

**AN EXPLORATORY STUDY OF THE RELATIONSHIPS AMONG
MIDDLE SCHOOL STUDENTS' FOOD AND GARDEN
EXPERIENCES AND THEIR ENGAGEMENT AND MOTIVATION**

by
Amonté L. Martin, Sr.

A Thesis

*Submitted to the Faculty of Purdue University
In Partial Fulfillment of the Requirements for the degree of*

Master of Science



Department of Youth Development and Agricultural Education

West Lafayette, Indiana

May 2017

ProQuest Number: 10257707

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



ProQuest 10257707

Published by ProQuest LLC (2017). Copyright of the Dissertation is held by the Author.

All rights reserved.

This work is protected against unauthorized copying under Title 17, United States Code
Microform Edition © ProQuest LLC.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

THE PURDUE UNIVERSITY GRADUATE SCHOOL
STATEMENT OF APPROVAL

Dr. Levon T. Esters, Chair

Department of Youth Development and Agricultural Education

Dr. Sybil S. Kelley

Department of Educational Leadership and Policy, Portland State University

Dr. Neil A. Knobloch

Department of Youth Development and Agricultural Education

Approved by:

Dr. Mark A. Russell

Head of the Departmental Graduate Program

This thesis is dedicated to my wife, Delreese N. Martin, and my son, Amonté L. Martin II.

Thank you both for changing my life for the better.

ACKNOWLEDGEMENTS

First and foremost, I would like to thank God for ordering my steps according to your will and for allowing me to reach this point. Without you in my life none of this would have been imaginable.

To my wife, I cannot say thank you enough for believing in me even when I didn't believe in myself. Thank you for exemplifying faith in action, and for your strength, patience, love, and support along this journey. Thank you for having my back and faith in me to lead us. Without you in my corner, I would not have made it to this point. Again, thank you. I love you.

To my son, no matter what you may face in life or what you may go through, remember that through God ANYTHING is possible. Always remain faithful and prayerful in knowing that God will always see you through.

To Jozaé, the future is what you make it. You have the potential to do great things, but you first have to believe in yourself and trust God's plan. Allow my story to be evidence of what perseverance and fortitude looks like. Thank you for motivating me to lead by example. The future is yours.

To my mom, thank you for the many sacrifices you made that paved the way for me to be where I am today. Also, thank you working so hard to provide the best life you could for me. Your strength in midst of adversity truly showed me what it was to be a person of mettle.

To my grandparents, thank you for always keeping family first. Thank you for showing me how to navigate through life's ups and downs with each other. Also, thank

you both for the many sacrifices and prayers which allowed me to reach this point in my life.

To Dr. Esters, thank you for believing in my abilities and taking a chance on me. Also, thank you for the tough love which made me want and expect more out of myself. Thank you for being a role model and teaching me how to pursue excellence in everything that I do.

To Dr. Kelley, thank you for agreeing to be on my committee on such short notice. Thank you for allowing me into your circle when I visited your class. Also, I really appreciated and will never forget when your class sang happy birthday to me. Thank you so much for your time and continued support along this journey.

To Dr. Knobloch, thank you for teaching me how to think critically – like a researcher. I really appreciated and valued all of our conversations. Thank you for your continued guidance and support, and for connecting me with your sister for this study. Also, I will not forget my thesis statement.

To Dr. Evans, thank you for always being there for Reese, Amonté II, and I during our time at Purdue. Your selflessness, compassion and hospitality was treasured and greatly appreciated, and really made our experience at Purdue enjoyable. Thank you for welcoming us into your family.

To Brandon, my brother in protest. Thank you for showing me what a true activist- scholar is. Continue to change the world one person, one community at a time.

To Torrie and Brittini, the big sisters I never had, thank you for all of the laughs and for making my time at Purdue not only enjoyable but also inspiring. Thank you both for your support and for being a part of my community.

To my YDAE family, thank you for all of the support and for fostering my growth as a graduate student while at Purdue. Also, thank you for making Purdue a home away from home.

To Brenda and Joel, thank you both for taking the time out of your busy schedules to assist me with my data collection while in Oregon. It was truly a pleasure to work with you both and to see firsthand the great things you all were doing. Continue to cultivate the brains of the future!

TABLE OF CONTENTS

LIST OF TABLES	xi
LIST OF FIGURES	xii
ABSTRACT.....	xiii
CHAPTER 1. INTRODUCTION	1
1.1 Introduction	1
1.2 School Gardens	2
1.3 Statement of the Problem	3
1.4 Significance of Study	5
1.5 Purpose of Study	7
1.6 Research questions	7
1.7 Assumptions	8
1.8 Limitations	8
1.9 Definition of Terms	9
CHAPTER 2. REVIEW OF LITERATURE	11
2.1 Introduction	11
2.2 Literature Review Methodology	11
2.3 Purpose of Study	12
2.4 Research Questions	12
2.5 School Gardening.....	13
2.5.1 History and Current Status of School Gardening in the United States	13
2.5.3 Garden-Based Learning.....	14
2.6 Activity Motivation	17
2.6.1 Autonomy	17
2.6.2 Competence	18
2.6.3 Intrinsic Motivation	20
2.7 Activity Engagement.....	22
2.8 School Engagement.....	24
2.9 Educational Aspirations	26

2.10	Conceptual Framework	28
2.10.1	Contextual Teaching and Learning	28
2.10.2	Conceptual Model	32
2.11	Theoretical Framework	34
2.11.1	Self-Determination Theory	34
2.12	Need for Study	35
2.13	Summary	36
CHAPTER 3. METHODS		38
3.1	Introduction	38
3.2	Purpose of the Study	38
3.3	Research Questions	38
3.4	Research Design	39
3.5	Institutional Review Board Approval	39
3.6	Selection Criteria for Middle Schools	40
3.6.1	School Garden Coordinator	41
3.6.2	School Demographics	41
3.6.3	Classes Surveyed	43
3.7	Selection Criteria for Study Participants	44
3.7.1	Participant Assent and Consent	47
3.8	Instrumentation	48
3.8.1	Garden Participation	48
3.8.2	Food and Garden Activities	49
3.8.3	School Engagement	49
3.8.4	Future Educational Aspirations	50
3.8.5	Food and Garden Activity Motivation	50
3.8.5.1	Intrinsic Motivation	50
3.8.5.2	Autonomy	51
3.8.5.3	Competence	52
3.8.6	Food and Garden Activity Engagement	52

3.8.6.1	Behavioral Engagement	53
3.8.6.2	Emotional Engagement	53
3.8.6.3	Behavioral Disengagement	54
3.8.6.4	Emotional Disengagement	54
3.8.7	Demographics Variables	55
3.8.8	Validity	55
3.8.9	Reliability.....	55
3.9	Data Collection.....	56
3.10	Data Management	58
3.11	Data Analysis	58
CHAPTER 4. RESULTS		66
4.1	Introduction	66
4.2	Purpose of the Study	66
4.3	Research Questions	66
4.4	Demographic Characteristics of Participants	67
4.5	Results for the Research Questions of the Study	70
4.6	Results for Research Question 1a.....	70
4.6.1	Students' Garden Participation	71
4.6.2	Students' Participation in Food and Garden Activities	72
4.7	Results for Research Question 1b	74
4.7.1	Students' School Engagement	74
4.8	Results for Research Question 1c.....	78
4.8.1	Students' Future Educational Engagement.....	78
4.9	Results for Research Question 1d	79
4.9.1	Food and Garden Activity Motivation.....	79
4.10	Results for Research Question 1e.....	80
4.10.1	Food and Garden Activity Engagement.....	80
4.11	Results of Research Question 2.....	81
4.11.1	Pearson's Correlation among Variables	81

CHAPTER 5 CONCLUSIONS AND DISCUSSION	84
5.1 Introduction	84
5.2 Purpose of the Study	84
5.3 Research Questions	84
5.4 Conclusion 1.....	85
5.4.1 Discussion.....	85
5.5 Conclusion 2.....	87
5.5.1 Discussion.....	87
5.6 Conclusion 3.....	89
5.6.1 Discussion.....	89
5.7 Conclusion 4.....	90
5.7.1 Discussion.....	90
5.8 Implications for Practice and Policy	91
5.8.1 Implications for Practice	91
5.8.2 Implications for Policy.....	92
5.9 Implications for Theory.....	94
5.10 Recommendations for Future Research	95
REFERENCES	97
APPENDIX A: IRB APPROVAL.....	107
APPENDIX B: PARENTAL MEMO & CONSENT FORM.....	108
APPENDIX C: STUDENT ASSENT FORM	110
APPENDIX D: FOOD & GARDEN QUESTIONNAIRE.....	111
APPENDIX E: MEAN AND STANDARD DEVIATIONS FOR VARIABLES OF THE STUDY BY CLASS	115
APPENDIX F: PEARSON CORRELATIONS AMONG STUDY VARIABLES	116

LIST OF TABLES

Table 2.1	Motivational Conceptualization of Engagement and Disengagement in School.....	25
Table 2.2	Six Components of Contextual Teaching and Learning.....	30
Table 3.1	Demographic Profile of Middle Schools Participating in the Study.	42
Table 3.2	Descriptions of Course Acronyms and Course Objectives.....	43
Table 3.3	Food and Garden Activities, Purpose of Activities, and Student Objectives and Tasks.....	45
Table 3.4	Post-Hoc Reliabilities for the Food and Garden Questionnaire Scales.....	56
Table 3.5	Data Collection Schedule for Participating Schools.....	58
Table 3.6	Research Questions, Variables, Scale of Measurement and Statistical Analysis Methods.....	62
Table 3.7	Conventions for Relationships.....	64
Table 3.8	Conventions for Effect Sizes of Relationships.....	65
Table 3.9	Effect Size for Differences between Two Independent Means.....	65
Table 4.1	Demographic Characteristics of all Students by Race and Ethnicity, and Sex.....	68
Table 4.2	Demographic Characteristics of all Students by School, Course, and Grade.....	69
Table 4.3	Demographics of Students by Grade and Sex by Course.....	70
Table 4.4	Garden Participation Frequency for All Students.....	71
Table 4.5	Frequency of Students' Food and Garden Activity Participation....	73
Table 4.6	Descriptive Statistics and Effect Sizes for the Variables of the Study.....	75
Table 4.7	Mean and Standard Deviations for Variables of the Study by Class.	115
Table 4.8	Pearson Correlations among Study Variables.....	116
Table 4.9	Wilcoxon Signed Ranks Test among School Engagement, Future Educational Aspirations, and Activity Engagement.....	76
Table 4.10	Test Statistics for the Wilcoxon Signed Ranks Test for each Variable of the Study.....	77

LIST OF FIGURES

Figure 2.1	Process Model of Garden-Based Engagement.....	32
Figure 2.2	Conceptual Framework.....	33
Figure 4.1	Conceptual Model with Pearson Correlations.....	83

ABSTRACT

Author: Martin, Amonté, L. MS

Institution: Purdue University

Degree Received: May 2017

Title: An Exploratory Study of the Relationships among Middle School Students' Food and Garden Experiences and their Engagement and Motivation.

Major Professor: Levon T. Esters

The purpose of teaching in the traditional educational system, regardless of subject, or grade level, is for teachers to promote learning, and to develop learners and information seekers. Traditionally, within the public educational system, students grapple with the extraction of meaning from the content taught, and rarely detect the broader relevancy of the material. This dissonance results in students' low interest in the subject material, poor academic achievement, minimal classroom participation and engagement, and low motivation to learn. School gardens and garden-based learning activities can be used to enhance students' indirect academic outcomes, specifically, students' intrinsic motivation to learn, engagement via classroom participation, and school engagement by making students' educational experiences meaningful through the contextualization of their course content. The degree to which learning is promoted, and learners are developed, is determined by how teachers structure their classroom environment in an effort to orchestrate the acquisition of course content knowledge.

The purpose of this study was to explore and describe the relationships among middle school students' food and garden experiences and their school engagement, future educational aspirations, activity motivation, and activity engagement. The population for this study was middle school students ($N = 120$) enrolled in a course that offered a garden-based learning component at their schools. Quantitative data was collected at the

end of the school year using the Food and Garden Questionnaire which included retrospective pretest and posttest items. Descriptive statistics including means, standard deviations, frequencies, Pearson's correlation coefficients, and Wilcoxon nonparametric signed-rank tests were used to analyze the data. There were four conclusions for this study. First, middle school students who participated in food and garden activities were motivated and engaged while participating in those activities. Second, middle school students reported higher levels of school engagement after participating in food and garden activities. Third, middle school students reported higher levels of future educational aspirations after participating in food and garden activities. Fourth, there were positive and significant relationships among students' food and garden activity motivation, food and garden activity engagement, school engagement, and future educational aspirations. Future directions for research are provided as well as implications for the theory, research and practice.

CHAPTER 1. INTRODUCTION

1.1 Introduction

School gardens and garden-based learning activities can be used to enhance students' indirect academic outcomes, specifically, students' intrinsic motivation to learn, engagement via classroom participation, and school engagement (Ratcliffe, Merrigan, Rogers, & Goldberg, 2011; Skelly & Bradley, 2007; Skinner & Chi, 2012; Williams & Brown, 2012; Williams & Dixon, 2013) by making students' educational experiences meaningful through the contextualization of their course content (Johnson, 2002). The objective of teaching in a traditional educational system, regardless of subject, or grade level, is for teachers to promote learning through the acquisition of content knowledge. Teachers are endowed with the task of creating an environment that fosters learning for their students who bring various learning styles to the classroom. Students usually face challenges in traditional educational structures because content mastery is emphasized rather than content applicability (Williams & Brown, 2012). Traditionally, within the public educational system, students grapple with the extraction of meaning from the content taught, and rarely detect the broader relevancy of the material. This dissonance results in students' low interest in the subject material, poor academic achievement, minimal classroom participation and engagement, and low motivation to learn (Dotterer & Lowe, 2001). When students are unaware of how academic content is connected to the context of real life, they unknowingly forfeit their ability to garner meaning from the

content. An understanding of the course material in this case is synonymous to the course content's purpose, which is revealed through discovery (Johnson, 2002).

Discovery is what stems from students' understanding of the linkage between their educational content and course context, by which course context defines their educational content (Johnson, 2002). Also, within the traditional education structure, students are measured solely by their capacity to remember and regurgitate information. In the traditional education system, it is assumed that the memorization of subject content is equivalent to content mastery and content transferability. Students are seldom able to discover the meaning of course content, due to the decontextualization of the traditional method of teaching (Williams & Brown, 2012). In order for students to grasp the purpose and concepts of educational content being taught, teachers must move away from conventional monolithic teaching methods by way of contextualizing the subject material, so that students can identify the relationship between the course content, and its real-world significance and application (Williams & Brown, 2012). Previous research (Skelly & Bradley, 2007; Skinner & Chi, 2012; Williams & Dixon, 2013) has indicated that using school gardens as a pedagogical tool in the classroom to contextualize course content, has been shown to increase students' intrinsic motivation to learn, and class participation and engagement.

1.2 School Gardens

School gardens contextualize course content by promoting student learning through students' hands on interactions with their environment. Research has shown that school gardens not only aid in cultivating a more engaging, interesting, and dynamic learning experience for garden participants, but school gardens have also been found to

serve as a tool to enhance overall academic performance and outcomes of students who bring a diverse range of learning styles to the classroom (Hoffman, Knight, & Wallach, 2007). Researchers suggest teachers who wish to provide a context which fosters real-world experiences in science and math should employ the use of school gardening (Selmer, Rye, Malone, Fernandez, & Trebino, 2014). Globally, school gardens have become increasingly more popular in schools because of their utility to provide a complementary authentic context to the course curriculum. School gardens are being infused into courses to demonstrate how the academic content is connected to the context of subjects such as science, mathematics, language arts, nutrition, geography, literature, history, and health science (Williams & Dixon, 2013).

In the United States, garden-based curricula are being utilized within various grade levels, to not only enhance the learning experience, but also to foster student skill acquisition, and to meet subject standards (Williams & Dixon, 2013). Research has shown that students are more interested in the material being taught when teachers are able to transparently exhibit the link between classroom content and environmental context (Fusco, 2001). Students are notably more likely to take interest in class and academic activities when they can identify the connection between what they learn in the classroom and how the course material being taught is relevant, or directly related to the real world.

1.3 Statement of the Problem

The purpose of teaching in the traditional educational system, regardless of subject, or grade level, is for teachers to promote learning, and to develop learners and information seekers (Williams & Brown, 2012). The degree to which learning is

promoted, and learners are developed, is determined by how teachers structure their classroom environment in an effort to orchestrate the acquisition of course content knowledge. Williams and Brown (2012) argued that due to the “mechanistic orientation” of the way classroom environments’ are structured within the present educational system, schools have adopted an approach to teaching and learning that is not conducive to learning and creates academic trends, which are problematic.

Problematic trends deduced from the mechanistic nature of the present educational system include: fostering de-contextualization of learning, students’ loss of curiosity and wonder, homogenization of curriculum and learning, privileging of abstract ideas, perpetuation of individualism and autonomy, and stimulation of only certain senses (Williams & Brown, 2012). In order for the impact of these trends to be diminished or subdued, Williams and Brown suggested that education should move away from the lifeless “mechanistic” method of educating, and move progressively toward a holistic educational system, which values life itself. Williams and Brown also suggested that “a disconnection of education from life undermines the relevance of education to life” (p. 11).

Furthermore, the contextual teaching and learning approach to education enables students to engage in meaningful classroom work and activities that aid students in unveiling the big picture, by connecting their learned course material to their context in real life (Johnson, 2002). The process of identifying the relationship between course content and its application in real life context yields relevance and makes learning meaningful. Across the nation, school gardens are being utilized as a learning tool to aid educators in making learning meaningful by contextualizing classroom content (Ratcliffe,

Merrigan, Rogers, & Goldberg, 2011; Skinner & Chi, 2012; William & Brown, 2012; Williams & Dixon, 2013). Because of the current structure of the educational system, learners often experience negative indirect outcomes, which cause learners to become disengaged academically, resulting in a lack of motivation to learn and achieve. The present study will explore students' food and garden activity experiences relationship to their indirect academic outcomes, specifically students' school engagement, future educational aspirations, activity motivation, and activity engagement.

1.4 Significance of Study

This study is significant for three reasons: 1) this study enhances the evidence-based knowledge available regarding garden-based educational activities, and their relationship to students' indirect academic outcomes, 2) this study will examine an approach to education which provides an alternative way to reach and teach students who may be negatively affected by the traditional structure of the current educational system, which has been shown to enable students to become disengaged and unmotivated to learn (Williams & Brown, 2012), and, 3) this study expands upon the use of contextual teaching and learning in the context of garden-based learning.

First, this study is significant because it enhances the evidence-based knowledge available regarding garden-based educational activities, and their relationship to students' indirect academic outcomes, such as, motivation and school engagement. Only a few studies have explored the effects of garden-based educational programs relationship to student's achievement, engagement, and motivation. As school gardens and garden-based learning programs gain popularity across the country, an understanding of school gardens, and garden-based educational programs' utility to increase students' motivation

and engagement will aid in enhancing existing programs, inform the cultivation of new garden based programs, and policies that effect the funding of these initiatives (Ratcliffe et. al., 2011).

Second, this study will examine an approach to education which provides an alternative way to reach and teach students who may be negatively affected by the traditional structure of the current educational system. One of the most pressing educational issues has become the increase in the high school dropout rate. Students who lack motivation in school and are academically disengaged are more likely to drop out of high school than students who are academically engaged and motivated to learn (Christle, Jolivette, & Nelson, 2007; Fan & Wolters, 2012). Fan and Wolters (2014) argued that students are at a higher risk of dropping out of high school due to performing poorly academically and as a result of students becoming less engaged in school activities. Along with informing existing and potential school garden programs, the present study will add to the body of knowledge available to garden educators by exploring the extent to which school garden programs meet academic outcomes in an effort to legitimize the academic value of school garden programs. Legitimizing garden based educational programs through research is vital to the sustainability of school garden programs due to the increased potential for support via funding on the local district, state, and national levels (Williams & Dixon, 2013; Ratcliffe et. al., 2011).

Lastly, this study is significant because it expands the use of contextual teaching and learning in the context of garden-based learning. Contextual teaching and learning and garden-based learning at their core are characterized by the active discovery and uncovering of meaning. To date, the contextual teaching and learning framework has not

yet been used to conceptualize the phenomenon of school gardens and garden-based learning programs. This study will use contextual teaching and learning to conceptually frame the summation of traditional classroom learning and instruction with garden-based learning activities. Summation in this case refers to the coupling of traditional classroom learning with garden-based learning to create a contextualized teaching and learning environment to enhance student's learning experiences, in an effort to foster positive indirect academic outcomes (intrinsic motivation, school engagement, and future educational aspirations).

1.5 Purpose of Study

The purpose of this study was to explore and describe the relationships among middle school students' food and garden experiences and their school engagement, future educational aspirations, activity motivation, and activity engagement.

1.6 Research questions

This study addressed the following research questions:

1. To what extent:
 - a. Did students participate in food and garden experiences in their course?
 - b. Did students report their level of engagement in school before and upon completion of the school year?
 - c. Did students report their level of future educational aspirations in school before and upon completion of the school year?
 - d. Did students report their level of motivation in participating in food and garden activities?

- e. Did students report their level of engagement in food and garden activities before and upon completion of the school year?
2. What are the relationships among the following variables?
 - a. School Engagement (pre and post)
 - b. Future Educational Aspirations (pre and post)
 - c. Activity Motivation (Intrinsic Motivation, Autonomy, and Competence)
 - d. Activity Engagement (pre and post)

1.7 Assumptions

1. Data were collected using a survey-questionnaire and all responses accurately reflected participants' thoughts and beliefs.
2. Honest answers were provided by participants' who completed the questionnaire.
3. Participants participated in the study voluntarily, knowing that their participation would not affect their course performance.
4. The data collection materials were age appropriate for middle school participants.
5. All data were collected using valid and reliable instruments.
6. Participants were able to recall prior learning experiences for the retrospective portion of the survey-questionnaire.

1.8 Limitations

There exists three potential limitations of this study. First, the data were interpreted as being collected using a pre-experimental design without a comparison group. Second, because the demographic composition of the selected middle schools for

this study might be different from other middle schools nationally, the results are only generalizable to this study sample. Finally, the study utilized a retrospective pre-test design which relied on students' recollection of their garden experiences from the beginning of the school year.

1.9 Definition of Terms

The following is a list of terms used throughout the study:

- **Contextualized Teaching and Learning:** An educational process that aims to help students see meaning in the academic material they are studying by connecting academic subjects with the context of their daily lives, that is, with the context of their personal, social, and cultural circumstances (Johnson, 2002).
- **Garden-Based Learning:** An instructional strategy that utilizes a garden as an instructional resource, a teaching tool (Williams & Brown, 2012).
- **Activity Engagement:** Refers to the quality of a student's connection or involvement with the endeavor of schooling and hence with the people, activities, goals, values, and place that compose it (Skinner, Kindermann, & Furrer, 2009).
- **School Engagement:** Refers to student's perception of the goodness of fit between his or her needs and the specific environment (Hazel, Vazirabadi, & Gallagher, 2013).
- **Future Educational Aspirations:** Refers to the educational or vocational "dreams" students have for their future work lives (Sirin, Diemer, Jackson, Gonsalves, & Howell, 2004).
- **Intrinsic Motivation:** Performing an activity for itself to experience pleasure and satisfaction inherent in the activity (Ryan & Deci, 2000).

- **Autonomy:** The state of being self-initiated and self-regulated by one's own actions (Deci, Vallerand, Pelletier, & Ryan, 1991).
- **Competence:** The experience of behavior as effectively enacted (Niemiec & Ryan, 2009).
- **Disengagement:** Implies the absence of engagement, including the absence of effort or persistence (Skinner, Kindermann, & Furrer, 2009).
- **Self-Determination:** The process of utilizing one's will to satisfy one's psychological needs of autonomy, competence, and relatedness (Ryan & Deci, 2000).
- **Activity Motivation:** Describes students' awareness of being responsible for their decisions and actions, their confidence in their abilities to reach activity objectives, and their satisfaction and enjoyment in participating in that activity (Skinner & Chi, 2012).

CHAPTER 2. REVIEW OF LITERATURE

2.1 Introduction

This chapter will provide an overview of using school gardens as a way to contextualize academic content. Additionally, this chapter will review the literature of four primary related topic areas: 1) school gardening, 2) activity motivation, 3) engagement, and 4) contextual teaching and learning. The theoretical and conceptual frameworks will also be introduced in this chapter. Lastly, a brief summary will conclude the chapter.

2.2 Literature Review Methodology

This study was informed by literature across several academic disciplines, using a variety of search methods. References were found using the Purdue University library direct search, Purdue University e-Journal Database, Purdue University library catalog, Mendeley direct search, and Google Scholar. Examples of search terms and phrases used in the search for literature include: “contextual teaching and learning,” “contextualized teaching,” “school gardening + youth,” “garden based learning,” “self-determined learning,” “self-determination theory,” “intrinsic motivation + education,” “garden based education,” “garden + context + learning,” “intrinsic motivation + gardening,” “intrinsic motivation + school gardening,” and “school gardening + engagement”.

2.3 Purpose of Study

The purpose of this study was to explore and describe the relationships among middle school students' food and garden experiences and their school engagement, future educational aspirations, activity motivation, and activity engagement.

2.4 Research Questions

This study addressed the following research questions:

1. To what extent:
 - a. Did students participate in food and garden experiences in their course?
 - b. Did students report their level of engagement in school before and upon completion of the school year?
 - c. Did students report their level of future educational aspirations in school before and upon completion of the school year?
 - d. Did students report their level of motivation in participating in food and garden activities?
 - e. Did students report their level of engagement in food and garden activities before and upon completion of the school year?
2. What are the relationships among the following variables?
 - a. School Engagement (pre and post)
 - b. Future Educational Aspirations (pre and post)
 - c. Activity Motivation (Intrinsic Motivation, Autonomy, and Competence)
 - d. Activity Engagement (pre and post)

2.5 School Gardening

2.5.1 History and Current Status of School Gardening in the United States

In the United States, gardens were once used on school grounds as a resource for students to produce food during the food shortage of the First World War, not for educational purposes (Subramaniam, 2002). Using nature as a means of education through school gardening has a rich history in the U.S. (Suramaniam, 2002). Educators such as Liberty Hyde Bailey and others, have influenced the direction of the school garden movement by promoting the importance of hands-on learning in agriculture for those youth who were disconnected from rural America (Bailey, 1903; Childs, 2011). The next introduction of school gardens in U.S. history occurred between 1964 and 1975, introduced as a result of the elevation of environmental consciousness (Subramaniam, 2002). Regarded as the birth of the environmental movement, there existed a heightened sense of environmental consciousness during this time, which led to advocating for school gardens to be put in schools to teach students about environmental issues and solutions. Environmental gardens were fundamentally utilized to teach students about the environment to enhance their environmental awareness, essentially to raise their levels of environmental consciousness, and environmental empathy. These environmental gardens lacked rationale for academic worth and also faded away.

Today, in the United States, school gardens have again become increasingly popular, gaining public interest from educators, policymakers, and citizens (Ratcliffe, Kathleen, Rogers, & Goldberg, 2011). The foundational philosophy for the school garden movement rests on two pillars: 1) education, and 2) health and wellness. The rationale which upholds the educational pillar of the school gardening movement stems from

multiple waves of educational reform, specifically the No Child Left Behind Act, and the American Recovery and Reinvestment Act (William & Brown, 2012). The rationale which supports the health and wellness pillar of the school gardening movement emanates from a myriad of initiatives and programs geared toward addressing the pressing issue of childhood obesity (Ratcliffe, Kathleen, Rogers, & Goldberg, 2011). From a policy standpoint, the school gardening movement has seemed to have taken root in an abundance of available funding opportunities, public interest, educational need; but from a research perspective, there exists a lack of research about the extent to which school gardening garden-based educational programs meet academic indirect outcomes (Williams & Dixon, 2013).

2.5.3 Garden-Based Learning

Williams and Brown (2012) defined Garden-Based Learning (GBL) as “an instructional strategy that utilizes a garden as an instructional resource, a teaching tool” (p. 3). School gardens have gained popularity nationally because of their usefulness in raising students’ awareness as it relates to food and nutrition, promoting agricultural and environmental consciousness, and enhancing students’ indirect (e.g., motivation, engagement, achievement, etc.) and direct (e.g., grade point average, course specific test scores, etc.) academic outcomes (Ratcliffe, Kathleen, Rogers, & Goldberg, 2011; Williams & Brown, 2012). However, only a few studies have examined the effects of garden-based education programs on students’ school engagement and motivation.

A notable study conducted by Lieberman and Hoody (1998) examined over 400 students and 250 teachers in 40 schools. The authors found that students who were exposed to programs using the Environment as an Integrated Context (EIC) approaches

showed: 1) increased engagement and motivation to learn, 2) an improved sense of ownership in accomplishments, and 3) a decrease in disciplinary issues (Lieberman & Hoody, 1998). The findings from their study suggested that employing the outdoors as a means of instruction could aid in motivating and engaging students academically, which could lead to authentic learning and academic achievement.

Williams and Dixon (2013) conducted a comprehensive review where they synthesized the impacts of garden-based learning programs on indirect, direct, and other academic outcomes related to school gardens. The authors found that 83% of the studies which assessed direct learning outcomes found positive effects from school gardens (Williams & Dixon, 2013). The authors also identified 69 indirect academic outcomes and found that 80% of the studies reported positive effects of school gardens (Williams & Dixon, 2013). Additionally, of the 69 indirect outcomes measured, the authors found a 100% positive impact on motivation, even though motivation only accounted for 4% (3 outcomes out of the total 69 indirect outcomes measured) of the indirect outcomes measured. Furthermore, the authors also assessed “other outcomes” which were affected by school gardens and found a 50% positive impact in relation to students’ locus of control (autonomy), yet locus of control represented only 3% (2 studies) of the “other outcomes” measured. In total, of the 170 outcomes measured, which were affected by students’ participation in school gardening programs, the authors found only 5 outcomes (3% of all outcomes measured) related to students’ autonomy and motivation to learn. Results from this study speak to the potential of school gardens being used to positively impact students’ academic outcomes. Williams and Dixon’s study also suggests that more studies are needed to explore students’ motivation, engagement, and other indirect

outcomes because, “although practitioners, administrators, and policymakers may find the direct academic outcomes to be of primary interest, the totality of effects from indirect and other effects form what appears to be a systematic structure of positive impacts on many different levels for students exposed to school gardens” (p. 15).

A majority of the research which explores the use of school gardens has focused primarily on outcomes related to raising environmental awareness and consciousness, improving health and wellness through increased fruit and vegetable consumption, increase agricultural literacy – knowledge about the food system, and increasing academic outcomes (Berzowitz, Bontrager Yoder, & Schoeller, 2015; Fisher-Maltese & Zimmerman, 2014; Klemmer, Waliczek, & Zajicek, 2005; Koch, Waliczek, & Zajicek, 2006; Libman, 2007; Parmer, Salisbury-Glennon, Shannon, & Struempfer, 2009; Selmer, Luna, & Rye, 2015; Skinner & Chi, 2012; Ruiz-Gallardo, Verde, & Valdés, 2013; Williams & Dixon, 2013). Researchers have also measured academic outcomes by exploring students’ direct academic outcomes, such as standardized test scores, course test scores, and overall GPA. Only one study was found that explored specifically students’ indirect academic outcomes of intrinsic motivation, school engagement and achievement (Skinner & Chi, 2012).

Skinner and Chi (2012) sought to construct a set of brief quantitative indicators of student engagement in garden-based learning activities that were reliable and valid, and to examine whether they showed the predicted process links with student learning in the garden and school achievement. Prior to their study, no studies were found that included measures of student engagement related to garden based educational programs. Findings from their study also suggested that Self-Determination Theory could serve as a

framework to examine the academic impact on students' motivation and engagement when participating in garden-based educational programs.

2.6 Activity Motivation

Activity motivation describes students' awareness of being responsible for their decisions and actions, their confidence in their abilities to reach activity objectives, and their satisfaction and enjoyment in participating in those activities (Skinner & Chi, 2012). Activity motivation is comprised of three components: autonomy, competence, and intrinsic motivation.

2.6.1 Autonomy

Deci, Vallerand, Pelletier, and Ryan (1991) defined autonomy as "the state of being self-initiated and self-regulated by one's own actions" (p. 327). Autonomy exists when students identify the "dos and don'ts" within their classroom, and how students' govern themselves accordingly. Students are autonomous when they feel they are completely responsible for their decisions and actions in the classroom. Skinner and Chi (2012) suggest that "students with a greater sense of autonomy in school also achieve better outcomes such as classroom engagement, enjoyment, persistence, and learning" (p. 19).

Allen, Hauser, Bell, and O'Connor (1994) examined the ways in which autonomy and relatedness in observed parent-adolescent interactions predicted adolescent psychological development. The authors found that autonomy and relatedness in family interactions were strongly related to adolescent psychological development via their ego development and self-esteem. In terms of education, this finding suggests that when classroom environments foster structured autonomy, adolescents are more likely to

succeed and engage in school, which was also supported by Hafen, Allen, Mikami, Gregory, Hamre, and Pianta (2011).

Hafen, Allen, Mikami, Gregory, Hamre, and Pianta (2011) examined the extent to which secondary school students' perceptions about academic competence, teacher connection, and autonomy were associated with student-reported and observed engagement during a school year. Results from this study indicated that students' classroom autonomy was the strongest predictor of change in observed and student reported engagement. The authors argued that the reason autonomy may be the key to unlocking engagement in the classrooms is because autonomy is linked to ego development and self-esteem, which are fundamental needs of adolescent development. The authors also found that autonomy was associated with students' persistence and behavioral management in school.

Miserandino (1996) found that children who reported experiencing autonomy in school, also reported acting more curious, were more engaged, and persisted more while completing tasks in school. Miserandino also found a link between students' lack of autonomy and their emotions such as anger, anxiety, and less enjoyment. For this study, autonomy was explored by examining students' perceptions of their self-governing capacity in participating in food and garden activities. Students' autonomy was measured to explore a component of students' self-determination in participating in gardening activities.

2.6.2 Competence

Competence is defined as “the experience of behavior as effectively enacted” (Niemiec & Ryan, 2009, p. 135). Competence exists when an individual feels effective in

his or her interactions with the environment. In an educational context, competence exists when students feel that they are equipped with the knowledge and skills to perform a task successfully and efficiently. Students also experience competence when they are comfortable and confident in their abilities to reach academic objectives. Skinner and Chi (2012) suggested that “the need for competence may be met by experiences that problem-solving, effort, and persistence pay off in tangible outcomes” (p. 19).

Miserandino (1996) explored the impact of perceived competence and autonomy on above-average primary school students. Miserandino found that when students’ needs for competence or autonomy were unsatisfied, this lack of fulfillment of students’ needs was directly associated with negative effects and avoidance behavior. Miserandino also discovered that students reported negative affect and withdrawal behaviors, and ultimately showed a decline in performance when their need for competence or autonomy were perceived as unsatisfied. Miserandino discovered that a predictor of changes in students’ grades from the beginning to the end of the school year was their perceived competence and autonomy. Miserandino argued that when students perceived a lack of fulfillment regarding their need for competence or autonomy, manifested itself through students’ actions of “less involvement and persistence, more avoidance and ignoring behaviors accompanied by feelings of boredom and a lack of curiosity” (p. 208). The findings of this study align with Ryan and Deci’s (2000) assertion that students’ need for competence must be satisfied in order for students’ to become self-determined academically.

Raufelder, Regner, Drury, and Eid (2015) conducted a study which also confirms the notion of need satisfaction by examining if self-determination is a predictor of school

engagement of four different motivation types in middle school students. Raufelder, Regner, Drury, and Eid (2015) found that competence functioned as a predictor of school engagement, and that there existed significant positive correlations between each component of self-determination (i.e., autonomy, competence, and relatedness), and both dimensions of school engagement (i.e., behavioral and emotional) for each motivation type. This study further confirmed the notion set forth by Ryan and Deci (2000) that when students need for competence is met, they will be more likely to be self-determined, leading them to be more engaged in school. For this study, competence was examined to determine students' perception of their knowledge about gardening, and their ability to garden effectively, in an effort to gauge the competence element of students' self-determination.

2.6.3 Intrinsic Motivation

Intrinsic motivation is defined as performing a task or activity for the pleasure and satisfaction inherent in the task or activity (Ryan & Deci, 2000, p. 55). Research suggests that intrinsic motivation is positively related to academic achievement and improved learning outcomes (Ryan & Deci, 2000; Deci, Vallerand, Pelletier, & Ryan, 1991; Skinner & Chi, 2012). When intrinsic motivation is promoted through the process of teaching and learning, it has been found to improve the quality of learning, and enhance conditions that support students' autonomy, competence, and self-esteem (Deci & Ryan, 1985; Deci, Koestner, & Ryan, 1999; Niemic & Ryan, 2009; Ryan & Deci, 2000; Schunk, Meece, & Pintrich, 2014). Extrinsic rewards (e.g., gold stars, best-student awards, honor roles, dean's list, etc.) is an example of a condition that could positively or negatively affect students' intrinsic motivation.

Students' conceptual learning and critical thinking were shown to increase tremendously when educational conditions are created to foster intrinsic motivation, compared to educational settings that promote extrinsically structured learning (Deci, Koestner, & Ryan, 1999; Deci & Ryan, 1985; Niemic & Ryan, 2009; Ryan & Deci, 2000). An intrinsically motivated individual enacts behaviors when participating in an activity solely because they find it enjoyable. Also, intrinsically motivated individuals participate in tasks, because participating in a task is pleasurable, and the act of task participation is its own reward. Task participation isn't influenced by explicit rewards or other external constraints or motives. Cordova and Lepper (1996) found intrinsically motivated students became more deeply involved in classroom activities, they attempt to more difficult operations, and as a result learned more from classroom activities.

At the center of the educational process lie students' innate intrinsic behaviors and natural tendencies to learn. Students are considered intrinsically motivated when they perceive themselves as being autonomous (i.e., to feel self-determined in their learning) and competent (i.e., to feel they are efficacious) academically. Niemiec and Ryan (2009) stated that the "satisfaction of both basic needs for autonomy and competence is essential to sustained intrinsic motivation" (p.135). A self-determined student is an intrinsically motivated student whose basic needs for autonomy and competence are satisfied and maintained academically. A key indicator of an intrinsically motivated student is an engaged student. For this study, intrinsic motivation was measured to explore students' interest and engagement in participating in food and gardening activities.

2.7 Activity Engagement

The ultimate objective of education is for students to learn. In order for students to learn academically, experience academic achievement and success, students must be willing to proactively engage during class and class activities. Skinner, Wellborn, and Connell (1990) found that students who actively are more engaged in classroom activities, experience higher grades and standardized test scores than their peers. Engagement has been defined as, “the quality of student’s connection or involvement with the endeavor of schooling and hence with the people, activities, goals, values, and place that compose it” (Skinner, Kindermann, & Furrer, 2008, p. 2).

Several motivation theorists and researchers suggested that a motivated student is an engaged student because the act of engaging in an activity is a self-determined choice of willingness (Deci & Ryan, 1985, 2000; Connell & Wellborn, 1991; Skinner, Kindermann, & Furrer, 2008; Skinner & Pitzer, 2012; Kindermann, Connell, & Wellborn, 2009). In the field of education, self-determined engagement is vital to students’ academic achievement and success. To conceptualize engagement through a motivational lens, one must understand that two elements exist: 1) engagement encompasses behavioral and emotional academic participation, and 2) the absence of engagement, which is disengagement or disaffection must also be conceptualized (Connell & Wellborn, 1991; Kindermann, Connell, & Wellborn, 2009; Skinner & Pitzer, 2012; Skinner, Kindermann, & Furrer, 2008). Key indicators of students displaying engaged behaviors through a motivational conceptualization include students putting forth a mental effort and showing persistence. Chase, Hilliard, Geldhof, Warren, and

Lerner found that the greatest predictor of a higher GPA was behavioral school engagement.

Within the classroom, students who are attentive indicate putting forth mental effort. Students can also exemplify engaged behaviors or “academic behaviors,” by exemplifying “on-task”, and by participating in class (Skinner, Kindermann, Connell, & Wellborn, 2009; Skinner & Pitzer, 2012; Skinner, Kindermann, & Furrer, 2008). Dotterer and Lowe (2015) also found that students who feel that they are in an environment that is enriching and supportive, are more likely to engage emotionally and behaviorally in school. Key indicators of a student who is emotionally engaged within the motivational conceptualization show interest, enthusiasm, and enjoyment in class. The converse is also true for students who demonstrate the absence of engagement, which implies that they are disengaged or disaffected academically.

A student who is disengaged academically signifies the absence of persistence, effort, interest, and willingness or motivation to learn. Students’ willingness to learn is not the only precursor of students’ disaffection or disengagement. When students feel coerced or pressured to learn, academically excluded or isolated, and or experience boredom can also lead to low levels of engagement. Students’ relationships were explored to determine if students were engaged or disengaged while participating in their class and garden activities. In this study, the relationship between students’ engagement, their need for autonomy, competence, and intrinsic motivation were explored after students participate in a yearlong class which offered gardening activities.

2.8 School Engagement

Students are becoming increasingly more disengaged with school (Lee, 2014). It is estimated that 25% to 60% of students in the United States are disengaged from school (Lee, 2014). School engagement is defined as “student’s perception of the goodness of fit between his or her needs and the specific environment” (Hazel, Vazirabadi, & Gallagher, 2013, p. 1). Dotterer and Lowe (2011) argued that school engagement explains students’ feelings, behaviors, and thoughts about their school experiences and is important because of its link to school achievement and completion. Research also suggests that students’ school engagement is key to decreasing academic failure and disengagement, and increasing students’ academic outcomes and success (Parsons, Malloy, Parsons, Peters-Burton, & Burrowbridge, 2016; Lee, 2014; Wang & Fredricks, 2014; Dotterer & Lowe, 2011; Jimerson, Campos, & Greif, 2003; Hazel, Vazirabadi, & Gallagher, 2013; Chase, Hilliard, Geldhof, Warren, & Lerner, 2014).

School engagement is comprised of three elements: cognitive engagement, behavioral engagement, and emotional engagement (Table 2.1). Cognitive engagement refers to students’ self-perceptions and beliefs related to school, teachers, and other students (Dotterer & Lowe, 2011). Jimerson, Campos, and Greif (2003) offer examples of students’ cognitive engagement that include students’ academic motivation and aspirations regarding their sense of self-efficacy. Behavioral engagement refers to students’ class participation, school attendance, effort, and persistence, and completion of class work and homework (Fredricks, Blumenfeld, & Paris, 2004). Emotional engagement refers to students’ sense of belonging (Dotterer & Lowe, 2011), enjoyment in learning in school (Wang & Fredricks, 2014), and students’ attachment to their

teachers and classmates (Hazel, Vazirabadi, & Gallagher, 2013). Illustrated in Table 2.2 is the motivational conceptualization of school engagement which includes the three components of school engagement.

Table 2.1

Motivational Conceptualization of Engagement and Disengagement in School (Skinner & Pitzer, 2012)

	Engagement	Disengagement
Cognitive	<ul style="list-style-type: none"> • Purposeful • Goal Striving • Willing Participation • Self-Efficacy • Mastery 	<ul style="list-style-type: none"> • Helpless • Unwilling • Avoidance • Hopeless • Pressured
Behavioral	<ul style="list-style-type: none"> • Effort • Working Hard • Persistence • Focus, Attention • Involvement 	<ul style="list-style-type: none"> • Unfocused, Inattentive • Distracted • Mentally Withdrawn • Unprepared • Burned Out
Emotional	<ul style="list-style-type: none"> • Enthusiasm • Interest • Enjoyment • Satisfaction • Pride 	<ul style="list-style-type: none"> • Boredom • Disinterest • Frustration • Sadness • Worry, Anxiety

In an effort to understand how to motivate students to be more engaged in science and foster achievement in science fields, Lee, Hayes, Seitz, DiStefano, and O'Connor (2016) examined the relationships among motivational factors, and their integrative effects on engagement and science achievement in middle school students. Lee et al. found that engagement mediated the relationship between intrinsic motivation and

science achievement. Along the same lines of engagement mediating student achievement, Dotterer and Lowe (2011) examined if school engagement mediated the relationship between classroom context and academic achievement. The authors found that classroom context was an important predictor of students' school engagement, and confirmed that school engagement mediates the association between classroom context and academic achievement. These findings support the notion that students' engagement and subsequent academic achievement can be increased by enhancing classroom context.

There exists not only a linear relationship between students' school engagement and academic achievement, but also a bidirectional relationship. Chase, Hilliard, Geldhof, Warren, and Lerner (2014) found that students' GPA was not just a representation of an academic outcome but also predicted the degree to which students engaged in school. Chase et al. argues that, "the finding that GPA predicts all three aspects of school engagement suggests that students who thrive in school academically may be encouraged by their success, which may influence all three components of engagement in the school context" (p. 892). Chase et al.'s study highlights: 1) the importance of school engagement to students' academic success, and 2) the importance of students' academic success via their GPA to their school engagement. For the purpose of this study, students' school engagement will be examined before and upon completion of the food and garden activities to explore if the food and garden activities would be related to the level of students' school engagement.

2.9 Educational Aspirations

Future educational aspirations are defined as the educational or vocational "dreams" students have for their future work lives (Sirin, Diemer, Jackson, Gonsalves, &

Howell, 2004). Wilson and Wilson (1992) affirm that, “educational aspirations, or the level of educational attainment one desires to achieve, have been cited by various researchers as being among the most significant determinants of educational attainment” (p. 52). Initially, researchers suggested that students’ future educational aspirations were solely a reflection of their parent’s educational achievement. That is, students’ educational aspirations were directly related to the educational levels of their parents. Today, research regarding students’ future educational aspirations has moved away from the notion that parents’ educational attainment is the primary influence of their children’s future educational aspirations, to students’ future educational aspirations can be influenced by or positively related to their educational experiences in school (Wilson & Wilson, 1992).

Wilson and Wilson (1992) conducted a study to determine which factors within family and school environments influenced adolescents’ educational aspirations. Wilson and Wilson (1992) overwhelmingly found evidence that schools and teacher support were relevant to the effects on adolescents’ educational goals. Wilson and Wilson also found that when students felt supported by their teachers and perceived the climate of their schools to be conducive to perform well, students were more likely to have high educational aspirations and to pursue them. This study highlights the capacity of schools to foster students’ educational aspirations.

Students’ educational aspirations can not only be affected by their school experiences, but can also affect their academic expectations and achievement. Khattab (2015) found that when students’ academic expectations and aspirations were low, students’ academic achievement was highly negatively affected. Khattab discovered that

students' who held either high academic expectations or academic aspirations positively influenced school achievement. These findings suggest that supporting students' educational aspirations and expectations can have a positive effect on school achievement and educational outcomes.

Students' future educational aspirations guide students' short term and long term goals. Sirin et al. (2004) conducted a study to explore urban adolescents' future educational and volitional aspirations and to highlight the individual and social factors that influence them. Interestingly, Sirin et al. found that students' future educational aspirations seemed to reflect an awareness of the limitations of a high school diploma. Sirin et al. also discovered that "overall, students who appeared to have well-structured future plans (i.e., both short- and long-term goals in logical order) with a consideration of processes necessary to achieve their goals seemed to have an explicit plan to attend college" (p. 449). These findings suggest that students understand that furthering their education after high school is important and essential to achieving their educational aspirations. For the purpose of this study, students' future educational aspirations were examined before and upon completion of the food and garden activities, to explore if the food and garden activities were related to the level of students' future educational aspirations.

2.10 Conceptual Framework

2.10.1 Contextual Teaching and Learning

Johnson (2002) defines Contextual Teaching and Learning (CTL) as "an educational process that aims to help students see meaning in the academic material they are studying by connecting academic subjects with the context of their daily lives, that is,

with the context of their personal, social, and cultural circumstances” (p. 25). When developing a productive learning environment, Williams and Brown (2012) suggested that educators should discern that learning to know should not be separated from learning to do. CTL is an educational strategy based on the presumption that meaning arises from the relationship between course content and students’ context in real-life situations (Johnson, 2002). Glynn and Winter (2004) argued that, “contextual teaching and learning is based on situated cognition research, which has found that constructivist processes such as critical thinking, inquiry learning, and problem solving should be situated in relevant physical, intellectual, and social contexts” (p.51). CTL is comprised of six components: 1) problem-based learning, 2) multiple contexts, 3) self-regulated learning, 4) teaching and learning anchored in students’ diverse life, 5) authentic assessment, and 6) interdependent learning groups (Sears & Hersh, 1998) (Table 2.1).

Table 2.2

Six Components of Contextual Teaching and Learning (Johnson, 2002; Hersh, 1998)

Components of CTL

1. **Problem-Based Learning:** Problem-based learning is a strategy that begins by confronting students with a simulated or real problem. As students wrestle with a problem, they begin to realize that it can be viewed from very different perspectives and, that to resolve the problem, they need to integrate information from various disciplines. As students assume the roles of stakeholders who are affected by the resolution of the problem, they engage in higher-level thinking.
2. **Multiple Contexts:** Learning in multiple contexts draws upon current theories of cognition and learning suggesting that knowledge and learning are considered to be situated in particular physical and social context.
3. **Self-Regulated Learning:** SRL includes three characteristics: (1) awareness of thinking, (2) use of strategies, and (3) sustained motivation. Becoming self-regulated involves awareness of effective thinking and analyses of one's own thinking habits. Individuals can learn how to engage in self-observation, self-evaluation, and self-reaction to guide the plans they make, the strategies they select, and evaluation of their performances. A second aspect of SRL includes an individual's repertoire of strategies for learning, studying, controlling emotions, etc. Third, students' motivation influences choices they make and effort they extend. SRL involves motivation decisions about the goal of an activity, its perceived difficulty and value, self-perceptions of the learner's ability to accomplish the goal.
4. **Teaching and Learning Anchored in Students' Diverse Life:** Students are part of the context in which teachers teach. Today's students reflect the values and norms of different cultures and of cultures different from that of the majority of white, middle-class teachers. Students' cultural and social context is an important link to their achievement. Because it is an inherent and deep structural context, it automatically informs and connects to all learning. It can, therefore, be used as an instructional platform to allow students to move from what they now to what they do not know.
5. **Authentic Assessment:** Authentic Assessment challenges students to apply new academic information and skills to a real situation for a significant purpose. Authentic Assessment focuses on objectives, involves hands-on learning, requires making connections and collaborating, and includes higher order of thinking. Because authentic assessment tasks use these strategies, they allow students to display mastery of objectives and depth of understanding, while at the same time increasing their knowledge and discovering ways to improve. Authentic Assessment invites students to use academic knowledge in a real-world context for a significant purpose.
6. **Interdependent Learning Groups:** Learning activities occurring in various context are usually social – they involve other people. Interactions with learners in one's environment may be major determinants of what is learned and how learning occurs. Engagement in cooperative learning structures such as cohort groups appears to be an ideal means of encouraging interdependent learning.

The six components of CTL outline educational strategies that engage students in the learning process, and guide teachers in facilitating an environment where students immerse themselves in the exploration of their context to discover contextual meaning. The purpose of CTL is to merge their academic content with context (Johnson, 2002; Sears & Hersh, 1998). Lynch and Harnish (2003) conducted a study on novice educators' use of CTL in their classrooms to gain a better understanding of how CTL is applied in an authentic teaching context. The authors found that problem-based learning, project-based learning, collaborative learning, real-world applications, and authentic assessment were contextual teaching and learning strategies that were most utilized by novice teachers. They also found that novice teachers who employed contextual teaching and learning strategies in their classes yielded higher levels of learning, and students in these classes were more engaged, motivated, and attentive. Novice teachers who participated in the study believed that using CTL strategies had a positive impact on their students' level of engagement and content mastery (Lynch & Harnish, 2003).

Shamsid-Deen and Smith (2006) conducted a study which also adopted CTL as a framework to examine the level of knowledge family and consumer sciences teachers had on CTL, and also to investigate the extent to which contextual teaching and learning practices were used in their classes. Shamsid-Deen and Smith (2006) found that teachers had high to very high knowledge of CTL. The authors' study suggests that teachers, regardless of how many years in the profession, used one strategy of CTL during instruction. This study also suggested that teachers with more years of experience found CTL strategies more useful, and use CTL strategies more often than teachers who did not have as many years of teaching experience.

2.10.2 Conceptual Model

The conceptual model for this study was informed by the Process Model of Garden-Based Engagement (figure 2.1). The Process Model of Garden-Based Engagement is derived from the Self-Determination Model of Motivational Development (Skinner & Chi, 2012) and is based on the premise that a predictor of garden learning and engagement lie in garden participants' perception of their autonomy, competence, and intrinsic motivation while participating in a garden activity. This model also assumes that garden participants' self-perceptions of their autonomy, competence, and intrinsic motivation can predict school achievement and gardening learning. The Process Model of Garden-Based Engagement (Figure 2.1) explains garden participant's self-perceptions of their psychological needs for autonomy, competence, and intrinsic motivation which gives impetus to their actions of engagement vs. disaffection, and in turn predicts how their actions relate to their learning in the garden and school achievement.

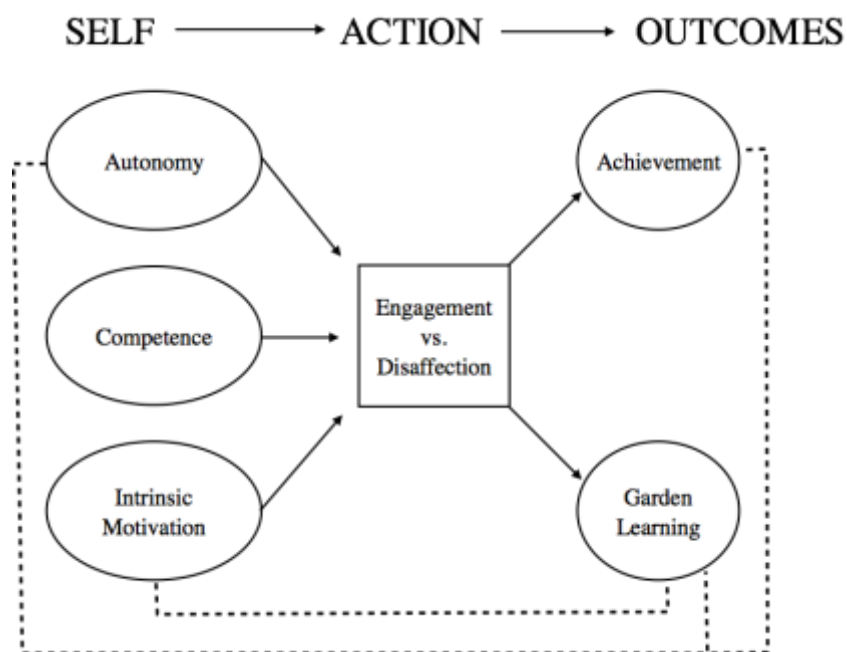


Figure 2.1. Process Model of Garden-Based Engagement (Skinner & Chi, 2012)

Contextual Teaching and Learning (CTL) was used to conceptually frame this study. The Process Model of Garden-Based Engagement (Figure 2.1) was adapted to explore and describe the effects of a contextualized course, which couples traditional course activities with food and garden activities, on students' food and garden activity engagement, before and after participating in yearlong food and garden activities. Furthermore, the Process Model of Garden-Based Engagement was also used to explain students' food and garden activity motivation relationship to their food and garden activity engagement, also to explain the relationship between students' food and garden activity engagement, and their future educational aspirations and school engagement. Similar to the Process Model of Garden-Based Engagement, the conceptual framework for this study (Figure 2.2) assumes that garden participant's self-perceptions of their activity motivation, gives impetus to their actions to engagement or disengagement in a classroom activity. Also, students' engagement or disengagement in a classroom activity will predict the nature of a positive or negative relationship to their future educational aspirations and school engagement.

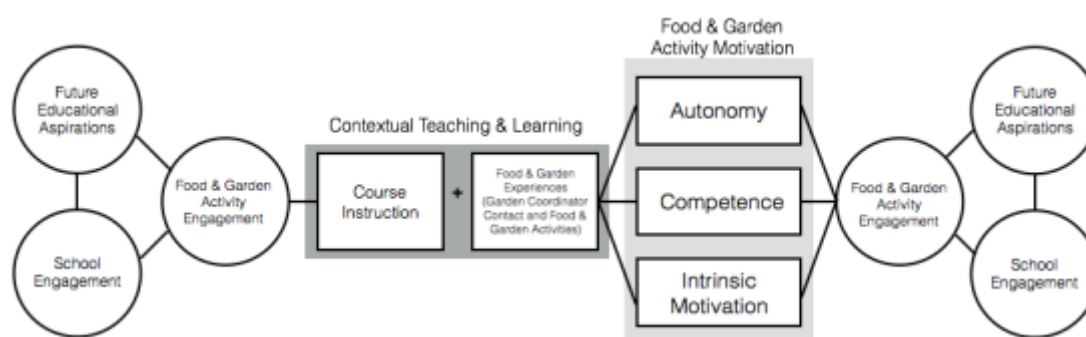


Figure 2.2. Conceptual Framework

2.11 Theoretical Framework

2.11.1 Self-Determination Theory

Self-determination is defined as the process of utilizing one's will (SDT; Deci & Ryan, 1985). For the present study, SDT was used to inform the variable of students' interest in participating in food and gardening activities. Self-determination theory is a motivational theory driven by intrinsic motivation that explores humans' growth tendencies and their capacity to satisfy their basic psychological needs (Deci & Ryan, 1985; Ryan & Deci, 2001; Deci, Vallerand, Pelletier, & Ryan, 1991). The satisfaction of psychological needs which fosters growth and development tendencies, are foundational components of one's self-motivation. Self-determination describes contextual determination and individuals' manifested attitudes and or behaviors within that context (e.g., within a classroom, in a laboratory, in a school garden, etc.) (Wehmeyer, Abery, Mithaug, & Stabcliffe, 2003). Inductively, Ryan and Deci (2000) have empirically identified three basic psychological needs that when satisfied deem individuals self-determined and include: autonomy, competence, and relatedness.

Applied to an educational context, SDT focuses mainly on fostering students' interest in learning, their appreciation for education, and confidence in their abilities to perform well academically (Deci & Ryan, 1985; Niemiec & Ryan, 2009). Academic achievement, academic engagement, and enhanced learning outcomes occur when students' psychological needs are supported by their teachers and academic environments (Reeve, Jang, Carrell, Jeon, & Barch, 2004; Jang, Reeve, & Deci, 2010); conversely, students can disengage academically resulting in poorer learning outcomes when their psychological needs are not met (Deci & Ryan, 1985; Ryan & Deci, 2000). Teachers play

an important role in supporting or discouraging students' basic psychological needs, which have been shown to contribute to students' motivation to learn and academic achievement (Niemiec & Ryan, 2009). The structure of learning environments and teachers are key components of fostering the psychological needs of learners.

2.12 Need for Study

The garden-based learning movement is growing rapidly as a result of increased availability of funding at all levels of government (i.e., local, state, and federal) which has led to the growth of more gardens in schools, and research exploring the benefits of these programs (Ozer, 2007; Libman, 2007; Ratcliffe, Merrigan, Rogers, & Goldberg, 2011; Skinner & Chi, 2012; Subramaniam, 2002; Williams & Brown, 2012; Williams & Dixon, 2013). As the number of school gardens increases nationally, so does the need for empirical research to explore garden experiences of teachers and students, as well as an examination of the impact school gardens have on direct (i.e., test scores, course grade) and indirect academic outcomes (i.e., curiosity, problem solving, discipline, attitudes toward academics, and life skills) of garden participants (Ozer, 2007; Libman, 2007; Ratcliffe, Merrigan, Rogers, & Goldberg, 2011; Skinner & Chi, 2012; Subramaniam, 2002; Williams & Brown, 2012; Williams & Dixon, 2013).

To date, research conducted on school gardens has focused primarily on school gardens' impact on students' direct academic outcomes (i.e., test scores, course grades) and on the school garden's ability to enhance students' nutritional consciousness (Ratcliffe, Merrigan, Rogers, & Goldberg, 2011; Skinner & Chi, 2012; Williams & Brown, 2012; Williams & Dixon, 2013). Further, only a few studies have explored school

garden's impact on students' indirect academic outcomes (i.e., engagement, interest, and motivation) (Skinner & Chi, 2012; Williams & Brown, 2012; Williams & Dixon, 2013).

Furthermore, no studies were found that used Contextual and teaching and learning to explore why garden-based educational programs are beneficial to students' academic outcomes. This study will explore and expand the use of CTL as a conceptual framework to examine the structure and nature of garden based educational program activities and their ability to conceptualize and enhance course material.

2.13 Summary

This chapter included the literature review methodology, purpose of the study, and research questions. It also provided literature on the current state of school gardening. Specifically, garden-based learning programs capability to enhance students' direct and indirect academic outcomes. Direct academic outcomes include grade point average (GPA) and test scores, while indirect academic outcomes include social development, problem solving, attendance motivation to learn, and school engagement.

This chapter also provided a review of literature on activity motivation. Activity motivation consist of three basic needs autonomy, competence, intrinsic motivation. The three basic needs of motivation were all operationalize using a modified Process Model of Garden-Based Engagement, a derivative of the Self-Determination Model of Motivational Development (Skinner & Chi, 2012).

Contextual Teaching and Learning (CTL) (Johnson, 2002) and Self-Determination Theory (Ryan & Deci, 2000) were presented as the conceptual and theoretical frameworks respectfully to guide this study. A literature review was conducted and introduced CTL as a framework to explain the process of using a food and

garden activities to contextualize course content. Self-Determination Theory (SDT) was presented as the theoretical framework for this study. SDT was used to frame the human psychological needs of autonomy, competence, and intrinsic motivation, which have been found to be important indicators of an engaged and motivated student (Deci & Ryan, 1985).

CHAPTER 3. METHODS

3.1 Introduction

This chapter will provide an overview of the research methods and procedures employed for this descriptive exploratory study. Particularly, this chapter will describe the purpose, research questions, research design, and criteria used to select the participants of this study. This chapter will also describe the instrument used in this study and address the selection of items used to measure the variables of this study, as well as the reliability and validity of the measures. Furthermore, to conclude this chapter, an explanation will be presented to describe the data collection procedures, data management, and data analyses procedures.

3.2 Purpose of the Study

The purpose of this study was to explore and describe the relationships among middle school students' food and garden experiences and their school engagement, future educational aspirations, activity motivation, and activity engagement.

3.3 Research Questions

This study addressed the following research questions:

1. To what extent:
 - a. Did students participate in food and garden experiences in their course?
 - b. Did students report their level of engagement in school before and upon completion of the school year?

- c. Did students report their level of future educational aspirations in school before and upon completion of the school year?
 - d. Did students report their level of motivation in participating in food and garden activities?
 - e. Did students report their level of engagement in food and garden activities before and upon completion of the school year?
2. What are the relationships among the following variables?
 - a. School Engagement (pre and post)
 - b. Future Educational Aspirations (pre and post)
 - c. Activity Motivation (Intrinsic Motivation, Autonomy, and Competence)
 - d. Activity Engagement (pre and post)

3.4 Research Design

This study was conducted from a positivist perspective, which assumes that knowledge is objectively gained through experimentation or observation (Scott & Morrison, 2005). A deductive approach was utilized to describe and explore students' perceptions of their activity motivation before and after participating in garden activities. The rationale for using a questionnaire was based on the theoretical and conceptual frameworks of the study along with a review of the literature and the current recommendations of the literature concerning research on contextual teaching and learning.

3.5 Institutional Review Board Approval

To protect the rights of the participants, the researcher completed the Collaborative Institutional Training Initiative (CITI) Course in the Protection of Human

Subjects online training. Following the completion of the CITI training, an application was submitted, complete with all materials and instrumentation to the Institutional Review Board (IRB) and Committee on the Use of Human Research Subjects at Purdue University. The researcher was granted approval from Purdue University's IRB on May 19, 2016. The approval letter is attached in Appendix A, for the research titled "*Exploring Food and Garden Activities Relationships among Garden Motivation and School Engagement of Eighth Grade Students*" (IRB protocol number: 1604017577).

Also in an effort to protect the rights of the participants, whom were minors, the researcher completed a Student Volunteer/Worker Criminal History Check Form, a Volunteer Form, and an IRB application detailing the research objectives, purpose and plan which were submitted online to the Shelby School District (pseudonym used to protect the school's identity). The researcher was granted approval from the Shelby School District via email. The researcher was also granted access to disseminate surveys on campus from the Shelby School District and from each school's principal. The approval emails from the school district and principals are attached in Appendix A.

3.6 Selection Criteria for Middle Schools

The target population for this study was middle school students enrolled in a course that offered a garden-based learning component at their schools. The state of Oregon was chosen because it was found to be a mature and sophisticated farm-to-school state and home to over 600 school gardens. Farm-to-school is an initiative that fosters student access to healthy, local foods and renders educational opportunities via school gardens, cooking lessons, and field trips to farms. Oregon is also the first state to institutionalize a Farm-to-School and School Garden Coordinator in both the state

agencies of Agriculture and Education. The middle schools participating in the study were located in Shelby, OR. This city was chosen after a review of cities that had middle schools with school gardens, and that used school gardens to help facilitate student learning in various course subjects. Additionally, in Shelby, there are 11 middle schools, and of these, only three offered garden-based learning opportunities for their students that aligned with their course content. For this reason, these three schools were targeted.

3.6.1 School Garden Coordinator

A school garden coordinator co-instructed each class during class time allocated to school gardening, and food and garden activities. A school garden coordinator was employed by FoodCorps and was assigned to the three schools under study to fulfill FoodCorp's mission, which is to connect kids to healthy food in school, so the students can lead healthier lives and reach their full potential.

3.6.2 School Demographics

Table 3.1 highlights the demographic profile of each school which includes the racial and ethnic makeup and the income level of students.

Table 3.1

Demographic Profile of Middle Schools Participating in the Study

School Name	Economically Disadvantaged ^a	English Learners ^b	Race/Ethnicity
Lincoln Middle	64%	19%	White, 54% Hispanic/Latino, 34% Native Hawaiian/Pacific Islander, 1% Multi-Racial, 6% Asian, 2% American Indian/Alaska Native, 2% Black/African American, 1%
Howard Middle	84%	49%	Hispanic/Latino, 60% White, 29% Native Hawaiian/Pacific Islander, 3% Multi-Racial, 3% Asian, 2% American Indian/Alaska Native, 1% Black/African American, 1%
Pines Middle	>95%	46%	Hispanic/Latino, 60% White, 30% Native Hawaiian/Pacific Islander, 2% Multi-Racial, 5% Asian, 1% American Indian/Alaska Native, 1% Black/African American, 1%

Note. ^aEconomically Disadvantaged is a term used by government institutions in allocating free school meals. The percentage of students who are categorized as economically disadvantaged also represents the percentage of students on free or reduced-priced lunch. ^bEnglish Learners are students who have been eligible for or participated in a program to acquire academic English.

3.6.3 Classes Surveyed

Table 3.2 list the classes that were surveyed and describes the purpose of each course. These classes were selected because teachers offered food and garden activities to complement course content.

Table 3.2

Descriptions of Course Acronyms and Course Objectives

School Name	Class Type	Class Description
Lincoln Middle:	AVID	Advancement Via Individual Determination (AVID), aims to eliminate the achievement gap between traditionally underserved populations and the general student population by preparing students for college and careers. AVID is designed to help students develop the critical thinking, organizational and academic skills needed to succeed in college.
Howard Middle:	FACS	Family and Consumer Science (FACS) is an introductory course where students explore basic information in the areas of foods and nutrition, sewing technology, and personal relationships. Students learn proper cooking and preparation techniques related to the following categories of foods: quick breads, eggs and poultry, international foods, cookies, and fruits and vegetables. In each unit students study recommended cooking techniques, scientific principles relating to recipes, and the role each plays in a healthy diet. The course integrates technical reading, writing, math/measurement, and problem solving within the curriculum. Basics of kitchen management and safety are integral to each lab situation. Healthy food choices are emphasized in each unit.
	Projects & Engineering	Projects and Engineering is an experiential learning, hands-on, and service learning course, which focused on school improvement and beautification.
Pines Middle:	Leadership	This course was geared toward developing students' leadership, critical thinking, problem solving, and communication skills through art projects in class, and around their school.

Note. Pseudonyms were used for the school names to insure confidentiality of the schools that were surveyed.

3.7 Selection Criteria for Study Participants

Middle school students who were enrolled in a course that offered a garden-based learning component were the target population of this study. Study participants had to meet the following criteria in order to be included in the final data analysis: 1) attended one of the three selected middle schools, and 2) at the time of the study, enrolled in a course that offered a garden-based learning component via a food and garden activities. There were 120 participants who met the criteria and were included in the final data analyses.

In order to meet the requirements of being enrolled in a course that offered a garden-based learning component, students' had to have participated in at least one of nine food and in-class garden activities throughout the school year. For the purpose of this study, food and garden activities were defined as any activity used or participated in or out of a school garden setting to aid in illustrating or teaching corresponding course content. The food and garden activities which were identified by a garden coordinator included: 1) Try-day Friday tasting table, 2) cooking with garden fruits and vegetables, 3) preparing garden beds, 4) caring for plants in the garden, 5) caring for plants in the green house, 6) learning and trying healthy cooking options, 7) learning about the health benefits of different vegetables, 8) garden planning, and 9) starting plants from seeds. Table 3.3 highlights the purpose of each food and garden activity and also explains students' task objectives while engaging in food and garden activities.

Table 3.3

Food and Garden Activities, Purpose of Activities, and Student Objectives and Tasks

Activity	Purpose of Activity	Student Task
1. Try-Day Friday Tasting Tables	To allow students the opportunity to taste the “fruits of their labor,” to explore garden yields through taste and smell, to allow students to develop their leadership and communication skills.	Students from classes with food and garden activities prepare, taste, serve, and explain the ingredients and growth cycle of produce grown in their garden to other students during lunch.
2. Cooking with Garden Fruits and Vegetables	To allow students to explore the variety of ways to cook with their grown produce, while learning how to follow recipes.	Students look up recipes of meals that can be made with their grown produce. Students also prepare the meals.
3. Preparing Garden Beds	To allow students to “get their hands dirty” while learning what is involved in planning, preparing, planting, caring for and harvesting their produce.	Students work collaboratively to install raised garden beds, plan where plants will be planted, and to explore which plants can be planted next to each other.
4. Caring for Plants in the Garden	To allow students to “get their hands dirty” while learning what is involved in planning, preparing, planting, caring for and harvesting their produce.	Students work collaboratively to maintain the health of garden plants, while learning about the growth cycle of plants.
5. Caring for Plants in the Greenhouse	To allow students to “get their hands dirty” while learning what is involved in planning, preparing, planting, caring for and harvesting their produce. To also allow students to learn about photosynthesis and the usefulness of greenhouses.	Students work collaboratively to maintain the health of garden plants, while learning about the growth cycle of plants.
6. Learning and Trying Healthy Cooking Options	To allow students to explore the variety of ways to cook with their grown produce, while also learning about the nutritional value about their produce.	Students actively listen to the garden coordinator explain methods of healthy cooking and its importance.

Table 3.3

(Continued)

7. Learning about the Health Benefits of Different Vegetables	To allow students to explore the variety of ways to cook with their grown produce, while also learning about the nutritional value about their produce.	Students actively listen to the garden coordinator explain the importance and benefit of eating healthy.
8. Garden Planning	To allow students to “get their hands dirty” while learning what all is involved in planning, preparing, planting, caring for and harvesting their produce.	Students work collaboratively to develop planting plans to plant fruits and vegetables in their gardens.
9. Starting Plants from Seeds	To allow students to “get their hands dirty” while learning what all is involved in planning, preparing, planting, caring for and harvesting their produce.	Students work collaboratively to plant seeds in their greenhouse, while actively listening to the garden coordinator explain the benefit of initiating plants’ growth from seed.

Note. Student task refers to students’ actions or sequence of actions that are performed while engaging in Food and Garden activities.

3.7.1 Participant Assent and Consent

Before the middle school students could participate in this study, and because they were minors, the students, and parents or guardians of the students had to provide informed consent and assent. The IRB approved parental memo and parental consent forms outlined the purpose and objectives of the study, the study procedures, and explained that students' participation in the study would be voluntarily. All information and details related to this study was contained within the IRB approved parental memo and parental consent forms. The parental memo and parental consent forms were sent them home with the students who were asked to share them with their parents in an effort to inform them of the study and to explain how their child would be participating.

The students were given the forms and instructed to have their parents read both the parental memo and parental consent forms, and have their parent sign only the parental consent form if they understood the study and study procedures, and if they agreed to allow their child to participate in the study. The students were given two weeks to take the parental memo and consent forms home, and to have the forms signed and turned back in to their teachers. Once the parental consent forms were signed, students were encouraged to bring the signed forms to class to give back to their teachers. Each teacher collected the parental consent forms and placed the forms in sealed box in their office. The parental memo and consent forms also explained to the parents that participation in the study would be voluntary and solely up to the students if he or she wanted to participate in the study.

The researcher picked up the forms from the teachers on each day of data collection. Before the questionnaires were handed out, the researcher reiterated that their

participation in the study was strictly voluntary, and that they did not have to participate in the study if they did not want to. The students who elected not to participate in the study were not given a questionnaire to complete. For the students who decided to participate in the study, they were given an assent form which re-stated that the study was voluntary and mentioned that all information gathered would be kept confidential. Once the assent form was complete students were given questionnaires to complete.

3.8 Instrumentation

A review of the literature revealed three instruments that met the goal of the study. As a result, the Process Model of Garden-Based Engagement (Skinner & Chi, 2012) was modified to meet the research questions of this study. The final instrument elicited information regarding: 1) garden participation, 2) food and garden activities, 3) educational engagement, 4) school engagement, 5) food and garden motivation, 6) school gardening engagement, and 7) demographic characteristics. The instrument for this study included retrospective pretest and posttest questions. Retrospective questions were included on the same survey as the pretest. Retrospective pretest questions were utilized to allow students to reflect on their food and garden experiences from the beginning of the school year. The instrument used for this study can be found in Appendix D.

3.8.1 Garden Participation

The first section of the questionnaire contained items regarding students' participation in food and gardening activities. These items elicited information regarding food and gardening activity dosage such as: students' previous gardening experience, students' enrollment in a school gardening class, student at home gardening, and students with friends or relatives with a garden.

3.8.2 Food and Garden Activities

This section of the instrument contained items measuring food and gardening activities that took place at the schools throughout the school year. The items in this section elicited information regarding the frequency to which students' participated in the listed activities throughout the school year. This section also measured dosage of students' participation in food and garden activities. Students responded by indicating how often they participated in the listed food and gardening activities (e.g., preparing garden beds) by using a 5-point rating scale: 1 = *Never*, 2 = *Once a year*, 3 = *Twice a year*, 4 = *Three times a year*, and 5 = *Four or more times per year*. Summed scores were divided by 5, with greater scores indicating that students participated in food and gardening activities three or more times per year.

3.8.3 School Engagement

Six self-reported items were adopted from the Educational Engagement Teen Survey (Lippman, Anderson-Moore, Guzman, Ramos, Caal, Carle, & Kuhfeld, 2014) to gain insight into students' frequency of classroom participation. For example, "*Care about doing well in school. All the Time*". For the first three items, students indicated their classroom participation and preparedness on a 4-point rating scale: 1 = *None of the Time*, 2 = *A little of the Time*, 3 = *Most of the Time*, and 4 = *All the Time*. For the remaining three items, students responded by indicating twice, for the beginning of the year, and at the end of the year their perception of their classroom engagement. Example item included: "*I think the things I learn in school are useful.*" Using a 4-point rating scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Agree*, and 4 = *Strongly Agree*. Negatively worded questions in this section were reverse coded. Lippman et al. reported

a Cronbach's alpha of 0.72, which supported the internal consistency reliability of this measure. For the current study, the post-hoc reliability coefficient was 0.80.

3.8.4 Future Educational Aspirations

Five self-reported items from the Student Engagement Instrument (Appleton, Christenson, Kim, & Reschly, 2006) instrument were used to elicit students' future goals and aspirations in an effort to gain an understand of a possible reason why students may engage in school - because it aligns with their future goals. Example items included: *"School is important for achieving my future goals"* or *"I plan to continue my education following high school."* Students responded by indicating twice, for the beginning of the year, and at the end of the year their future goals by using a 4-point rating scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Agree*, and 4 = *Strongly Agree*. Summed scores of each (beginning of the year column, end of the year column "today" from the questionnaire) were divided by 4, with greater scores indicating a greater degree of students believing that school was important to reaching their future goals. Appleton et al. (2006) reported a Cronbach's alpha of 0.78 on a sample of ninth grade students which supported the internal consistency reliability of this measure. For the current study, the post-hoc reliability coefficient was 0.92.

3.8.5 Food and Garden Activity Motivation

Food and garden activity motivation was comprised of three components: intrinsic motivation, autonomy, and competence.

3.8.5.1 Intrinsic Motivation

Three self-reported items were adapted from the Self-Regulatory Styles Questionnaire (as cited in Skinner & Chi, 2012) to elicit information regarding students'

engagement in gardening activities for intrinsic reasons or because the activity was fun. Example items included: “*It’s fun*” or “*I enjoy it.*” Students responded by indicating their intrinsic gardening reasoning by using a 4-point rating scale: 1 = *Not at all True*, 2 = *A little bit True*, 3 = *Fairly True*, and 4 = *Very True*. Summed scores were divided by 4, with greater scores indicating greater degree of believing that students garden because they enjoy it, or they believe it is fun. Skinner and Chi (2012) reported a Cronbach’s alpha of 0.88 on a sample of sixth and seventh grade students which supported the internal consistency reliability of this measure. For the current study, the post-hoc reliability coefficient was 0.81.

3.8.5.2 Autonomy

Six self-reported items from the Self-Regulatory Styles Questionnaire (as cited in Skinner & Chi, 2012) were used to obtain information regarding students’ autonomy orientation in the food and gardening activities. Three items in this section were used to explore why students externally engaged in food and gardening activities. Students indicated their autonomy orientation in food and garden activities by answering the question, “*Why do I participate in food and garden activities?*” An example response item included: “they make us.” The other three items were used to examine if students participated in the food and gardening activities for specific “identified” reasons. An example item included: “*it’s important to me.*” Students responded by indicating their autonomy orientation by using a 4-point rating scale: 1 = *Not at all True*, 2 = *A little bit True*, 3 = *Fairly True*, and 4 = *Very True*. Summed scores were divided by 4, with greater scores indicating greater the degree to which students’ believed that engaging in food and gardening activities was important, or because they wanted to learn. There existed three

negatively worded questions in this section which were reverse coded. Skinner and Chi (2012) reported a Cronbach's alpha of 0.85 on a sample of sixth and seventh grade students which supported the internal consistency reliability of this measure. For the current study, the post-hoc reliability coefficient was 0.77.

3.8.5.3 Competence

Six self-reported items from the Student Perceptions of Control Questionnaire (as cited in Skinner & Chi, 2012) were used to measure students' perceived competence in participating in the food and gardening activities. The items in this section elicited students' belief in themselves to perform food and gardening task well. Example items included: "*I am pretty good at gardening*" or "*I am not very good at gardening.*" Students responded by indicating their perceived competence in participating in the food and gardening activities by using a 4-point rating scale: 1 = *Not at all True*, 2 = *A little bit True*, 3 = *Fairly True*, and 4 = *Very True*. Summed scores were divided by 4, with greater scores indicating greater degree to which students' felt competent in their abilities to garden well. There existed two negatively worded questions in this section which were reverse coded. Skinner and Chi (2012) reported a Cronbach's alpha of 0.73 on a sample of sixth and seventh grade students which supported the internal consistency reliability of this measure. For the current study, the post-hoc reliability coefficient was 0.82.

3.8.6 Food and Garden Activity Engagement

Ten self-reported items were used from the Classroom Engagement scale to measure students' participation in academic activities (as cited in Skinner & Chi, 2012). The Classroom Engagement scale includes 10 items comprised of four dimensions: behavioral engagement, emotional engagement, behavioral disaffection, and emotional

disaffection. The Classroom Engagement scale was used in the present study to measure students' food and garden activity engagement. There existed one negatively worded question for each subsection listed below. All negatively worded questions were reversed coded.

3.8.6.1 Behavioral Engagement

Two items were used from Skinner and Chi's (2012) Engagement vs. Disengagement Scale to measure students' focused attention and persistence and hard work when participating in academic activities. An example item included: "*I try hard to do well.*" Students responded by indicating twice, for the beginning of the year, and at the end of the year their perceptions of their academic persistence on a 4-point rating scale: 1 = *Not at all True*, 2 = *A little bit True*, 3 = *Fairly True*, and 4 = *Very True*. Skinner & Chi (2012) reported a Cronbach's alpha of 0.85 on a sample of sixth and seventh grade students which supported the internal consistency reliability of this measure. For the current study, the post-hoc reliability coefficient was 0.86.

3.8.6.2 Emotional Engagement

Two items were taken from Skinner and Chi's (2012) Classroom Engagement Scale to measure students' interest and enjoyment in academic activities. An example of items includes: "*Gardening is interesting.*" Students responded by indicating twice, for the beginning of the year, and at the end of the year their perceptions of their enjoyment and interest in academic activities on a 4-point rating scale: 1 = *Not at all True*, 2 = *A little bit True*, 3 = *Fairly True*, and 4 = *Very True*. Skinner & Chi (2012) reported a Cronbach's alpha of 0.85 on a sample of sixth and seventh grade students which

supported the internal consistency reliability of the measure. For the current study, the post-hoc reliability coefficient was 0.86.

3.8.6.3 Behavioral Disengagement

Three items were used from Skinner and Chi's (2012) Engagement vs. Disengagement scale to measure students' lack of focused attention and persistence when participating in academic activities. An example of items includes: *"I can't wait for it to be over."* Students responded by indicating twice, for the beginning of the year, and at the end of the year their perceptions of their lack of academic persistence on a 4-point rating scale: 1 = *Not at all True*, 2 = *A little bit True*, 3 = *Fairly True*, and 4 = *Very True*. Skinner and Chi reported a Cronbach's alpha of 0.85 on a sample of sixth and seventh grade students which supported the internal consistency reliability of this measure. For the current study, the post-hoc reliability coefficient was 0.86.

3.8.6.4 Emotional Disengagement

Three items were used from Skinner and Chi's (2012) Engagement vs. Disengagement scale to measure students' lack of interest and enjoyment when participating in academic activities. Example item included: *"I don't care if I miss gardening class."* Students responded by indicating twice, for the beginning of the year, and at the end of the year their perceptions of their lack of enjoyment and interest in academic activities on a 4-point rating scale: 1 = *Not at all True*, 2 = *A little bit True*, 3 = *Fairly True*, and 4 = *Very True*. Skinner and Chi (2012) reported a Cronbach's alpha of 0.85 on a sample of sixth and seventh grade students which supported the internal consistency reliability of this measure. For the current study, the post-hoc reliability coefficient was 0.86.

3.8.7 Demographics Variables

The last section of the instrument contained items eliciting demographic information about the study's participants. These items gathered information such as participants' gender and race/ethnicity.

3.8.8 Validity

Thomas (2009) asserts that validity is the extent to which the instrument accurately assesses the construct which it intended to assess. For the current study, face and content validity were evaluated for by a panel of experts. The panel of experts consisted of five individuals, including three faculty members and two doctoral students. They were selected because of their knowledge of research methods and survey development. No major issues of validity were identified.

3.8.9 Reliability

Thomas (2009) contends that reliability is the extent to which an instrument consistently measures the same results on different occasions. Previous research established reliability measures of the Educational Engagement Teen Scale (Lippman et al., 2014), Student Perceptions of Control Scale (Skinner & Chi, 2012), Student Engagement Scale (Appleton et al., 2006), Self-Regulatory Styles Questionnaire and the Classroom Engagement Scale (Skinner & Chi, 2012). Post-hoc reliability scores were computed using Cronbach's Alpha Coefficient are displayed in Table 3.4. Reliabilities are considered acceptable according to social science standards if they are above 0.70 (Kline, 1999).

Table 3.4

Post-Hoc Reliabilities for the Food and Garden Questionnaire Scales

Scales	Cronbach's α	
	Reliabilities from the Literature	Post-hoc Reliabilities for this Study
Educational Engagement Teen Scale (6 items)	0.72	0.80
Student Engagement Scale (5 items)	0.78	0.92
Classroom Engagement Scale (10 items)	0.85	0.86
Activity Motivation (15 items)		0.88
Intrinsic Motivation (3 items)	0.88	0.81
Autonomy (6 items)	0.85	0.77
Competence (6 items)	0.73	0.82

3.9 Data Collection

When Purdue University's IRB granted approval to conduct this study, the IRB approval letter along with, an email detailing the study's purpose, objectives, and research plan were sent to the Shelby School District's IRB coordinator. Once the Shelby School District (SSD) granted the researcher permission to conduct this study, the SSD IRB coordinator then reached out to the middle school principals on the researcher's behalf to inform them of the study's purpose, objectives, and data collection plan. Next,

with assistance from the school Garden Coordinator, an itinerary was developed that best fit each teacher's availability.

The data collection itinerary and the number of students surveyed per class are shown in Table 3.5. During the class visits, the researcher read an information sheet that informed students of the purpose, content, and confidentiality aspects of the study. Prior to administering the survey instruments, the researcher used a white board to illustrate what and how to answer the "Beginning of the School Year" and the "Today" columns on the survey (Sections 3, 4, & 6). When students completed the assent forms they were instructed to raise their hands to notify either their teacher, garden coordinator, or the researcher that they had completed the forms. Next, the researcher accompanied by the classroom teacher and school garden coordinator administered the surveys. During survey administration, the researcher encouraged students to ask any questions they had in an effort to ensure they were answering the survey questions accurately. The survey took approximately 20 minutes for the students to complete. All completed surveys and assent forms were returned to the researcher.

Table 3.5

Data Collection Schedule for Participating Schools

Date	School Names	Grade Level of Students	Class Type	Number of Completed Questionnaires
June 6, 2016	Lincoln Middle	6 th	AVID	29
June 8, 2016	Howard Middle	6 th	FACS (Group1)	22
	Howard Middle	7 th - 8 th	Projects and Engineering	31
June 9, 2016	Howard Middle	6 th	FACS (Group 2)	17
	Pines Middle	8 th	Leadership	21
Total				120

Note. For analysis purposes, FACS group 1 and FACS group 2 were combined into one FACS group.

3.10 Data Management

The records of this study were kept private. No names, social security number, or other identifiers were used. Following IRB protocol, all information was stored in a locked cabinet in the researcher's secured office. Consent forms and completed surveys were kept secure along with the results of the study. Additionally, data that were entered were secured by a password-protected computer system.

3.11 Data Analysis

Quantitative data were collected using the Food and Garden questionnaire which included retrospective pretest and posttest items. The researcher used the Statistical Package of the Social Scientist (SPSS) Version 22 to analyze students' responses across all quantitative items. Descriptive statistics including means, standard deviations,

frequencies, Pearson's correlation coefficients, and Wilcoxon nonparametric signed-rank test were used to analyze the data (see Table 3.6).

For research question 1a, "*To what extent did students participate in food and garden experiences in their course?*" descriptive statistics were utilized. Frequency was used to describe students' prior participation in their food and garden activities.

For research question 1b, "*To what extent did students report their level of engagement in school before and upon completion of the school year?*" descriptive statistics were utilized. Means and standard deviations were used to describe students' level of school engagement or lack thereof before and upon completion of the school year.

For research question 1c, "*To what extent did students report their level of future educational aspirations in school before and upon completion of the school year?*" descriptive statistics were used to describe students' level of future educational aspirations before and upon completion of the school year.

For research question 1d, "*To what extent did students' report their level of motivation in participating in garden activities?*" descriptive statistics were utilized. Means and standard deviations were used to describe students' level activity motivation in participating in food and garden activities.

For research question 1e, "*To what extent did students report their level of engagement in participating in food and garden activities before and upon completion of the school year?*" descriptive statistics were utilized. Means and standard deviations were

used to describe students' level activity engagement before and upon completion of the school year.

For question 2a, "*What are the relationships between students' school engagement among the other variables measured?*" descriptive statistics and correlations were utilized. Means and standard deviations were used to describe students' level of future educational engagement. Pearson's correlation coefficients were utilized to determine the relationship between students' school engagement, and students' future educational aspirations, activity motivation, and activity engagement. The data was collected via purposive sampling and was not assumed to be randomly distributed. A Wilcoxon signed-rank test was used because it is the nonparametric equivalent of a matched paired t-test. The Wilcoxon nonparametric signed-rank test was used to understand whether there was a difference in students' school engagement before and upon completion of semester long food and garden activities.

For question 2b, "*What are the relationships between students' future educational aspirations among the other variables measured?*" descriptive statistics and correlations were utilized. Means and standard deviations were used to describe students' level of future educational engagement. Pearson's correlation coefficients were utilized to determine the relationship between students' future educational aspirations, and students' school engagement, and students' activity motivation, and activity engagement. The data was collected via purposive sampling and was not assumed to be randomly distributed. A Wilcoxon signed-rank test was used because it is the nonparametric equivalent of a matched paired t-test. The Wilcoxon nonparametric signed-rank test was used to understand

whether there was a difference in students' future educational aspirations before and upon completion of semester long food and garden activities.

For question 2c, "*What are the relationships between students' activity motivation among the other variables measured?*" descriptive statistics and correlations were utilized. Means and standard deviations were used to describe students' level activity motivation. Pearson's correlation coefficients were utilized to determine the relationship between students' activity motivation, and students' future educational aspirations, school engagement, and activity engagement.

For question 2d, "*What are the relationships between students' activity engagement among the other variables measured?*" descriptive statistics and correlations were utilized. Means and standard deviations were used to describe students' level of activity engagement. Pearson's correlation coefficients were utilized to determine the relationship between students' activity engagement, and students' school engagement, future educational aspirations, and activity motivation. The data was collected via purposive sampling and was not assumed to be randomly distributed. A Wilcoxon signed-rank test was used because it is the nonparametric equivalent of a match paired t-test. The Wilcoxon nonparametric signed-rank test was used to understand whether there was a difference in students' activity engagement before and upon completion of semester long food and garden activities.

Table 3.6

Research Questions, Variables, Scale of Measurement and Statistical Analysis Methods

Research Questions	Variables		Scale of Measurement	Analysis
	Independent	Dependent		
RQ1. To what extent:				
1a: Did students participate in food and garden experiences in their course?	F&G Experiences		Nominal	Frequency
1b: Did students report their level of engagement in school before and upon completion of the school year?	F&G Experiences	School Engagement	Interval	Mean, SD
1c: Did students report their level of future educational aspirations in school before and upon completion of the school year?	F&G Experiences	Future Ed. Aspirations	Interval	Mean, SD
1d: Did students report their level of motivation in participating in food and garden activities?	F&G Experiences	Activity Motivation	Interval	Mean, SD
1e: Did students report their level of engagement in participating in food and garden activities before and upon completion of the school year?	F&G Experiences	Activity Engagement	Interval	Mean, SD

Table 3.6

(Continued)

Research Questions	Variables		Scale of Measurement	Analysis
	Independent	Dependent		
RQ2. What are the relationships among the following variables?				
2a: School Engagement (pre and post)		School Engagement	Interval	Pearson's Correlation Coefficient, Wilcoxon Signed-Rank Test
2b: Future Educational Aspirations (pre and post)		Future Ed. Engagement	Interval	Pearson's Correlation Coefficient, Wilcoxon Signed-Rank Test
2c: Activity Motivation (Intrinsic Motivation, Autonomy, and Competence)		Activity Motivation	Interval	Pearson's Correlation Coefficient
2d: Activity Engagement (pre and post)		Activity Engagement	Interval	Pearson's Correlation Coefficient, Wilcoxon Signed-Rank Test

Note. F&G represents Food and Garden Activities.

Using the statistical test describe in Table 3.6, the relationships were then described. Descriptions of relationships were explained using Hopkin's (2000) conventions (Table 3.7).

Table 3.7

Conventions for Relationships (Hopkins, 2000)

Relationship Coefficient (r)	Convention
0.0 - 0.1	Trivial
0.1 - 0.3	Low
0.3 - 0.5	Moderate
0.5 - 0.7	High
0.7 - 0.9	Very Large
0.9 - 1.0	Nearly Perfect

Note. Relations were reported as positive or negative.

Descriptive statistics and significance test were used to establish knowledge claims. The level of significance was set at a *priori* of $p = 0.05$. In order to determine practical significance, effect sizes were utilized. Effect sizes with a medium or large effect size were classified as practically significant. For relationships calculated with Pearson's correlation, Cohen's conventions were used to describe effect sizes as shown in Table 3.8. Effect sizes for mean differences (See Table 3.9) were calculated using Cohen's d (1988).

Table 3.8

Conventions for Effect Sizes of Relationships (Cohen, 1988)

Effect Size Coefficient (r^2)	Convention
0.01 - 0.08	Small
0.09 - 0.24	Medium
> 0.25	Large

Table 3.9

Effect Size for Differences between Two Independent Means (Cohen, 1988)

Effect Size Coefficient (D)	Interpretation
0.0 - 0.2	Trivial
0.2 - 0.5	Small
0.5 - 0.8	Moderate
> 0.8	Strong

CHAPTER 4. RESULTS

4.1 Introduction

The findings of this study will be presented in this chapter. Data were analyzed using SPSS version 22 for Windows. Findings from this study are organized by first presenting the demographic characteristics of the participants. The remaining sections of the chapter are organized by presenting the findings for each of the eight research questions.

4.2 Purpose of the Study

The purpose of this study was to explore and describe the relationships of food and garden activities, school engagement, future educational aspirations, activity motivation, and activity engagement among eighth grade students.

4.3 Research Questions

This study addressed the following research questions:

1. To what extent:
 - a. Did students participate in food and garden experiences in their course?
 - b. Did students report their level of engagement in school before and upon completion of the school year?
 - c. Did students report their level of future educational aspirations in school before and upon completion of the school year?
 - d. Did students report their level of motivation in participating in food and garden activities?

- e. Did students report their level of engagement in food and garden activities before and upon completion of the school year?
2. What are the relationships among the following variables?
 - a. School Engagement (pre and post)
 - b. Future Educational Aspirations (pre and post)
 - c. Activity Motivation (Intrinsic Motivation, Autonomy, and Competence)
 - d. Activity Engagement (pre and post)

4.4 Demographic Characteristics of Participants

The following section presents the demographic characteristics of the study's participants. Of the 120 total students who met the study criteria (attended one of the three selected middle schools, and at the time of the study, were enrolled in a course that offered a garden-based learning component via a food and garden activities.), 51 (42.5%) of the students were male, and 69 (57.5%) were female (Table 4.1). Sixty-nine (57.5%) of the 120 students identified as White/Caucasian/European/Not Hispanic, thirty-three (27.5%) of the students identified as Mexican-American/Chicano/Hispanic/Latino.

Table 4.1

Demographics Characteristics of all Students by Race and Ethnicity, and Sex

	Race/Ethnicity			Sex	
	<i>f</i>	%		<i>f</i>	%
Black/African American	0	0	Male	51	42.5
White/Caucasian/European/Not Hispanic	33	27.5	Female	69	57.5
Alaska Native	0	0			
Native Hawaiian/Pacific Islander	0	0			
American Indian/ Native American	1	0.8			
Asian/Asian American	3	2.5			
Mexican-American/Chicano/Hispanic/Latino	69	57.5			
Multiracial	14	11.7			
Total	12	100.0		120	100.0

Of the 120 students, sixty-seven (55.8%) students were sixth graders, and eleven (9.2%) were seventh graders, and forty-two (35%) were eighth graders (Table 4.2). Seventy students (58%) attended Howard Middle School. Of the 70 students who attended Howard Middle School, 39 (32.5%) were in the FCAS class, and 31 (25.8%) were in the Projects and Engineering class.

Table 4.2

Demographics Characteristics of all Students by School, Course, and Grade

	School			Course			Grade	
	<i>f</i>	%		<i>f</i>	%		<i>f</i>	%
Howard	70	58.3	H-FACS	39	32.5	Grade 6	67	55.8
Lincoln	29	24.2	H-Projects	31	25.8	Grade 7	11	9.2
Pines	21	17.5	L-AVID	29	24.2	Grade 8	42	35.0
			P-Leadership	21	17.5			
Total	120	100.0		120	100.0		120	100.0

In the H-FACS class there were 38 (97.4%) sixth graders, and one seventh grader. There were only eighth graders ($f=21$) in the P-Leadership class, and only sixth graders ($f = 29$) in the L-AVID class. Female students comprised a majority of the P-Leadership (81%) and L-AVID classes (69%), and male students were the majority for the H-FACS (54.8%) and H-Projects (53.8%) classes (Table 4.3).

Table 4.3

Demographics of Students by Grade and Sex by Course

Course Name	Grade	<i>f</i>	%	Sex	<i>F</i>	%
H-FACS	6	38	97.4	Male	21	53.8
	7	1	2.6	Female	18	46.2
Total		39	100.0	Total	39	100.0
H-Projects	7	10	32.3	Male	17	54.8
	8	21	67.7	Female	14	45.2
Total		31	100.0	Total	31	100.0
P-Leadership	8	21	100.0	Male	4	19.0
				Female	17	81.0
				Total	21	100.0
L-AVID	6	29	100.0	Male	9	31.0
				Female	20	69.0
Total		120		Total	29	100.0

Note. H-FACS – Howard Middle School Family and Consumer Science class. H-Project – Howard Middle School Projects and Engineering class. P-Leadership – Pines Middle School Leadership class. L-AVID – Lincoln Middle School Advancement Via Individual Determination class.

4.5 Results for the Research Questions of the Study

The results for the study are presented for each research question. The statistical analyses used for each research question is described, as well as the results for each research question.

4.6 Results for Research Question 1a

Research Question 1a: *To what extent did students participate in food and garden experiences in their course?*

4.6.1 Students' Garden Participation

The Food and Garden Questionnaire contained four items regarding students' previous gardening experiences. Students' responses on their previous gardening experiences were based on their answering 1 = *Yes* and 2 = *No*. Students' responses to these items, depicted in Table 4.4, indicated information regarding students' previous gardening experience, students' enrollment in a school gardening class, students' gardening at home, and students' who garden with friends or relatives. Ninety (75%) of all students indicated that they had previously participated in a school gardening activity prior to taking on of the food and garden courses (i.e., H-FACS, H-Projects, P-Leadership, & L-AVID). Sixty-nine (57%) students indicated that they have a garden at home, and seventy (58.3%) students indicated that they gardened with a friend or a relative (Table 4.4).

Table 4.4

Garden Participation Frequency for All Students

Garden Participation Survey Questions	Yes		No		Total	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
1. Have you previously participated in a school gardening activity?	90	75.0	30	25.0	120	100.0
2. Are you currently enrolled in a school gardening class?	120	100.0	0	0	120	100.0
3. Do you have a garden at home?	69	57.5	51	42.5	120	100.0
4. Do you garden with a relative or friend?	70	58.3	50	41.7	120	100.0

4.6.2 Students' Participation in Food and Garden Activities

The Food and Garden Questionnaire contained items regarding food and gardening activities that took place at the schools throughout the school year. Students' responses to these items were based on 5-point rating scale: 1 = *Never*, 2 = *Once a year*, 3 = *Twice a year*, 4 = *Three times a year*, and 5 = *Four or more times per year*. Students' responses to these items are illustrated in Table 4.5. Fifty-six (46.7%) students indicated that they participated in Try-Day Friday Tasting Tables four or more times per year. Only seven (5.8%) students indicated that they never cared for garden plants through the year. Twenty-eight (23.3%) students indicated that they never participated in Cooking with Garden Fruits and Vegetables per year. Twenty-nine (24.2%) students indicated that they participated in Preparing Garden Beds once per year. Fifty-three (44.2%) students indicated that they participated in Caring for Plants in the Garden four or more times per year. Thirty-six (30%) students indicated that they participated in Learning about the Health Benefits of Different Vegetables four or more times per year. Thirty (25%) students indicated that they participated Starting Plants from Seeds three or more times per year. Eighty-two (68%) students indicated that they participated in Try-Day Friday Tasting Tables three or more times per year. Seventy-seven (64%) students indicated that they cared for or provided maintenance for plants in the garden. Seventy-two (60%) students indicated that they cooked with garden fruits and vegetables two times or fewer per year. Seventy-one (59%) students indicated that they cooked with garden fruits and vegetables two times or fewer per year.

Table 4.5

Frequency of Students' Food and Garden Activity Participation

Food and Garden Activity Participation Survey Questions	Never		Once a Year		Twice a Year		Three Times a Year		Four or More Times Per Year		Total	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
1. Try-Day Friday Tasting Tables	15	12.5	9	7.5	14	11.7	26	21.7	56	46.7	120	100.0
2. Cooking with Garden Fruits and Vegetables	28	23.3	24	20	20	16.7	25	20.8	23	19.2	120	100.0
3. Preparing Garden Beds	15	12.5	29	24.2	25	20.8	29	24.2	22	18.3	120	100.0
4. Caring for Plants in the Garden	7	5.8	16	13.3	20	16.7	24	20.0	53	44.2	120	100.0
5. Caring for Plants in the Greenhouse	19	15.8	22	18.3	15	12.5	29	24.2	22	18.3	120	100.0
6. Learning and Trying Healthy Cooking Options	12	10.0	21	17.5	31	25.8	30	25.0	26	21.7	120	100.0
7. Learning about the Health Benefits of Different Vegetables	11	9.2	11	9.2	25	20.8	37	30.8	36	30.0	120	100.0
8. Garden Planning	21	17.5	27	22.5	23	19.2	23	19.2	26	21.7	120	100.0
9. Starting Plants from Seeds	19	15.8	16	13.3	27	22.5	30	25.0	28	23.3	120	100.0

4.7 Results for Research Question 1b

Research Question 1b: *To what extent did students report their levels of engagement in school before and upon completion of the school year?*

4.7.1 Students' School Engagement

The Educational Engagement Teen Survey measured students' perception of their level of school engagement before and upon completion of the school year. Students' responses on their perceived level of school engagement were on a 4-point rating scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Agree*, 4 = *Strongly Agree*. The students' average scores, depicted in Table 4.6, were "Agree" ($M = 3.03$, $SD = .65$) at the beginning of the score year, and "Agree" ($M = 3.34$, $SD = .48$) upon completion of the school year. Students' average scores by course are illustrated in Table 4.7. The students' average scores indicated that they perceived themselves to be engaged in school before and after the school year. Further, Cohen's effect size ($d = .54$) indicated moderate to medium practical significance.

The data was collected via purposive sampling and was not assumed to be randomly distributed. A Wilcoxon signed-rank test was used because it is the nonparametric equivalent of a match paired t-test. The Wilcoxon nonparametric signed-rank test was to understand whether there was a difference in students' school engagement before and upon completion of semester long food and garden activities. The findings revealed that more students perceived themselves to be more engaged in school than their classmates. Illustrated in Table 4.9, more students ($N = 69$) reported a higher posttest score regarding their school engagement than students who reported a higher pretest score, which indicates that students perceived themselves to be more engaged in

school upon completion of food and garden activities. Also, twenty-three students reported showed no change between their pretest scores and posttest scores regarding their school engagement. Depicted in Table 4.10 are the test statistics for the Wilcoxon signed rank test for each variable measured.

Table 4.6

Descriptive Statistics and Effect Size for the Variables of the Study

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	<i>D</i>	Effect Size
School Engagement PRE ^a	120	3.03	.65	0.54	Moderate
School Engagement POST ^a	120	3.34	.48		
Future Educational Aspirations PRE ^b	120	3.38	.71	0.60	Moderate
Future Educational Aspirations POST ^b	120	3.72	.37		
Activity Motivation ^c	120	3.08	.55		
Intrinsic Motivation	120	3.10	.72		
Autonomy	120	3.04	.67		
Competence	120	3.11	.60		
Activity Engagement PRE ^d	120	3.16	.60	0.34	Small
Activity Engagement POST ^d	120	3.37	.62		

Note. ^aScale: 1 = None of the Time, 2 = A little of the Time, 3 = Most of the Time, 4 = All of the Time; ^bScale: 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree; ^c(posttest only) Scale 1 = Not at all True, 2 = A little bit True, 3 = Fairly True, 4 = Very True; ^dScale 1 = Not at all True, 2 = A little bit True, 3 = Fairly True, 4 = Very True.

Table 4.9

Wilcoxon Signed Ranks Test among School Engagement, Future Educational Aspirations, and Food and Garden Activity Engagement

Variables	Ranks	<i>N</i>	Mean Rank	Sum of Ranks
School Engagement	Negative Ranks	69 ^a	52.16	3599.00
	Positive Ranks	28 ^b	41.21	1154.00
	Ties	23 ^c		
	Total	120		
Future Educational Aspirations	Negative Ranks	53 ^d	34.43	1825.00
	Positive Ranks	10 ^e	19.10	191.00
	Ties	57 ^f		
	Total	120		
Food and Garden Activity Engagement	Negative Ranks	62 ^g	44.64	2767.50
	Positive Ranks	23 ^h	38.59	887.50
	Ties	35 ⁱ		
	Total	120		

Note. a. School Engagement PRE < School Engagement POST, b. School Engagement PRE > School Engagement POST, c. School Engagement PRE = School Engagement POST, d. Future Educational Engagement PRE < Future Educational POST, e. Future Educational Engagement PRE > Future Educational POST, f. Future Educational Engagement PRE = Future Educational POST, g. Food and Garden Activity Engagement PRE < Food and Garden Activity Engagement POST, h. Food and Garden Activity Engagement PRE > Food and Garden Activity Engagement POST, i. Food and Garden Activity Engagement PRE = Food and Garden Activity Engagement POST

Table 4.10

Test Statistics for the Wilcoxon Signed Ranks Test for each Variable of the Study

Variables	School Engagement PRE – School Engagement POST	Future Educational Aspirations PRE – Future Educational Aspirations POST	Activity Engagement PRE – Activity Engagement POST
<i>Z</i>	-4.43 ^a	-5.62 ^a	-4.13 ^a
Sig (2-tailed)	.000	.000	.000

Note. a. Based on positive ranks.

4.8 Results for Research Question 1c

Research Question 1c: *To what extent did students report their level of future educational engagement before and upon completion of the school year?*

4.8.1 Students' Future Educational Engagement

The Student Engagement Instrument measured students' future goals and aspirations before and upon completion of the school year. Students' responses on their perceived future educational aspirations were based on a 4-point rating scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Agree*, 4 = *Strongly Agree*. The students' average scores, depicted in Table 4.6, were "Agree" ($M = 3.38$, $SD = .71$) at the beginning of the school year, and "Agree" ($M = 3.72$, $SD = .37$) upon completion of the school year. Students' average scores by course are illustrated in Table 4.7. The students' average score indicated that students' perceived themselves to have a positive perception of their future goals and aspirations. Further, Cohen's effect size ($d = .60$) indicated moderate to medium practical significance.

The data for this study was collected via purposive sampling and was not assumed to be randomly distributed. A Wilcoxon signed-rank test was used because it was the nonparametric equivalent of a matched paired t-test. The Wilcoxon nonparametric signed-rank test was used to understand whether there was a difference in students' future educational aspirations before and upon completion of semester long food and garden activities. The findings indicated that more students perceived themselves to have higher levels of post future educational aspirations than their classmates. Illustrated in Table 4.9, more students ($N = 53$) reported a higher posttest score regarding their future educational aspirations than students ($N = 10$) who reported a higher pretest score, which indicates

that students perceived themselves to have higher levels future educational aspirations upon completion of food and garden activities. Also, fifty-seven students reported showed no change between their pretest scores and posttest scores regarding their future educational aspirations. Depicted in Table 4.10 are the test statistics for the Wilcoxon signed rank test for each variable measured.

4.9 Results for Research Question 1d

Research Question 1d: *To what extent did students report their level of motivation in food and garden activities?*

4.9.1 Food and Garden Activity Motivation

The Self-Regulatory Styles Questionnaire and the Student Perceptions of Control Questionnaire measured students' food and garden activity motivation through their perceptions of their intrinsic reasoning for engaging in food and garden activities, their autonomy orientation in the food and gardening activities, and their perceived competence in participating in the food and gardening activities upon completion of the school year. Students' responses on their perceived food and garden activity motivation via their intrinsic motivation, autonomy, and competence were based on a 4-point rating scale: 1 = *Not at all True*, 2 = *A little bit True*, 3 = *Fairly True*, 4 = *Very True*. The students' average scores, depicted in Table 4.6, were "Fairly True" ($M = 3.08$, $SD = .55$) for their perceived food and garden activity motivation, "Fairly True" ($M = 3.10$, $SD = .72$) for their perceived intrinsic motivation, "Fairly True" ($M = 3.04$, $SD = .67$) for their perceived autonomy, and "Fairly True" ($M = 3.11$, $SD = .60$) for their perceived competence upon completion of the school year. Students' average scores by course are illustrated in Table 4.7. The students' average scores indicated a positive level of activity

motivation, and that students' perceived themselves to be intrinsically motivated, autonomous, and competent from having participated in food and garden activities.

4.10 Results for Research Question 1e

Research Questions 1e: *To what extent did students report their level of engagement in food and garden activities before and upon completion of the school year?*

4.10.1 Food and Garden Activity Engagement

The Classroom Engagement scale measured students' level of food and garden activity engagement or disengagement. Students' responses on their perceived food and garden activity engagement were based on a 4-point rating scale: 1 = *Not at all True*, 2 = *A little bit True*, 3 = *Fairly True*, and 4 = *Very True*. The students' average scores, depicted in Table 4.6, were "Fairly True" ($M = 3.16$, $SD = .60$) for their activity engagement at the beginning of the school year, and "Fairly True" ($M = 3.37$, $SD = .62$) upon completion of the school year. Students' average scores by course are illustrated in Appendix E (Table 4.7). The students' average scores indicated that students perceived themselves to be engaged in food and garden activities before and upon completion of the school year. Further, Cohen's effect size value ($d = .34$) indicated small practical significance.

The data was collected via purposive sampling and was not assumed to be randomly distributed. A Wilcoxon signed-rank test was used because it was the nonparametric equivalent of a match paired t-test. The Wilcoxon nonparametric signed-rank test was to understand whether there was a difference in students' food and garden activity engagement before and upon completion of semester long food and garden activities. The findings revealed that more students perceived themselves to be more engaged in the food and garden activities than their classmates. Illustrated in Table 4.9,

more students ($N = 62$) reported a higher posttest score regarding their food and garden activity engagement than students who reported a higher pretest score, which indicates that more students perceived themselves to be more engaged in the food and garden activities upon completion of those activities. Also, twenty-three students reported a tie or no change between their pretest scores and posttest scores regarding their food and garden activity engagement. Depicted in Table 4.10 are the test statistics for the Wilcoxon signed ranks test for each variable measured.

4.11 Results of Research Question 2

Research Question 2: *What are the relationships among students' school engagement, future educational aspirations, activity motivation, and activity engagement?*

4.11.1 Pearson's Correlation among Variables

Pearson's correlation coefficients were used to describe the relationship between students' school engagement, future educational aspirations, activity motivation, and activity engagement (figure 4.1). To measure effect size, Cohen's (1988) conventions were used and Hopkins (1997) conventions were used to measure strength of relationships. An effect size (r^2) that is $<.08$ is considered small, an r^2 between $.09$ -. 24 is considered medium and an $r^2 >.25$ is noted as a large effect size. Practically significant effects are evidenced by effect sizes of $.09$ (medium) or larger. The strength of a relationship (r) is assessed on a scale of trivial ($.00$ -. 10), low ($.11$ -. 30), moderate ($.31$ -. 50), high ($.51$ -. 70), very large ($.71$ -. 90) and nearly perfect ($.91$ - 1.00).

Overall, there were several significant correlations among the variables illustrated in Figure and 4.1 and Appendix F (Table 4.8). Students' future educational aspirations was significantly correlated to students' (pre) school engagement ($r = .21$, low, positive),

post school engagement ($r = .66$, high, positive), pre future educational aspirations ($r = .32$, moderate, positive), activity motivation ($r = .36$, moderate, positive), intrinsic motivation ($r = .35$, moderate, positive), autonomy ($r = .42$, moderate, positive), and post activity engagement ($r = .43$, moderate, positive). The results from the correlational analyses are shown in figure 4.1. Students' post food and garden activity engagement was significantly correlated to food and garden activity motivation ($r = .71$, very large, positive), intrinsic motivation ($r = .66$, high, positive), autonomy ($r = .67$, high, positive), competence ($r = .47$, moderate, positive), post school engagement ($r = .58$, high, positive), and post future educational aspirations ($r = .43$, moderate, positive). Also, students' school engagement was significantly correlated to their future educational aspirations ($r = .66$, high, positive). The findings revealed that as students' participation in food and garden activities increased, students reported being more engaged in school, classroom activities, and more motivated to participate in those activities.

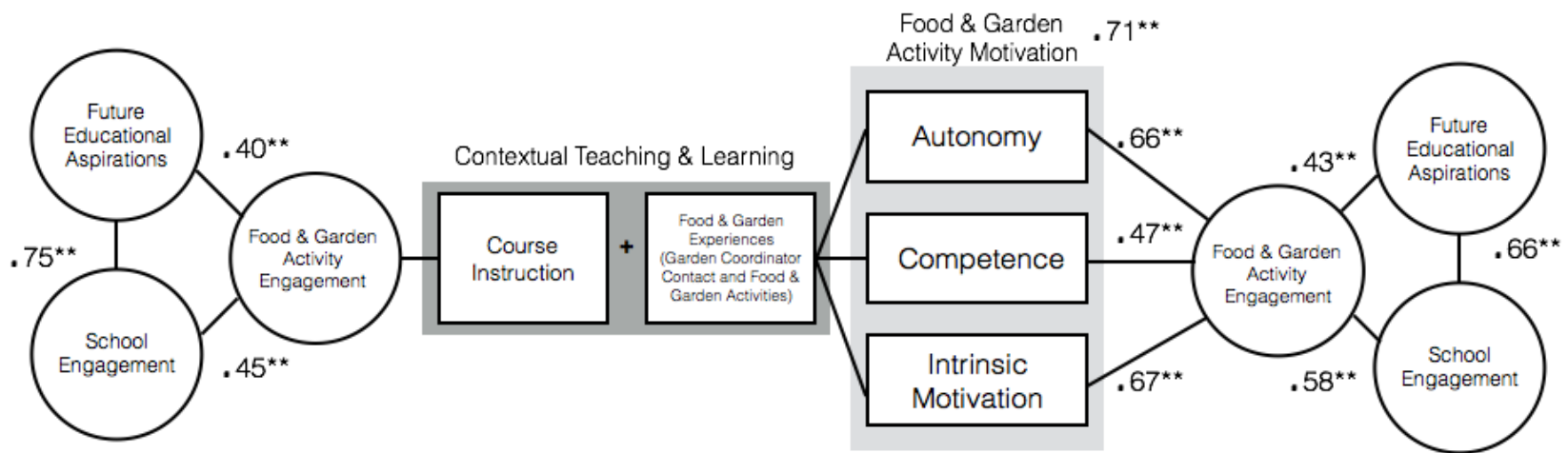


Figure 4.1 Conceptual Model with Pearson Correlations

CHAPTER 5 CONCLUSIONS AND DISCUSSION

5.1 Introduction

The following section presents conclusions for this study. There were four conclusions from the study, which are listed below, followed by a discussion regarding the contribution to the knowledge base and implications for practice for each conclusion. The chapter concludes with implications for theory and research, and recommendations for future research.

5.2 Purpose of the Study

The purpose of this study was to explore and describe the relationships of food and garden activities, school engagement, future educational aspirations, activity motivation, and activity engagement among eighth grade students.

5.3 Research Questions

This study addressed the following research questions:

1. To what extent:
 - a. Did students participate in food and garden experiences in their course?
 - b. Did students report their level of engagement in school before and upon completion of the school year?
 - c. Did students report their level of future educational aspirations in school before and upon completion of the school year?
 - d. Did students report their level of motivation in participating in food and garden activities?

- e. Did students report their level of engagement in food and garden activities before and upon completion of the school year?
2. What are the relationships among the following variables?
- a. School Engagement (pre and post)
 - b. Future Educational Aspirations (pre and post)
 - c. Activity Motivation (Intrinsic Motivation, Autonomy, and Competence)
 - d. Activity Engagement (pre and post)

5.4 Conclusion 1

Middle school students who participated in Food and Garden activities were motivated and engaged while participating in those activities.

5.4.1 Discussion

In examining the ways in which students were motivated to participate in food and garden activities, and engaged while participating in food and garden activities, two subscales were utilized in the Food and Garden Questionnaire: food and garden activity motivation and food and garden activity engagement. Students were asked why they participated in food and garden activities with overall responses indicating that students perceived themselves to be intrinsically motivated, autonomous, and competent regarding their food and garden activity motivation. The findings revealed that as students' participation in food and garden activities increased, students reported being more engaged in classroom activities and more motivated to participate in those activities. These findings also suggest that students enjoyed participating in food and garden activities, they felt comfortable and confident in their abilities to reach food and garden activity goals and objectives, and they felt in control and responsible for their decisions

and actions regarding completing food and garden activity task. Further, students were also asked if they were engaged in food and garden activities and students reported that they were engaged while participating in food and garden activities. These findings indicate that students were behaviorally and emotionally engaged while participating in food and garden activities, that is, students perceived themselves to be focused and actively paid attention during food and garden activities, and students perceived themselves to be interested and enthused about learning during the food and garden activities. Students' perceived food and garden activity motivation and engagement could possibly be attributed to majority of the students indicating that they have had previous school garden experience, have gardens at home, and garden with relatives or friends.

Students were motivated to participate in food and garden activities because they reported that they perceived themselves as being intrinsically motivated, autonomous, and competent while participating in the food and garden activities. This finding supports Lieberman and Hoody (1998) who found that employing the outdoors as a means of instruction aids in motivating and engaging students academically. Students' activity motivation was evident through students survey responses of indicating that they were intrinsically motivated, autonomous, and competent while participating in the food and garden activities. This finding aligned with previous research which suggests that the satisfaction of both needs for autonomy and competence are essential to sustaining intrinsic motivation, which in turn, represents students' sustained activity motivation (Niemic & Ryan, 2009). This also finding confirms research that suggest that a key indicator of an intrinsically motivated student is an engaged student, and that engagement

is the outward manifestation of motivation (Skinner, Kindermann, Connell, & Wellborn, 2009; Skinner & Pitzer, 2012; Skinner & Chi, 2012).

Finally, Skinner and Pitzer (2012) characterize engagement as students' putting forth effort and showing enthusiasm, which the authors suggests represents students' energy. Skinner and Pitzer also characterize engagement as interest and focus, which the authors argue represents purpose. Energy and purpose are inwardly manifested within students through their motivation and expressed through their active engagement. Because students reported to be motivated to participate and engaged while participating in food and garden activities, this confirms the notion that students who perceived themselves to be motivated or focused will also perceive themselves to be engaged or energized.

5.5 Conclusion 2

Middle school students reported higher levels of school engagement after participating in food and garden activities.

5.5.1 Discussion

Students were asked about their frequency of school engagement by gathering students' self-perceptions of their preparedness for class, participation while in class, and during food and garden activities. Overall, students reported that they perceived themselves to be cognitively, behaviorally, and emotionally engaged in class, that is, students perceived themselves to be interested in class, willing to participate in class, and focused during class at a higher level upon completion of food and garden activities. The findings revealed that as students' participation in food and garden activities increased, students were also more engaged in school. Students perceived higher level of school

engagement could possibly be due to the nature of the contextualization of their course content, which has been described as a way to enable students to engage in the learning process, by allowing students to explore the connection between their academic content and context – food and garden activities (Johnson, 2002; Sears & Hersh, 1998).

This finding supported the claim that students' engagement in food and garden activities transfers students' enthusiasm to the context of their classroom and to school in general, possibly by satisfying students' basic psychological needs of autonomy and competence (Skinner & Chi, 2012). Lee et al. (2016) also argues that schools can promote students' school engagement because students' school engagement is significantly associated with their school experiences.

As mentioned in conclusion one, students reported that they perceived themselves to be intrinsically motivated, autonomous, and competent while participating in the food and garden activities. Veiga, Oliveira, and Taveira's (2014) found that students' engagement in school and academic aspirations were related to their academic achievement. Veiga, Oliveira, and Taveira's findings could explain the relationship found in this study between students' higher level of school engagement and future educational aspirations upon completion of the food and garden activities. Skinner and Chi (2012) found that students with a greater sense of autonomy in school also achieved better outcomes such as classroom engagement, enjoyment, persistence, and learning. Enjoyment and persistence are indicators of intrinsic motivation and coupled with students' autonomy represents students' activity motivation. Due to the nature of the relationship between students enjoyment and autonomy found in the present study,

Skinner and Chi's findings may explain students' perceived activity motivation and higher level of school engagement upon completion of the food and garden activities.

5.6 Conclusion 3

Middle school students reported higher levels of future educational aspirations after participating in food and garden activities.

5.6.1 Discussion

Students were asked about their future goals and aspirations in order to gain an understanding of reasons why students may engage in school and garden activities, possibly because it aligns with their future educational goals and aspirations. Overall, students indicated that they perceived themselves to be engaged in school because engaging in school will allow them to reach their future educational goals and aspirations.

For this study, it was assumed that students would engage in class and food and garden activities because it aligned with their future educational aspirations. Students' reported higher level of future educational aspirations could possibly be attributed to students' increased level of school engagement. Also, there existed positive and significant correlations between students' school engagement and future educational aspirations. This finding could possibly suggest that students' engaged in school because they are aware that engaging in school affords them the opportunity to reach their future educational aspirations. This finding also supported Sirin et al.'s (2004) finding that students who reported higher levels of future educational aspirations were engaged in school because: 1) they reflected an awareness of the limitations of not obtaining a college degree, and 2) students were cognizant in knowing that in order to achieve their educational goals and aspirations they had to plan to further their education upon

completion of high school. Conclusion three supported Beal and Crockett (2010) who found that adolescents' aspirations predicted their adult educational attainment eight years later. Simply, students engage in school and classroom activities because they realized that by engaging in school may allow them to attain their educational goals and aspirations.

5.7 Conclusion 4

There were positive relationships among students' food and garden activity motivation, food and garden activity engagement, school engagement, and future educational aspirations.

5.7.1 Discussion

The traditional structure of the current educational system has been shown to enable students to become disengaged academically, unmotivated to learn, which consequently results in academic alienation, poor academic outcomes, and academic failure (Dotterer & Lowe, 2011; Lee, 2014; Ratcliffe, Merrigan, Rogers & Goldberg, 2011; Skelly & Bradley, 2007; Skinner & Chi, 2012; Williams & Brown, 2012; Williams & Dixon, 2013). Skinner and Chi (2012) developed the Process Model of Garden-Based Engagement which is based on the premise that a predictor of garden learning and engagement lie in garden participants' perception of their autonomy, competence, and intrinsic motivation while participating in a garden activity. Skinner and Chi's model also assumed that garden participants' self-perceptions of their autonomy, competence, and intrinsic motivation can predict school achievement and garden learning. Similar to Skinner and Chi's model, this study showed elements of the predictive nature of students' engagement in food and garden activities which was found to be connected to their food

and garden activity motivation, their overall engagement in school, their future educational aspirations, as well as to their food and garden activity self-perceptions, such as, perceived competence, autonomy orientation, and intrinsic motivation. Conclusion four of this study supports the claim that students' food and garden activity engagement transfers their excitement to their classroom and to school in general, perhaps by meeting students' fundamental needs for competence and autonomy (Skinner & Chi, 2012). Furthermore, the positive results among the relationships of the variables of this study as it relates to students' food and garden activity motivation and activity engagement could be attributed to students' out-of-school gardening experiences, where the majority of students reported that they have previously participated in school gardening activities, have a garden at home, and garden with a relative or friend.

5.8 Implications for Practice and Policy

5.8.1 Implications for Practice

When considering the conclusions and findings of this study, there are two implications for practice related to students' food and garden activity experiences: 1) teachers and school garden coordinators should work more collaboratively to ensure that course objectives and goals are strategically situated within food and garden activities, and 2) teachers and school garden coordinators should ensure that students' food and garden experiences remain enjoyable.

First, the findings of this study suggest that possibly due to the contextualization of students' academic content with the context of food and garden activities, students indicated that they were motivated to participate in food and garden activities, reported higher levels of school engagement and food and garden activity engagement. In order to

maximize students' school engagement and academic outcomes, teachers and school garden coordinators must take advantage of students' food and garden activity motivation and activity engagement by strategically using food and garden activities contextualize academic content.

Second, students' reported that they perceived themselves to be intrinsically motivated to participate in food and garden activities, which means that students found food and garden activities to be enjoyable. Students' also reported that they perceived themselves to be engaged in the food and garden activities, which suggest that students were emotionally, cognitively, and behaviorally engaged in the food and garden activities. Emotional engagement, like intrinsic motivation is expressed through students' interest and enjoyment in participating in food and garden activities. It is important that school garden coordinators continue to ensure that students' food and garden experiences are enjoyable and interesting by offering a variety of activities as exemplified in this study.

5.8.2 Implications for Policy

When considering the findings of this study related to students' food and garden activity experiences, there are two potential policy implications related to school gardening initiatives that are connected to funding: 1) increase teacher training on how to develop contextualized lessons and to facilitate activities within school gardens, and 2) increase opportunities for researchers interested in examining the dynamics of garden-based educational programs.

The findings of this study highlight the relationships among garden-based learning programs and students' indirect academic outcomes, such as, students' school

engagement, future educational aspirations, and food and garden activity motivation and engagement. Today, due to the increasing number of students becoming disengaged and unmotivated in school, policymakers and educational stakeholders are exploring alternative ways to engage and motivate students in the process of learning. Funding should be allocated through policy to train teachers to effectively use their school gardens as a pedagogical tool to contextualize and enhance their instructional practices.

As previously mentioned, the school garden movement has become popular because of an increased awareness of the educational value of school gardens. Historically within the United States, school gardens have come and gone on multiple occasions, due to a lack of evidence of indicating their academic value and worth (Williams & Dixon, 2013). Williams and Dixon suggested that in order to validate the practicality and versatility of school gardens, more research is needed to describe, explain, predict, and control the phenomena of garden-based. Thus, as the popularity and interest surrounding the garden-based learning increases, so does the need to legitimize the significance and relevance of school garden educational programs and activities. Popularity and curiosity surrounding the school garden movement has stemmed from educators, students, parents, policymakers, stakeholders, and most recently researcher interest (Ratcliffe, Merrigan, Rogers & Goldberg, 2011). At the district, state, and/or national levels, more funding could be extended to graduate students and/or academic faculty as an approach to increase opportunities to conduct quality research regarding garden-based learning, students' school engagement, and future educational aspirations, to provide a sense of confirmation and legitimacy.

5.9 Implications for Theory

Self-Determination Theory (SDT) was utilized to inform the development of this study as well as interpret the results. Specifically, for the current study, SDT was used to inform the variable of students' interest in participating in food and gardening activities. Self-determination theory is a motivational theory driven by intrinsic motivation that explores humans' growth tendencies and their capacity to satisfy their basic psychological needs (Deci & Ryan, 1985, Ryan & Deci, 2001; Deci, Vallerand, Pelletier, & Ryan, 1991). SDT is comprised of three basic psychological needs that when satisfied deem individuals self-determined. These psychological needs include: autonomy, competence, and relatedness. Applied to an educational context, SDT focuses mainly on fostering students' interest in learning, their appreciation for education, and confidence in their abilities to perform well academically (Deci & Ryan, 1985; Niemiec & Ryan, 2009).

Overall, findings from this study support SDT. For example, regarding the three components of SDT for this study (autonomy, competence, and relatedness), students reported that they perceived themselves to be autonomous and competent while participating in food and garden activities. Overall, the findings of this study contribute to SDT by providing preliminary information that can be further explored within the context of food and garden activities. The understanding of the relationships between students' food and garden activity experiences and their perceived autonomy, competence, and relatedness during those activities still requires much investigation. An additional piece of information that emerged from this study was possibly an alternative measure of students' relatedness - one of the components of SDT. Relatedness was not directly measured within this study but could have possibly been indirectly measured through

students' perceived school engagement, specifically students' emotional engagement, which represents like relatedness, students' sense of belonging and attachment to their teachers and peers.

5.10 Recommendations for Future Research

There are several recommendations for future research that should be considered. First, some school gardens have been in place for a number of years which means that some students may have had early exposure to school garden experiences. Future research should consider to examine the relationships between students' early exposure in school gardening programs and activities, and students' first encounter with these experiences, because of the potential early exposure influence on students' perspective of school gardening programs and activities.

Second, within an educational setting, students' can encounter a variety of engagement and motivation enhancing activities. In order to determine the academic value of garden-based educational programs and activities, future research should consider exploring garden-based educational programs and activities and their influence on students' academic outcomes. For example, future research could compare students involved in school gardening programs and activities with students who are not enrolled in order to more accurately determine the contribution of garden-based educational activities to students' academic engagement and motivation.

Third, quantitatively, students can report their levels of interest, enjoyment, and motivation to participate in garden-based learning programs, but students can also express their interest, enjoyment, and motivation in more qualitative ways. As such, future research should consider employing a mixed method approach to incorporate

standardized open-ended interviews to gain insight into students' perceived food and garden experiences. A mixed methods approach would also allow researchers to triangulate students' quantitative and qualitative responses to help create a more holistic picture of why they participate in garden-based learning activities, and what they like or dislike about garden-based learning activities.

Lastly, due to research that suggests students who are engaged in school may do so because they are aware of how engaging in school may allow them to reach their future educational aspiration (Sirin et al., 2004; Beal & Crockett, 2010), future research should consider exploring in further detail the relationship between school gardens and students future educational aspirations.

REFERENCES

- Abbott, S. (2014). *Student engagement: The glossary of education reform*. Retrieved from <http://edglossary.org/student-engagement/>
- Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the student engagement instrument. *Journal of School Psychology, 44*(5), 427-445.
- Bailey, L. H. (1903). *The nature-study idea: being an interpretation of the new school movement to put the child in sympathy with nature*. New York, NY: Doubleday, Page & Company.
- Beal, S. J., & Crockett, L. J. (2010). Adolescents' occupational and educational aspirations and expectations: Links to high school activities and adult educational attainment. *Journal of Developmental, 46*(1), 258-265. doi: 10.1037/a0017416
- Berezowitz, C. K., Bontrager-Yoder, A. B., & Schoeller, D. A. (2015). School gardens enhance academic performance and dietary outcomes in children. *Journal of School Health, 85*(8), 508-518.
- Chase, P. A., Hilliard, L. J., Geldhof, G. J., Warren, D. J. A., & Lerner, R. M. (2014). Academic achievement in the high school years: The changing role of school engagement. *Journal of Youth Development, 43*, 884-896. doi: 10.1007/s10964-013-0085-4
- Childs, E. A. (2011). *Impact of school gardens on student attitudes and beliefs* (master's thesis). Iowa State University, Ames, Iowa.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. New York, NY: Routledge Academic

- Christle, C. A., Jolivette, K., & Nelson, C. M. (2007). School characteristics related to high school dropout rates. *Remedial and Special Education, 28*(6), 325-339. doi: 10.1177/07419325070280060201
- Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy and relatedness: a motivational analysis of self-system process. *Journal of Personality and Social Psychology, 65*, 43-77.
- Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. *Journal of Educational Psychology, 88*(4), 715-730.
- Deci, E. L. (1980). *The psychology of self-determination*. Lexington, MA: Lexington Books.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum Press.
- Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. *Nebraska Symposium on Motivation, 38*, 237-288.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125*(6), 627-668.
- Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist, 26*(3 & 4), 325-346.

- Dotterer, A., & Lowe, K. (2001). Perceived discrimination, parenting, and academic adjustment among racial ethnic minority adolescents. *Journal of Applied Developmental Psychology, 41*, 71-77. doi: 10.1007/s10964-011-9647-5
- Fan, W., & Wolters, C. A. (2012). School motivation and high school dropout: The mediating role of educational expectation. *British Journal or Educational Psychology, 84*, 22-39. doi: 10.1111/bjep.12002
- Fisher-Maltese, C., & Zimmerman, T. D. (2015). *A garden-based approach to teaching life science produces shifts in students' attitudes toward the environment.* 10(1), 51-66. doi: 10.12973/ijese.2015.230a
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59-109. doi: 10.3102/00346543074001059
- Fusco, D. (2001). Creating relevant science through urban planning and gardening. *International Journal of Environmental & Science Education, 10*(1), 51-66.
- Glynn, S. M., & Winter, L. K. (2004). Contextual teaching and learning of science in elementary schools. *Journal of Elementary Science Education, 16*(2), 51-63. doi: 10.1007/BF03173645
- Hoffman, A. J., Knight, L. F. M., & Wallach, J. (2007). Gardening activities education, and self-esteem learning outside the classroom. *Journal of Urban Education, 42*, 403-411. doi: 10.1177/0042085907304909

- Hazel, C. E., Vazirabadi, J., & Gallagher, J. (2013). Measuring aspirations, belonging, and productivity in secondary students: Validation of the student school engagement measure. *Psychology in the Schools, 50*(7), 689-704. doi: 10.1002/pits.21703
- Hopkins, W. G. (2000). New view of statistics: Effect magnitudes. Retrieved from <http://www.sportsci.org/resource/stats/effectmag.html>.
- James, D. C. S. (2004). Factors influencing food choices, dietary intake, and nutrition-related attitudes among African Americans: Application of a culturally sensitive model. *Ethnicity & Health, 9*(4), 349-367. doi: 10.1080/13557850420000285375
- Jang, H., Reeve, J., & Deci, R. (2010). Engaging students in learning activities: It is not autonomy support of structure but autonomy support and structure. *Journal of Educational Psychology, 102*(3), 588-600. doi: 10.1037/a0019682
- Jimerson, S. R., Campos, E., & Greif, J. L. (2003). Toward an understanding of definitions and of school engagement and related terms. *The California School Psychologist, 8*(1), 7-27. doi: 10.1007/BF03340893
- Johnson, E. B. (2002). *Contextual teaching and learning: What it is and why it's here to stay*. Thousand Oaks, CA: Crowing Press.
- Kline, P. (1999). *The handbook of psychological testing*. London: Routledge.
- Lee, J. S. (2014). The relationships between student engagement and academic performance: Is it a myth of reality? *Journal of Educational Research, 107*, 177-185. doi: 10.1080/0022067.2013.807491

- Libman, K. (2007). Growing youth growing food: how vegetable gardening influences young people's food consciousness and eating habits. *Applied Environment Education and Communication*, 6(1), 87-95. doi: 10.1080/15330150701319388
- Lippman, L.H., Anderson-Moore, K., Guzman, L., Ramos, M.F., Caal, S., Carle, A., & Kuhfeld, M. (2014). *Flourishing children: Defining and testing indicators of positive development*. New York, NY: Springer.
- Lynch, R. L., & Harnish, D. (2003). *Implementing contextual teaching and learning by novice teachers*. Implementing Contextual Teaching and Learning: Case Study of Nancy, a High School Science Novice Teacher. Athens, GA: University of Georgia. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.200.5642&rep=rep1&type=pdf>
- Maltz, A. (2015). Planting a victory garden: our food is fighting: Lessons of food resilience from world war. *Journal of Environmental Studies and Sciences*, 5(3), 392-403. doi: 10.1007/s13412-015-0293-1
- Miserandino, M. (1996). Children who do well in school: Individual differences in perceived competence and autonomy in above-average children. *Journal of Educational Psychology*, 88(2), 203-214.
- Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education*, 7(2), 133-144. doi: 10.1177/1477878509104318

- Ozer, E. (2007). The effects of school gardens on students and schools: conceptualization and considerations for maximizing healthy development. *Journal of Health Education & Behavior*, 34(6), 846-863.
- Parmer, S. M., Salisbury-Glennon, J., Shannon, D., & Struempfer, B. (2009). School gardens: An experiential learning approach for a nutrition education program to increase fruit and vegetable knowledge, preference, and consumption among second-grade students. *Journal of Nutrition Education and Behavior*, 41(3), 212-217. doi: 10.1016/j.jneb.2008.06.002
- Parsons, S. A., Malloy, J. A., Parsons, A. W., Peters-Burton, E. E., & Burrowbridge, S. C. (2016). Sixth grade students' engagement in academic tasks. *Journal of Educational Research*, 1-14. doi: 10.1080/00220671.2016.1246408
- Ratcliffe, M. M., Kathleen, A. M., Rogers, B. L., & Goldberg, J. P. (2011). The effects of school garden experiences on middle school-aged students' knowledge, attitudes, and behaviors associated with vegetable consumption. *Health Promotion Practice*, 12(1), 36-43. doi: 10.1177/1524839909349182
- Raufelder, R., Regner, N., Drury, K., & Eid, M. (2015). Does self-determination predict the school engagement of four different motivation types in adolescence? *Journal of Educational Psychology*, 36(7), 1242-1263. doi: 10.1080/01443410.2015.1008405
- Reeve, J., Jang, H., Carrell, D., Soohyun, J., & Barch, J. (2004). Enhancing students' engagement by increasing teachers' autonomy support. *Motivation and Emotion*, 28(2), 147-169.

- Ruiz-Gallardo, J. R., Verde, A., & Valdés, A. (2013). Garden-based leaning: An experience with “at risk” secondary education students. *Journal of Environmental Education, 44*(4), 252-270. doi: 10.1080/00958964.2013.786669
- Ryan, M. R., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*, 54-67. doi: 10.1006/ceps.1999.1020
- Schunk, D. H., Meece, J. L., & Pintrich, P. R. (2014). *Motivation in education: Theory, research, and application*. Saddle River, NJ: Pearson
- Scott, D., & Morrison., M. (2005). *Key ideas in educational research*. New York, NY: Continuum International Publishing
- Sears, S. J., & Herch, S. B. (1998). *Contextual teaching and learning: preparing teachers to enhance student success in and beyond school*. Columbus, OH: ERIC
- Selmer, S., Rye, J., Malone, E., Trebino, K., & Fernandez, D. (2014). What should we grow in our school garden to sell at the farmers’ market? Initiating statistical literacy through science and mathematics integration. *Science Activities Classroom Projects and Curriculum Ideas, 51*(1), 17-32. doi: 10.1080/00368121.2013.860418
- Shamsid-Deen, I., & Smith, B. P. (2006). Contextual teaching and learning practices in the family and consumer sciences curriculum. *Journal of Family and Consumer Sciences Education, 24*(1), 14-27.

- Sirin, S. R., Diemer, M. A., Jackson, L. R., Gonsalves, L., & Howell, A. (2004). Future aspirations of urban adolescents: A person in context model. *International Journal of Qualitative Studies in Education*, 17(3), 437-459. doi: 10.1080/0951839042000204607
- Skelly, S. M., & Bradley, J. C. (2007). The growing phenomenon of school gardens: measuring their variation and their affect on students' sense of responsibility and attitudes toward science and the environment. *Journal of Applied Environmental Education & Communication*, 6(1), 97-104. doi: 10.1080/15330150701319438
- Skinner, E. A., & Chi, U. (2012). Intrinsic motivation and engagement as “active ingredients” in garden-based: Examining models and measures derived from self-determination theory. *Journal of Environmental Education*, 43(1), 16-36. doi: 10.1080/00958964.2011.596856
- Skinner, E. A., & Pitzer, J. R. (2012). *Developmental dynamics of student engagement, coping, and everyday resilience*. In Christenson, S. L., Reschly, A. L., & Wylie, C. (Eds.). *Handbook of Research on Student Engagement* (pp. 21-44). Thousand Oaks, CA: Sage Publications.
- Skinner, E. A., Kindermann, T. A, Connell, J. P., & Wellborn, J. G. (2009). *Engagement and disaffection as organizational constructs in the dynamics of motivational development*. Retrieved from https://www.pdx.edu/sites/www.pdx.edu.psy/files/35_Wentzel_C011-Skinner.pdf

- Skinner, E. A., Kindermann, T. A., & Furrer, C. J. (2009). A motivational perspective on engagement and disaffection: Conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educational and Psychological Measurement, 69*(3), 493-525.
- Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology, 100*(4), 765-781. doi: 10.1037/a0012840
- Subramaniam, A. (2002). Garden-Based Learning in Basic Education: A Historical Review (*University of California 4-H Center for Youth Development Monograph*). Davis, CA: University of CA, Department of Human and Community Development. Retrieved from <http://4h.ucanr.edu/files/1229.pdf>
- Thomas, G. (2009). *How to do your research project: a guide for students in education and applied social sciences*. Thousand Oaks, CA: Sage Publications.
- Veiga, F. H., Oliveira, I. M., & Taveira, M. C. (2014, Março). *Student's engagement in school, academic aspirations, and career exploration of Portuguese adolescents*. Proceedings of inted2014 conference (pp. 7545-7553), Valencia, Spain.
- Wang, M., & Fredricks, J. A. (2014). The reciprocal links between school engagement, youth problem behaviors, and school dropout during adolescence. *Journal of Child Development, 85*(2), 722-737. doi: 10.1111/cdev.12138
- Wehmeyer, M. L., Abery, B.H., Mithaug, D. E., & Stancliffe, R. J. (2003). *Theory in self-determination: foundations for educational practice*. Springfield, IL: Thomas Books.

- Williams, D. R., & Brown, J. D. (2012). *Learning gardens and sustainability education: Bringing life to schools and schools to life*. New York, NY: Routledge.
- Williams, R. W., & Dixon, P. S. (2013). Impact of garden-based learning on academic outcomes in schools: Synthesis of research between 1990 and 2010. *Review of Educational Research*, (83), 211-235.
- Wilson, P. M., & Wilson, J. R. (1992). Environmental influences on adolescent educational aspirations: A logistic transform model. *Journal of Youth and Society*, 24(1), 52-70. doi: 10.1177/0044118X92024001003

APPENDIX A: IRB APPROVAL



HUMAN RESEARCH PROTECTION PROGRAM
INSTITUTIONAL REVIEW BOARDS

To: LEVON ESTERS
AGAD

From: JEANNIE DICLEMENTI, Chair
Social Science IRB

Date: 05/19/2016

Committee Action: Expedited Approval - Category(7)

IRB Approval Date: 05/19/2016

IRB Protocol #: 1604017577

Study Title: Exploring Food and Garden Activities Relationships among Garden Motivation and School Engagement of Eighth Grade Students

Expiration Date: 05/18/2017

Subjects Approved: 0750

The above-referenced protocol has been approved by the Purdue IRB. This approval permits the recruitment of subjects up to the number indicated on the application and the conduct of the research as it is approved.

The IRB approved and dated consent, assent, and information form(s) for this protocol are in the Attachments section of this protocol in CoeusLite. Subjects who sign a consent form must be given a signed copy to take home with them. Information forms should not be signed.

Record Keeping: The PI is responsible for keeping all regulated documents, including IRB correspondence such as this letter, approved study documents, and signed consent forms for at least three (3) years following protocol closure for audit purposes. Documents regulated by HIPAA, such as Authorizations, must be maintained for six (6) years. If the PI leaves Purdue during this time, a copy of the regulatory file must be left with a designated records custodian, and the identity of this custodian must be communicated to the IRB.

Change of Institutions: If the PI leaves Purdue, the study must be closed or the PI must be replaced on the study through the Amendment process. If the PI wants to transfer the study to another institution, please contact the IRB to make arrangements for the transfer.

Changes to the approved protocol: A change to any aspect of this protocol must be approved by the IRB before it is implemented, except when necessary to eliminate apparent immediate hazards to the subject. In such situations, the IRB should be notified immediately. To request a change, submit an Amendment to the IRB through CoeusLite.

Continuing Review/Study Closure: No human subject research may be conducted without IRB approval. IRB approval for this study expires on the expiration date set out above. The study must be close or re-reviewed (aka continuing review) and approved by the IRB before the expiration date passes. Both Continuing Review and Closure may be requested through CoeusLite.

Unanticipated Problems/Adverse Events: Unanticipated problems involving risks to subjects or others, serious adverse events, and serious noncompliance with the approved protocol must be reported to the IRB immediately through CoeusLite. All other adverse events and minor protocol deviations should be reported at the time of Continuing Review.

APPENDIX B: PARENTAL MEMO & CONSENT FORM

Purdue IRB Protocol #: 1604017577 - Expires on: 18-MAY-2017

Exploring Food and Garden Activities' Relationships among Garden Motivation, School Engagement, and Entrepreneurial Intentions of Eighth Grade Students

Principal Investigator: Levon Esters, Ph.D., Associate Professor

Co-Principal Investigator: Amonté L. Martin, Masters Student

Youth Development and Agricultural Education

Purdue University

PARENT MEMO

DATE:

TO: Parent of _____ Student

FROM: Amonté L. Martin

RE: Request for Study Assistance

The purpose of this memo is to request permission for your son/daughter to participate in a study titled, "Exploring Food and Garden Activities' Relationships between Garden Motivation, School Engagement, and Entrepreneurial Intentions of Eighth Grade Students." Your child was selected as a possible participant because he/she attends the type of school we are interested in studying (i.e., a middle school gardening education program). Attached is a Parental Consent Form outlining the purpose of the study as well as information regarding the study's procedures, participant rights, confidentiality, etc. We ask that you read the attached form before agreeing to have your child participant in this study. If you do not want your child to participate in this study, you will need to sign the attached form and return it to the classroom teacher. If you do not return the form with your signature, your child will be free to participate in the study if he/she chooses to. If you have any other questions or concerns, please contact me.

Purdue IRB Protocol #: 1604017577 - Expires on: 18-MAY-2017

Exploring Food and Garden Activities' Relationships among Garden Motivation and School Engagement of Eighth Grade Students

Principal Investigator: Levon Esters, Ph.D., Associate Professor
 Co-Principal Investigator: Amonté L. Martin, Masters Student
 Youth Development and Agricultural Education
 Purdue University

PARENTAL CONSENT FORM

What is the purpose of this study?

The purpose of this study is to explore students' activity motivation and school engagement before and after participating in food and gardening activities at their school.

What will I do if I choose to be in this study?

If you agree to your child participating in this study, your child will be asked to complete a 51-item questionnaire. Your child will be asked to describe the way in which they approach and accomplish their goals, to indicate what's important to them as it relates to their career interest, to indicate their frequency of engagement in school and their perceived utility of engaging in class, to indicate their future goals and aspirations; and to also indicate their level of enjoyment of participating in a food and garden activity, and their perceived competence and personal reasoning for participating in a food and garden activity. You as the parent have the right to review the research procedures and survey questions before consenting.

How long will I be in the study?

The survey will take approximately 25 minutes to complete.

What are the possible risks or discomforts?

The risk is minimal no greater than everyday life. There's a risk of breach of confidentiality and the safeguards used to minimize this risk can be found in the confidentiality section.

Are there any potential benefits?

There are no direct benefits to your child; however, it is hoped that the information gained in this study will benefit society by providing valuable information about food and garden activities relationship to students' motivation, school engagement, and entrepreneurial intentions.

Confidentiality: The records of this study will be kept private. No names, social security number, or other identifiers will be used. Only the primary investigator and co-principal investigator will have access to data obtained for the study. All information will be stored in a locked cabinet in the Principal Investigator's secure office. Consent forms and completed surveys will be kept securely along with results for seven years after completion of this study. The teachers will assign each participant an identification (ID) code, and the same ID code will be used for the survey-questionnaire. The researchers will not be able to determine the identity of the participants, as they will not know how each teacher assigned the code. In addition, data entered into a computer statistical program will be secure on a password-protected computer and system. The project's research records may be reviewed by departments at Purdue University responsible for regulatory and research oversight.

What are my rights if I take part in this study?

Your participation in this study is voluntary. You may choose not to participate, or if you agree to participate, you can withdraw your participation at any time without penalty or loss of benefits to which you are otherwise entitled.

APPENDIX C: STUDENT ASSENT FORM

Purdue IRB Protocol #: 1604017577 - Expires on: 18-MAY-2017

Exploring Food and Garden Activities' Relationships among Garden Motivation and School Engagement of Eighth Grade Students

Principal Investigator: Levon Esters, Ph.D., Associate Professor
Co-Principal Investigator: Amonté L. Martin, Masters Student
Youth Development and Agricultural Education
Purdue University

ASSENT FORM

We are doing a research study. A research study is a special way to find out about something. We want to find out about students' activity motivation and school engagement before and after participating in food and gardening activities.

If you agree to be in this research study, we will ask questions about your approach to accomplishing your goals, importance of your career interest, your frequency of engagement in school and your perceived utility of engaging in class, your future goals and aspirations; your level of enjoyment of participating in a food and garden activity, and also your perceived competence and personal reasoning for participating in a food and garden activity. The questionnaire will take about **25** minutes to complete.

Being in this study is study is voluntary, meaning that you do not have to answer any questions. No one will be mad at you and your grade will not drop if you do not participate in this study. You can ask questions that you may have about this study at any time. If you do not want to be in this study or at any point you decided not to continue after you have started, just let me know. This study is confidential, meaning that no one will use your name with this study or see your answers.

Signing this paper means that you have read this or had it read to you and that you agree to be in this study. If you do not want to be in this study, do not sign. Remember, being in this study is up to you, and no one will be mad at you if you don't sign this or even if you change your mind later.

If you have any questions regarding this study, you may contact the researcher at 765-496-1152. If you have questions about your rights while taking part in the study or have concerns about the treatment of research participants, please call the Human Research Protection Program at (765) 494-5942, email (jrb@purdue.edu) or write to: Human Research Protection Program - Purdue University, Ernest C. Young Hall, Room 1032 - 155 S. Grant St., West Lafayette, IN 47907-2114

I, _____, want to be in this research study.
(write your name here)

Participant Name

Date

Researcher's Signature

Date

APPENDIX D: FOOD & GARDEN QUESTIONNAIRE

Food & Garden Questionnaire
CODE BOOK

Researcher Developed (Martin, 2016)

Section I. GARDEN PARTICIPATION (GRDN_PART)

Please **CIRCLE** the appropriate answer to the questions below.

- | | | | | |
|--------------------|---|----------|----------|--|
| | | 1 | 2 | |
| GRDN_PART 1 | 1. Have you previously participated in a school gardening activity? | Yes | No | Question GRDN_PART 2 was not used for the study, because the researcher only had access to students who were currently enrolled in a gardening class, so it was assumed that all students would answer "Yes". |
| GRDN_PART 2 | 2. Are you currently enrolled in a school gardening class? | Yes | No | |
| GRDN_PART 3 | 3. Do you have a garden at home? | Yes | No | |
| GRDN_PART 4 | 4. Do you garden with a relative or friend? | Yes | No | |

Section II. Food & Garden Activities (FGACT)

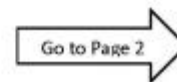
Researcher Developed (Martin, 2016)

Instructions: Each of the following items represents food and garden activities conducted at your school. Indicate the frequency to which you have done these activities in your school. Please use the following categories in determining your response by **CIRCLING** the appropriate response at the right of each statement.

	Never (1)	Once a year (2)	Twice a year (3)	Three times a year (4)	Four or more times per year (5)
--	--------------	-----------------------	------------------------	---------------------------------	---

Example: I participated in a garden activity at my school..... 1 ② 3 4 5

- | | | | | | | |
|----------------|---|---|---|---|---|---|
| FGACT 1 | 1. Try-Day Friday Tasting Tables..... | 1 | 2 | 3 | 4 | 5 |
| FGACT 2 | 2. Cooking with Garden Fruits and Vegetables..... | 1 | 2 | 3 | 4 | 5 |
| FGACT 3 | 3. Preparing Garden Beds..... | 1 | 2 | 3 | 4 | 5 |
| FGACT 4 | 4. Caring for Plants in the Garden..... | 1 | 2 | 3 | 4 | 5 |
| FGACT 5 | 5. Caring for Plants in the Greenhouse..... | 1 | 2 | 3 | 4 | 5 |
| FGACT 6 | 6. Learning and Trying Healthy Cooking Options..... | 1 | 2 | 3 | 4 | 5 |
| FGACT 7 | 7. Learning about the Health Benefits of different Vegetables.. | 1 | 2 | 3 | 4 | 5 |
| FGACT 8 | 8. Garden Planning..... | 1 | 2 | 3 | 4 | 5 |
| FGACT 9 | 9. Starting Plants from Seeds..... | 1 | 2 | 3 | 4 | 5 |



6 items from Educational Engagement - Teen Survey
(Lippman, Anderson-Moore, Guzman, Ramos, Caal, Carle, & Kuhfeld, 2014)

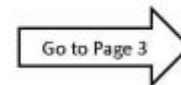
Section III. School Engagement (SE)

Instructions: Please indicate how often this has happened this school year. CIRCLE the most appropriate answer for each statement. How often do you... 1 - None of the time True, 2 - A little of the Time, 3 - Most of the Time, 4 - All of the Time	Beginning of the School Year				Today			
	PRE				POST			
	None of the time	A little of the Time	Most of the Time	All the Time	None of the time	A little of the Time	Most of the Time	All of the Time
Example: Pay attention to detail?.....	1	2	③	4	1	②	3	4
1. Care about doing well in school?.....	1	2	3	4	1	2	3	4
SEPRE 1								SEPOST 1
2. Pay attention in class?.....	1	2	3	4	1	2	3	4
SEPRE 2								SEPOST 2
3. Go to class unprepared?.....	1	2	3	4	1	2	3	4
SEPRE 3 Reverse Code								SEPOST 3

Section IV. Future Educational Aspirations (FE)

Instructions: Please indicate by CIRCLING how much you agree or disagree with the following statements. 1 - Strongly Disagree, 2 - Disagree, 3 - Agree, 4 - Strongly Agree	Beginning of the School Year				Today			
	PRE				POST			
	Strongly Disagree	Disagree	Agree	Strongly Agree	Strongly Disagree	Disagree	Agree	Strongly Agree
1. If something interests me, I try to learn more about it.....	1	2	3	4	1	2	3	4
SEPRE 4								SEPOST 4
2. I think the things I learn at school are useful.....	1	2	3	4	1	2	3	4
SEPRE 5								SEPOST 5
3. Being a student is one of the most important parts of who I am	1	2	3	4	1	2	3	4
SEPRE 6								SEPOST 6
4. I plan to continue my education following high school.....	1	2	3	4	1	2	3	4
FEPRE 1								FEPOST 1
5. Going to school after high school is important.....	1	2	3	4	1	2	3	4
FEPRE 2								FEPOST 2
6. School is important for achieving my future goals.....	1	2	3	4	1	2	3	4
FEPRE 3								FEPOST 3
7. My education will create many future opportunities for me.....	1	2	3	4	1	2	3	4
FEPRE 4								FEPOST 4
8. I am hopeful about my future.....	1	2	3	4	1	2	3	4
FEPRE 5								FEPOST 5

Future Goals and Aspirations - 5 items adopted from the Student Engagement Instrument (Appleton, Chistenson, Kim, & Reschly, 2006)



Intrinsic Motivation - 3 self-report items adopted from the Self-Regulatory Styles Questionnaire
 Autonomy - 6 self-report items from the Self-Regulatory Styles Questionnaire
 Competence (Self-Efficacy) - 6 student-report items from the Student Perceptions of Control Questionnaire
 (as cited Skinner & Chi, 2012)

Section V. Food & Garden Motivation

Instructions: Please indicate by **CIRCLING** your belief about the following statements.

Not at all True (1)	A little bit True (2)	Fairly True (3)	Very True (4)
------------------------------	-----------------------------------	-----------------------	---------------------

Food & Gardening Activity Motivation

(Intrinsic Motivation (IM), Autonomy (AUTO), and Competence (COMP))

Why do I participate in the food and garden activities?

IM 1	1. I enjoy it.....	1	2	3	4
IM 2	2. It's fun.....	1	2	3	4
IM 3	3. It's cool to see things grow.....	1	2	3	4
AUTO 1	4. So I can learn important things.....	1	2	3	4
AUTO 2	5. Because I want to treat the environment better.....	1	2	3	4
AUTO 3	6. It is important to me.....	1	2	3	4
AUTO 4	7. They make us.....	1	2	3	4 Reverse Code
AUTO 5	8. Our teacher said we had to; otherwise I probably would not...	1	2	3	4 Reverse Code
AUTO 6	9. That's the rule.....	1	2	3	4 Reverse Code
Gardening					
COMP 1	1. I am pretty good at gardening.....	1	2	3	4
COMP 2	2. I know a lot about gardening.....	1	2	3	4
COMP 3	3. I can figure out how to make things grow.....	1	2	3	4
COMP 4	4. I don't have the brains to garden.....	1	2	3	4 Reverse Code
COMP 5	5. I am not very good at gardening.....	1	2	3	4 Reverse Code
COMP 6	6. Gardening is too hard for me.....	1	2	3	4 Reverse Code

Classroom Engagement Scale - 10 items from (Skinner & Chi, 2012)

Activity Engagement (ACE) - Engagement vs. Disengagement
Section VI. School Gardening Engagement

Instructions: Please indicate by CIRCLING your belief about the following statements. 1 – Not at all True, 2 – A little bit True, 3 – Fairly, 4 – Very True	Beginning of the School Year				Today			
	PRE				POST			
	Not at all True	A little bit True	Fairly True	Very True	Not at all True	A little bit True	Fairly True	Very True
When I'm in the garden...								
1. I try hard to do well..... ACEPRE 1	1	2	3	4	1	2	3	4 ACEPOST 1
2. I listen carefully to our gardening teacher..... ACEPRE 2	1	2	3	4	1	2	3	4 ACEPOST 2
3. I feel good..... ACEPRE 3	1	2	3	4	1	2	3	4 ACEPOST 3
4. I can't wait for it to be over..... ACEPRE 4 Reverse Code	1	2	3	4	1	2	3	4 ACEPOST 4
5. I just act like I'm working..... ACEPRE 5 Reverse Code	1	2	3	4	1	2	3	4 ACEPOST 5
6. My mind wanders..... ACEPRE 6 Reverse Code	1	2	3	4	1	2	3	4 ACEPOST 6
7. Gardening is interesting..... ACEPRE 7	1	2	3	4	1	2	3	4 ACEPOST 7
8. I'd rather be doing just about anything else but gardening..... ACEPRE 8 Reverse Code	1	2	3	4	1	2	3	4 ACEPOST 8
9. I don't care if I miss gardening class..... ACEPRE 9 Reverse Code	1	2	3	4	1	2	3	4 ACEPOST 9
10. Gardening is boring..... ACEPRE 10 Reverse Code	1	2	3	4	1	2	3	4 ACEPOST 10

Section VII. Demographic Information

Please **CHECK** the appropriate answer to the questions below.

- SEX 1.** Gender: **1** Male **2** Female
- RACE 2.** Please choose your ethnicity (check all that apply):
- | | |
|---|---|
| <p>School Course Name Coordinator Contact</p> <p>1 - Houck 1 - H-FACS FACS (Houck) – 5 hours</p> <p>2 - Leslie 2 - H-Projects Projects (Houck) – 38 hours</p> <p>3 - Parrish 3 - P-Leadership Leadership (Parrish) – 12 hours</p> <p> 4 - L-AVID AVID (Leslie) – 14 hours</p> | <p>1 <input type="checkbox"/> Black/African American</p> <p>2 <input type="checkbox"/> White, Caucasian, European, Not Hispanic</p> <p>3 <input type="checkbox"/> Alaska Native</p> <p>4 <input type="checkbox"/> Native Hawaiian/Pacific Islander</p> <p>5 <input type="checkbox"/> American Indian/ Native American</p> <p>6 <input type="checkbox"/> Asian/Asian American</p> <p>7 <input type="checkbox"/> Mexican-American, Chicano, Hispanic, Latino</p> <p>8 - Multiracial</p> |
|---|---|

Thank you for completing our survey!



APPENDIX E: MEAN AND STANDARD DEVIATIONS FOR VARIABLES OF THE STUDY BY CLASS

Table 4.7

Mean and Standard Deviations for Variables of the Study by Class

Variable	H-FACS			H-Projects			P-Leadership			L-AVID		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
SE PRE	39	3.11	.54	31	2.90	.79	21	3.19	.45	29	2.94	.73
SE POST	39	3.34	.45	31	3.39	.49	21	3.28	.41	29	3.32	.55
FEA PRE	39	3.51	.47	31	3.08	.95	21	3.66	.30	29	3.32	.79
FEA POST	39	3.74	.38	31	3.72	.37	21	3.68	.29	29	3.73	.41
ACM	39	3.08	.50	31	3.16	.56	21	2.97	.42	29	3.07	.68
IM	39	3.10	.72	31	3.04	.82	21	3.03	.47	29	3.22	.80
AUTO	39	3.13	.57	31	3.08	.72	21	2.83	.54	29	3.05	.81
COMP	39	3.03	.66	31	3.30	.44	21	3.09	.55	29	3.02	.67
ACE PRE	39	3.31	.52	31	2.96	.71	21	3.22	.38	29	3.14	.66
ACE POST	39	3.49	.49	31	3.30	.68	21	3.19	.55	29	3.43	.73

Note. In the variable column PRE next to an acronym refers to data that was retrospectively collected, and POST next to an acronym refers to data that was collected upon completion of the food and garden activities. SE = School Engagement, FEA = Future Educational Aspirations, ACM = Activity Motivation, IM = Intrinsic Motivation, AUTO = Autonomy, COMP = Competence, ACE = Activity Engagement.

APPENDIX F: PEARSON CORRELATIONS AMONG STUDY VARIABLES

Table 4.8

Pearson Correlations among School Engagement, Future Educational Aspirations, Activity Motivation, and Activity Engagement

Variables	SE PRE	SE POST	FE PRE	FE POST	ACM	IM	AUTO	COMP	ACE PRE	ACE POST
SE PRE	--									
SE POST	.22*	--								
FE PRE	.75**	.02	--							
FE POST	.21*	.66**	.32**	--						
ACM	-.02	.39**	-.05	.36**	--					
IM	.02	.40**	-.08	.35**	.81**	--				
AUTO	-.002	.37**	-.01	.42**	.89**	.70**	--			
COMP	-.04	.23*	-.05	.15	.80**	.46**	.49**	--		
ACE PRE	.45**	.18*	.40**	.17	.44**	.38**	.39**	.33**	--	
ACE POST	.03	.58**	-.10	.43**	.71**	.66**	.67**	.47**	.51**	--

Note. SE = School Engagement, FE = Future Educational Aspirations, ACM = Activity Motivation, IM = Intrinsic Motivation, AUTO = Autonomy, COMP = Competence, ACE = Activity Engagement. *p < .05, **p < .01; N = 120