how far from each other the vegetables need to grow” (FG1).

Abstract science knowledge

The moderator asked the question, “What did you think about the gardening project?” An example of the participants responses was “what I think about the garden is it’s nice and it helps the environment, keeps it safe

and it helps with... it helps animals provide for food if they don't have none and insects.... they need pollen, like honey bees they need something to eat ... Yep."(FG 2). The moderator also asked "Why do we need plants?" One participant said "we need plants because the air that we breathe it has chemicals in it so when it goes through the leaves it gets stuck on the leaves and new air comes out." (FG 2)

Benefit of growing own produce

Participants discussed several reasons why they believe growing their own produce can have benefits including the economic benefit, convenience, eating higher quality produce, and the ability to help others that can emerge from growing one's own produce.

Economic Benefit

The economic benefits mentioned included the ability to sell produce as well as save money by not having to purchase produce in a store. Some of their responses included:

- "You can raise money by collecting plants and crops."(FG2)
- "You can plant vegetables to eat for yourself... if you don't have vegetables or enough money to buy vegetables at Wal-Mart" (FG2)

Convenience

Convenience was a benefit mentioned by students, as one who keeps their own garden does not need to leave home to purchase vegetables. Vegetable gardening also allows for security against lack of access to vegetables in a store if the store is on short supply. Some of the responses included:

- "You can eat and stay home if you don't have money to buy some stuff cause you have vegetables." (FG2)
- "If the store runs out of food you can get some." (FG1)
- "You don't have to go to the store." (FG2)

Higher Quality Produce

Participants mentioned how homegrown vegetables can taste better and be free from chemicals/pesticides. Participants reflected this in the following statements:

- "The good taste of the homemade plants." (FG2)
- "Its better cause it doesn't have all them chemicals on it."(FG2)
- "It's better to umm... to have your own cause the store products have pesticides in them." (FG1)

Help Others

Participants also discussed the ability to help others through vegetable production, by showing others how to start and maintain their own gardens. Some of their comments included:

- "I think they [the gardening staff] teach us how umm to plant while we young and when we get older we teach other kids how to plant." (FG2)
- "What I like about the garden, um, we get to have fun and plant vegetables for every people who doesn't have vegetables to buy." (FG2)

Importance of eating vegetables

Participants discussed the health benefits and importance of eating green vegetables. They mentioned the benefits that vegetable consumption can have on maintaining a normal body weight, providing energy, fostering muscle growth, and preventing ill-health such as cancer, disease, and high blood pressure. The moderator asked the

following question “Why do you think it’s important to eat green vegetables?” The quotes below illustrate some of the participants’ responses:

- “So you don’t have to go on weight watchers.” (FG2)
- “So you can be big and strong like Popeye when he eats spinach.” (FG2)
- “You need green plants for football so you can be fast, not slow and fat.” (FG2)
- “So you won’t gain no weight.” (FG1)
- “Blood pressure.” (FG1)
- “So you can stay strong.” (FG1)

Working with adults

Participants had mixed feelings about working with adults. While some reported they were comfortable speaking candidly in the presence of adults, others did not feel this way. Some participants enjoyed working with adults because they could gather information about things they did not know, while others felt they could not speak candidly about how they feel in front of adults. The participants did not elaborate on why they were not comfortable. The following quotes were exchanges between the moderator and the participants.

- Moderator: “What did you like about working with the adults?” (FG1)
 - “Harvesting the plants.” (FG1)
 - “Telling you information about the plants.” (FG1)
- Moderator: “Why did you feel you could share what you were thinking with the adults?” (FG1)
 - “No, I couldn’t say what I thought or was thinking.” (FG1)
 - “I thought I was comfortable and could share anything with the adults.” (FG1)

General Enjoyment

Participants expressed general positive attitudes about the gardening project, indicating their enjoyment of eating vegetables, the types of plants they grew, and generally thinking the project was fun. Some of their comments included:

- “Umm another reason that I like about the garden it’s you can eat fresh vegetables... and plant some more and its really fun plant flowers, vegetables, fresh fruit, and it’s just fun.” (FG2)
- “What I like about the garden project is the type of plants that we grow.” (FG2)
- “It’s fun.” (FG1)
- “It’s cool.” (FG1)

Activities

Participants mentioned activities they were engaged in during their experience in the gardening project. Due to the lack of records of gardening activities, the discussion amongst the participants regarding different activities they participated in was included in the focus group analysis and summarized below.

Plan:

Both groups reported mixed attitudes and confusion as to whether or not they were required to create a gardening plan before beginning the gardening project. In one focus group, students were asked what they need to know to develop a plan. Their interchange is quoted below:

- Moderator: “Anything else you need to know [when planting vegetables]?” (FG2)
- “How much space you need.” (FG2)
- “When you going to harvest.” (FG2)
- “How many seeds you need.” (FG2)
- “How much time.” (FG2)
- “When you going to pick them.” (FG2)
- “When you going to cooking.” (FG2)
- “Cleaning them.” (FG2)

Presentation

There was also confusion as to whether or not the students gave presentations to other students about their gardening experience. When asked whether or not they had, participants gave mixed responses. A response attempting to clarify was given by the community garden coordinator:

- “Community Garden Coordinator: We mostly, class time... like what we are doing now. I will be standing in front up and even outside in the garden... More or less participation..... everyone participating in the event such as right now.” (FG1)

Selling:

From the discussion amongst the two focus groups, it was discovered that Focus Group 1 conducted a market day where they gave away (but did not sell) vegetables to their families. Focus Group 2 participants reported they were not allowed to sell at school.

- “Moderator: Did you sell your products?” (FG2)
- “No we can’t sell it...we eat it for snacks...” (FG2)
- “You can’t sell at school.” (FG2)

Limitations

The implications of this evaluation study are very limited; therefore it is difficult to know the true impact this program had on the children who have participated. Additionally, lack of record keeping and lack of access to staff perceptions of the program further limited the generalizations and recommendations that could be made from this evaluation. A list of the specific limitations of this evaluation includes:

- The pre-test format of the survey was distributed in place of the post-test at the conclusion of the program. Therefore, the students were not asked to report the types of activities they engaged in during the gardening experience, such as computer use, journal keeping, presentations to others, and parent participation.
- The pre-test survey given in place of the post-test also had missing pages, so only half of the survey was given to the participants. As a result, key index items were not asked of all the participants and could not be

calculated. Therefore, the results of the pre/post-test survey are based on only approximately 30 to 60 participants who had completed all questions during both survey distributions.

- The evaluation team did not receive open-ended survey data from the staff, including teachers and gardening staff that had experience with the participants during the gardening project.
- The evaluation team did not receive surveys from a control group, so the results could not be compared to students who did not participate in the gardening project.
- Of special note and consideration for this project, was the sudden passing of Damon Miller, the key leader of this project. He was also a well-known community leader and pastor, and his sudden death created both logistical challenges to the project, as well as emotional ones for the staff and others involved in the gardening project, many of whom were very personally close to him.

Findings

The overall findings of the evaluation are reported below. Demographically, the program is currently targeting and reaching the appropriate age range of participants. The majority of students (93.5%; $n = 185$) fell in the target grade range of 4th and 5th grade students, and most ranged from 9-11 years old (93.9%; $n = 184$). Most of the students are African-America/Black (71%), which supports the program's goals of serving minority populations. Key findings and recommendations by short-term goal area are summarized below.

Knowledge Acquisition

The overall knowledge index was the only index with a statistically significant positive change from before to after the program's implementation. In particular, evaluation data suggested students have acquired knowledge about (1) the importance of insects, (2) plant physiology, and (3) overall benefits of growing produce. Participants had some of the highest change for the knowledge item "insects are good for a garden." Focus group data also supports the survey findings of participants discussing how insects, plants, and animals are connected, particularly by the food chain. This suggests that students understand some key ecological concepts, particularly the ecological connection of different types of species.

Participants also have demonstrated knowledge gains around plant physiology. Another knowledge item with higher change than others was "the color of a vegetable is very important." This suggests participants understand the color of a vegetable is a key indicator of other qualities of a vegetable, such as its health and viability. Students also gained knowledge regarding the ability to identify different parts of a plant.

Participants demonstrated some knowledge gains regarding the overall benefits of growing their own produce. They discussed in the two focus groups the economic benefit that can be gained through selling produce to others and the convenience of not having to purchase vegetables at a store. Additionally, students mentioned that growing one's own vegetables can lead to consuming higher quality produce and is a venue for charity to others that may not have easy access to their own produce.

Participants demonstrated little to no gains in specific math questions related to gardening activities; however their previous knowledge levels were higher than that of identifying different plant parts. One potential explanation could be if students were confused at the survey formatting of the plant description portion of the survey, which required them to identify and fill in the blanks next to areas indicating different plant parts.

Life Skills

Participants in the two focus groups had mixed feelings about comfort with working with adults. While they enjoyed the information adults can provide them when asked, some do not feel they can say what they think of feel with ease around adults, while others feel they can. The pre and post-test survey data showed no significant gains in the life skills index or working with others index. The only item with a statistically significant increase was “I work with other kids in the garden” which was to be expected since the program includes working in the garden with other children.



Figure 8: Participants at FAMU DRS

Social and Moral Development

Participants did discuss the importance of eating vegetables as a way to regulate energy, promote muscle growth, regulate weight, and maintain overall health. Participants did have a statistically significant increase in their agreement to the statement “it is important to eat green vegetables every day.” However, participants’ overall attitude towards health remained largely unchanged.

Environmental and Conservation Awareness and Development

There were no significant gains in eco-behavior or interest in the environment and conservation. There was a statistically significant decrease in the overall eco-behavior index, including the individual items about recycling at home, suggesting students at home are not as engaged in environmentally friendly behaviors at the end of the school year as they were at the beginning.

Recommendations for the evaluation team/activities

Recommendations from the evaluation team are summarized below. One overall key recommendation for the program's success is more open dialogue, training, and development of a clear plan of how to implement the evaluation and programmatic activities. Programmatic activities include monitoring gardening activities and curriculum deliverance, keeping a gardening journal, and giving gardening presentations. Regarding the evaluation of the program, a plan should be created and agreed upon on how and when to collect the pre and post-test surveys, staff surveys, and record keeping books. The evaluation team considers this the key recommendation.

A programmatic suggestion for the program staff is to emphasize the development of life skills beyond gardening knowledge if these are the intended outcomes. This includes incorporating opportunities for children to engage with adults in meaningful conversations and activities where they have an opportunity to work collaboratively. Doing so would allow the children to establish trust with adult partners and encourage the development of adult/youth partnerships. In addition, children should be encouraged to work in teams as part of the program. Perhaps a team activity could be built into the program where students are working on a yearlong project with fellow classmates that result in a combined presentation so they get the experience of working with and relying on others. Lastly, participants could be encouraged to engage creatively in their learning process by expressing their feelings and learning outcomes through artistic means to further emphasize knowledge gains.

Art can be a way for young children to express themselves more easily with adults, and can be a way to better understand their thought process and engagement with the gardening project and its related topics of working with others, development of science knowledge and appreciation for the environment, and learning new skills and knowledge. Some suggestions to incorporate creativity in the learning process include:

- Allowing students to take disposable cameras into the garden to take pictures of what their favorite activities, plants, and friendship interactions look like. Once developed, the garden coordinator could have an activity where students sit in a circle and share their picture and why they took it.
- Asking students to create small skits or plays where they act out different gardening scenarios. These scenarios could include practical skills (why not to overwater) or be descriptions of their favorite or most interesting experience in the garden.
- A class scrapbook could be kept documenting the experience in the garden, including pictures of the garden at various stages of growth. Students could reflect at the end of the year using the scrapbook as a reminder of what types of activities they engaged in at different points of the project.
- The students could give a presentation to the evaluation team, or another class, on how to start a garden of their own, based on what they have learned through the experience.
- Give each student a project to complete about their favorite vegetable. This could be in a book format in which the student describes why the vegetable is their favorite, the nutritional benefits of that particular vegetable, how best to grow it, and how to prepare/cook it.
- A jeopardy style game about science and math related to the garden could be created to foster fun competition and learning amongst the students.
- Incorporating math and entrepreneurship knowledge into the lessons by asking students to come up with a business plan for their garden through a guidebook for them to fill out. The business plan could include key questions such as:

- Who would you sell to?
- When could you sell different crops?
- Where would you sell?
- How much would you sell them for?
- How much do your inputs cost?
- How much could you make?

Appendix C- Pre-test Red Clay Garden Project

Fun Survey – this is NOT A TEST!

1. This is a survey about what you think about the environment, gardening, food, and working with others.
2. There are no right or wrong answers.
3. If you want to change your answer, erase the X and mark another.
4. Have fun!

What is your name? _____

What grade are you in? _____

What is your teacher's name? _____

How old are you? _____

Are you a (circle one): Boy Girl

What race are you (circle one): Black White Hispanic Asian Native American

Tell us a little bit about yourself by putting an X in the box that matches how much you do the following things.

	Always	Most of the Time	Sometimes	Occasionally	Never
I recycle cans or bottles at HOME	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I recycle cans or bottles at SCHOOL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I recycle paper or magazines at HOME	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I recycle paper or magazines at SCHOOL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I compost food scraps at HOME	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I compost food scraps at SCHOOL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I turn off the water when I brush my	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

teeth					
I turn off the light when I am not in the room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

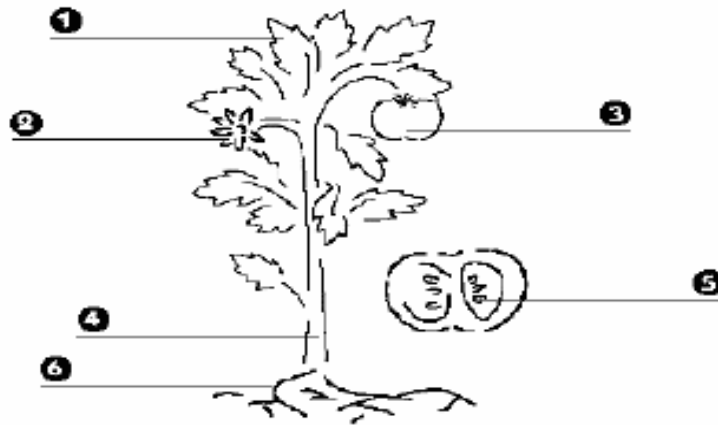
How much do you agree or disagree with the following statements?

Place an X in the box that matches how you feel.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I am worried about animals that are going extinct	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organic vegetables are dirty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think people should build more parks for animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel like there are many things I can do to protect the environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trying to protect the environment is my responsibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think my own actions might harm the environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Doing things for the environment is a waste of time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plants are important to have in our environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Some insects are good for a garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Measuring the planting distance between plants when gardening is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keeping a journal is an important part of a gardening project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowing the best time to harvest vegetables is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The color of vegetables is very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is important to eat green vegetables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

everyday					
Homegrown fresh foods are better than processed food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Living in a healthy community is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What are the names of the different plant parts? Write them on the lines pointing to the part.



What does the “K” in NPK stand for? (circle one)

- Potato Kinetic Kilogram Potassium

Where does photosynthesis happen? (circle one)

- Leaf Roots Stems Flower

What does the H₂O mean? (circle one)

- Air Water Wood Cement

What do plants make? (circle one)

- Nitrogen Calcium Oxygen Hydrogen

If I have 12 feet of soil to transplant collards, and the plants have to be 18 inches apart to get maximum growth, how many can I plant?

- 8 12 18 25

If I put 9 seeds in the ground and only 1 plant grows for every 3 seeds, how many plants will grow?

1 2 3 4

If a plant grows 2 inches every week, how many inches tall will it be after 4 weeks?

2 4 6 8

If you had 2 pounds of squash and the market value of squash is \$1.39/pound, how much could you expect to sell your squash for? (circle one)

\$1.39 \$2.78 \$4.26 \$6.82

Put an X in the box that matches how much you do the following things:

	Always	Most of the Time	Sometimes	Occasionally	Never
I say what I think and feel in front of adults	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I say what I think and feel in front of other kids	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I respect adults	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I ask questions if I don't understand something	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I get angry quickly when someone disagrees with me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am a good listener	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am responsible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to work with others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat fast food every day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat green vegetables every day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think it is important to eat green vegetables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do physical exercises every day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I go to the doctor for a checkup every year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I work with other kids in the garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I work with adults in the garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for taking the survey! Enjoy your gardening project this year!



Appendix D- Post-test Red Clay Garden Project

Fun Survey – this is NOT A TEST!

5. This is a survey about what you think about the environment, gardening, food, and working with others.
6. There are no right or wrong answers.
7. If you want to change your answer, erase the X and mark another box.
8. Have fun!

What is your name? _____

What grade are you in? _____

What is your teacher's name? _____

How old are you? _____

Are you a (circle one): Boy Girl

What race are you (circle one): Black White Hispanic Asian Native American

How often did you participate in the garden project (mark one)?

- 5 times a week
- 3 - 4 times a week
- 1 - 2 times a week
- Less than once a week

Did you keep a gardening journal (circle one)? Yes No

If yes, how much did you like writing in your journal (mark one)?

- I liked it a lot
- I kind of liked it
- I thought it was okay

- I didn't like it
- I hated it

Did you give a garden presentation in front of people (circle one)? Yes No

If yes, how much did you like giving your presentation (mark one)?

- I liked it a lot
- I kind of liked it
- I thought it was okay
- I didn't like it
- I hated it

Did you use computers to help with your gardening project (circle one)? Yes No

If yes, can you tell us how you used the computer to help:

If you grow vegetables in a garden, who could you sell your vegetables to?

Tell us a little bit about yourself by putting an X in the box that matches how much you do the following things.

	Always	Most of the Time	Sometimes	Occasionally	Never
I recycle cans or bottles at HOME	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I recycle cans or bottles at SCHOOL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I recycle paper or magazines at HOME	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I recycle paper or magazines at SCHOOL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I compost food scraps at HOME	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I compost food scraps at SCHOOL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I turn off the water when I brush my teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I turn off the light when I am not in the room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

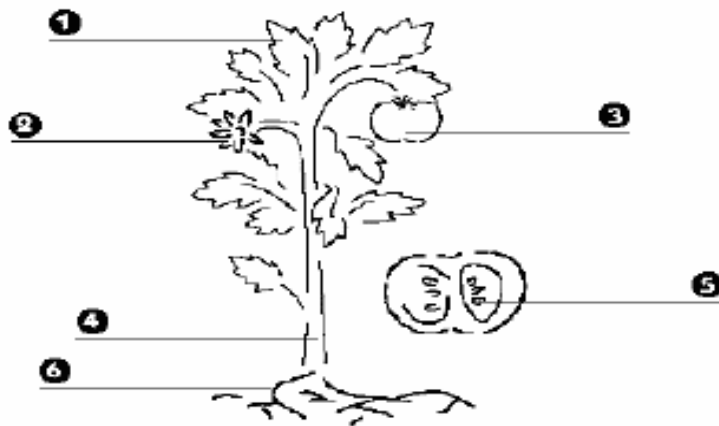
How much do you agree or disagree with the following statements?

Place an X in the box that matches how you feel.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I am worried about animals that are going extinct	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organic vegetables are dirty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think people should build more parks for animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel like there are many things I can do to protect the environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trying to protect the environment is my responsibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think my own actions might harm the environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Doing things for the environment is a waste of time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plants are important to have in our environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Some insects are good for a garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Measuring the planting distance between plants when gardening is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keeping a journal is an important part of a gardening project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Knowing the best time to harvest vegetables is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The color of vegetables is very important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is important to eat green vegetables everyday	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Homegrown fresh foods are better than processed food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Living in a healthy community is important	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What are the names of the different plant parts? Write them on the lines pointing to the part.



What does the “K” in NPK stand for? (circle one)

- Potato Kinetic Kilogram Potassium

Where does photosynthesis happen? (circle one)

- Leaf Roots Stems Flower

What does the H₂O mean? (circle one)

- Air Water Wood Cement

What do plants make? (circle one)

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8 12 18 25

If I put 9 seeds in the ground and only 1 plant grows for every 3 seeds, how many plants will grow?

1 2 3 4

If a plant grows 2 inches every week, how many inches tall will it be after 4 weeks?

2 4 6 8

If you had 2 pounds of squash and the market value of squash is \$1.39/pound, how much could you expect to sell your squash for? (circle one)

\$1.39 \$2.78 \$4.26 \$6.82

Put an X in the box that matches how much you do the following things:

	Always	Most of the Time	Sometimes	Occasionally	Never
I say what I think and feel in front of adults	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I say what I think and feel in front of other kids	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I respect adults	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I ask questions if I don't understand something	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I get angry quickly when someone disagrees with me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am a good listener	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am responsible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to work with others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat fast food every day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I eat green vegetables every day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think it is important to eat green vegetables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do physical exercises every day	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I go to the doctor for a checkup every year	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I work with other kids in the garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I work with adults in the garden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Did your parents come and work in the garden with you? (circle one) Yes No

Do you have anything else you would like to share about the gardening project?

