

AN EXPLORATION OF THE BENEFITS OF GARDENING ON ELEMENTARY  
SCHOOL STUDENTS' MENTAL AND PHYSICAL WELL-BEING AND  
COMMUNITY INCLUDING STUDENTS IDENTIFIED AS HAVING DISABILITIES

By

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## ABSTRACT

### AN EXPLORATION OF THE BENEFITS OF GARDENING ON ELEMENTARY SCHOOL STUDENTS' MENTAL AND PHYSICAL WELL-BEING AND COMMUNITY INCLUDING STUDENTS IDENTIFIED AS HAVING DISABILITIES

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Gardening has been known to reduce stress and increase relaxation in people with emotional disturbances, developmental delays, mental illness, sensory integration challenges, and the average gardener alike. Gardening has also been seen at times as a liberating and empowering activity that contributes to a sense of individual and group accomplishment. Though the relationship between gardening at schools has been studied in regard to creating and fostering community, agriculture education, health education, and other disciplines, the relationship between gardening at schools for children identified as having disabilities has gone largely understudied. Through a series of classroom visits and participation in gardening activities with children receiving services for special needs; this study seeks to further understand and explore this relationship. The gardening lessons will be accompanied by a series of journaling activities after gardening, and other modes of emotional and sensory expression (drawing, taking pictures, etc). Through teacher, potentially parent, student, and researcher surveys and expression activities, this relationship will be further explored and evaluated.

This study may have broader implications in the curriculum and design of gardening based education programs, adaptation of special education programs, and student advocacy.

Key Words: Gardening, Schools, Education, Special Education, Special Needs, Disabilities, Disability Studies, Horticulture Therapy, Relaxation, Mood, Emotion, Plants, Nature.

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## CHAPTER ONE: INTRODUCTION

### About the Garden

It was winter in northern California, but the gardening project was started as soon as possible. Our space was a few plots of rectangular shaped gardens at the school or, on rainy days, in the special education teacher's friendly and welcoming classroom. On a typical gardening day would be 10-13 students with smiling, excited faces, wearing mostly jeans or sweatpants and t-shirts, and clothing speckled with gardening dirt. The students were mostly between 10 and 11 years in age but some as young as five. Some days shoes were covered in mud. Students were talking or silent, digging or planting, even weeding, even laughing. Teachers were always close by, standing by the group as a source of support and safety. Weathered, wooden boards created rectangular support structures that housed soil, beans, kale, tulips, and pansies among other vegetables and flowers. The students stood confidant with their tools and in their ability to garden with care. The students gravitated to their preferred areas of the garden; areas where they were conducting special projects, like a "jungle" of daffodils, or where they had discovered "their" special plant, always a vegetable or flower that the student had planted and cared for in recent months. This is an example of what some of the final gardening

days were like, but the students had come a long way: struggled, practiced, and had learned many things to get here.

Research in recent years on the topic of school gardening comes from a variety of fields. Gardening has been known to reduce stress and increase relaxation in people with emotional disturbances, developmental delays, mental illness, sensory integration challenges, and the average gardener alike. Gardening has also been seen as an at times liberating and empowering activity that contributes to a sense of individual and group accomplishment. Though gardening at schools has been studied in regard to its role in creating and fostering community and promoting agriculture and health education, the positive effects of gardening at schools for children receiving services for special needs has gone largely understudied.

Children in our modern day school system face many challenges, particularly students identified as having disabilities. Some of these challenges include larger class sizes or less elective classes due to budget cuts. Students come to the public school system from a variety of backgrounds, from privilege to poverty. Some students come to school hungry and/or with little knowledge of a healthy diet, often due to poverty. On top of all of this, some students have specific learning challenges from emotional to physical to intellectual. What can be done to help these students that is practical, educational, and engaging? How can we help students feel better and good at school?

How can we create a healthy future for each person? School gardens have been proven to be beneficial in a number of areas – might they also play a role in addressing some of these critical concerns and issues? This study explores these questions and relationships through an examination of the positive effects of a school garden program on the experience of children identified as having disabilities.

## CHAPTER TWO: METHODS

### What Drew me to the Topic

I was drawn to the topic of exploring the relationship between gardening and children identified as having disabilities for a number of reasons, many of which involved my experiences working with children with Autism as well as experiences with friends, family, and personal experiences benefiting from gardening and/or being in nature as a means of or space for self-regulation, reflection, invigoration, and learning.

Most of my observations and experiences of the benefits of nature came from working in different settings: organic farms, parks, and a non-profit focusing on environmental restoration for endangered salmon. I remember noticing how my friends, coworkers, and I were more easily able to emote, relax, share personal experiences, and/or feel invigorated by being outside and around living things. The act of cultivating vegetables for food or plants, trees, and shrubs for the livelihood of endangered salmonids, all seemed so meaningful and authentic to me. Having studied Psychology and having always been interested in helping people feel better, and having always respected the learning process and education, a deep interest in finding reasonable methods for people to find mental and physical health in an educational setting was something that really resonated with me. As we know from Maslow's Hierarchy of needs: health must come first before reaching self-actualization. I firmly believe that health trumps academic success.

Additionally, having had people in my own life that I cared about, who have sought ways of finding mental health and physical health, led me to want to help find something, too. I know, personally, I find a life throughout which I can regulate my emotions to be a goal. I find great fulfillment helping others find ways to regulate their emotions while also learning functional academics in an engaging, exciting way, where all students feel like they are thriving, cared for, and understood.

My interest in this topic continued as I worked with people with diverse needs, and identified as having disabilities, at group homes, as a behavioral therapist, and now, as a teacher myself. My desire to support individual and group mental and physical wellness extended to a desire to want to develop a healthy community. This was due to the learning that took place in the Environment and Community Program where I learned that everything is better, and our well-being is improved, when working, living, and being educated within a community.

### Getting Connected to the School

The process of getting connected to the school was relatively easy and exciting. It involved phone calls and emails to local self-contained class teachers at schools that already had gardens. The first teacher to respond and I set up a meeting, and that sealed the deal. That teacher ended up moving on to another position, but the teacher that took her place enthusiastically agreed to allow me to work with her and her students for my

gardening project. After we met during the Spring of 2010, I was able to set up tentative plans to get started in the Fall.

In Spring of 2010, I also conducted a practice study for my Qualitative Research Methods for Education class which informed my research. During that time, I interviewed a number of professionals to garner insights about teacher/educator perceptions of gardening with children. This was done as a preliminary step in gathering ideas and practice in my future thesis project for the M.A.S.S. I hoped to learn: whether educators felt gardens might be a useful tool to aid in understanding, how realistic it would be to implement a gardening curriculum at a school, and how a garden may be helpful to students functioning at school in general. This project involved practice working with people in the community, around various schedules and communication preferences. Data was coded for themes within the practice research as related to the current literature on the subject of gardening at school as well as gardening with people identified as having disabilities (upon which some of my literature review is focused). What I discovered from this practice project was encouraging and helped me to feel that a future thesis exploring the benefits of gardening at school with children identified as having disabilities.

### Work Coordinating with Becky

I was able to meet with Becky for the first time in the Fall of 2010, and we were excited to get started. After a long IRB process (Approval #10-124) and getting all of the

required paperwork in, we were able to start our gardening project. The students patiently awaited the start of the project, despite the delay. Throughout the project, Becky and I were able to communicate via email and phone message, and Becky was always present during our gardening sessions to lend a helping hand. Becky always was willing to share her insights and was very positive about the project. She was a great source of enthusiasm and positivity, and I am very grateful for all of her energy and encouragement.

### Methods

Each week involved a different lesson. The lessons unfolded flexibly as is required for a self-contained class and in the inconsistent weather that winter often brings. The lessons were shaped with intentions of contributing to a present need for food education, multi-cultural education, multi-sensory education, and education that can meet multiple learning styles and always included a safety talk. See list of gardening lessons in Appendix A.

### Analysis

The data was analyzed by creating excel spreadsheets, charts, and graphs that displayed the results of each gardening lesson. Data analysis also included unique and varied collection techniques including analyzing the following: notes/journal entries, survey responses, drawings, student writing, whole group interview responses, teacher interview response, teacher aide comments, photographs, and researcher memories.

### Notes/Journal Entries

I culled through my notes and journal entries to look for any evidence or contradiction to literature reviewed. The notes/journal entries were either little observations or my memories and feelings of the gardening experience, daily.

### Survey Responses

Students filled out a survey (see Appendix B) before and after gardening that shared how they felt in the garden, if they wanted to garden that day, etc. Prior to as well as after each gardening lesson, the children filled out a brief survey. After the survey was completed post gardening lesson, the students were asked to journal or draw (given a choice between the two) for 5 minutes on their gardening experiences that day or their day at school. As time went by, the students really got in the routine of filling these out and knew just what to do.

### Drawings

Students had the option of drawing rather than writing to describe their experience in the garden. These drawings were included on the survey form. Students also went above-and-beyond at the end of the project, and created beautiful “thank you” notes which had their best effort of writing and art.

### Writing

Students had an opportunity to write about gardening each gardening day as well. Students would sometimes leave comments or write what they liked about gardening. There was always an option given to draw in the writing space on the survey form if the student preferred, using pencil and paper.

### Whole Group Interview

After the entirety of the gardening project had been completed, I interviewed the class as a group to get a sense of their gardening experience. As the culminating activity, the children were asked to participate in a group semi-structured interview with open ended questions.

### Teacher Interview

I interviewed Becky to see her thoughts about and observations of the gardening project. Her positivity and observations were much appreciated.

### Teacher/Student Aide Comments

Throughout the project, I was able to ask the teacher and student aides how they felt the project was going. I really appreciated their positivity and perspective.

### Photographs

There were some photos of the project throughout which helped document and remember the experience.

### Researcher Memories

My memory served as a way of reflecting on the experience. I was able to think about the gardening days and recall peak moments and remember the project.

Briefly there was an Environment and Community graduate student who made observations about social interaction as well as general notes. She participated via keeping tally of social interactions using a journal.

The surveys were compared and contrasted for how the children felt each day of gardening as well as whether or not the child wanted to garden that day. These surveys were compared and contrasted for similarities and differences between children and between activities as well as to consider the progression of each child throughout the gardening study. Journals were used to garner insights into how the child verbally expressed their experience in the garden. Along with the journaling, there was a daily option to draw a picture to supplement the writing, to take any writing pressure off each child. The interview was used to find out how each child felt about the gardening lessons throughout our time together. I hoped to find out attitudes about gardening as well as any other insights each child may have unknown to me at each point. Artwork was analyzed

for gardening themes. The days that artwork was done, I also reviewed the surveys and journals to see how each child felt about this activity. I hypothesized that I might learn, from these data collection techniques, how kids feel after certain types of activities (planting vs. indoor, etc) and which activities lead to more positive group interaction vs. more positive solitary activities.

## CHAPTER THREE: REVIEW OF LITERATURE

Exploration of the potential benefits of people-plant interactions requires an interdisciplinary approach (Zajicek, 1997). Many fields are now exploring the interplay between people and plants. These include Landscape Architecture, Horticulture, Psychology, Ecopsychology, Education, Behavioral Sciences, Health, Nutrition Science, Agriculture, Environmental Horticulture, and, most recently, Special Education. This review considers the literature on horticulture therapy, the positive effects of gardens on people, the potential roles of gardens within an educational context, the ways that gardens may support people with diverse needs, and the effects of gardens and gardening on people with diverse needs in an educational context. The interdisciplinary literature provides the basis for developing research exploring the relationship between a gardening environment and a self-contained class.

### Gardens within an Educational Context

School gardens can create a learning environment with the potential to educate students in multiple ways. Gardens have the potential to affect social dynamics. For example, gardens have been shown to increase students' abilities to work as a group or participate in team work (Hussein, 2010; Lautenschlager & Cherry, 2007). The benefits of school gardens include widening social views, communication skill development, creating community, interaction with peers, creating an inclusive school culture, and developing diverse relationships (Nimmo & Hallet, 2008). School gardens also help

students build interpersonal relationships and increase feelings of self-worth through positive self-empowerment and enhanced self-esteem. The opportunities that gardens create are valuable, providing students with opportunity to share knowledge (Ratcliffe, 2007) in an environment that is enjoyable, calming, pleasant, and stimulating (Hussein, 2010). Furthermore, people-plant interactions can improve quality of life and affect resilience, through creating an environment conducive to working through life challenges such as poverty (Kuo, 2001) as well as can create livelihood options in the case of gardening (Gallaher, 2012). Additionally, gardening, when used as a muscle strengthening activity, can also help cultivate fine and gross motor skills (Funkenbusch and Downs, 2010) as well as provide the environment for self-regulation (Hartig, 2003; Wilson, 2012). Furthermore, contributions of gardening include nutrition education, changing childrens' behaviors with, consumption of, and attitudes toward vegetables (McAleese & Rankin, 2007; Morris & Zindenberg-Cherr, 2002; Ratcliffe, 2007; Lineberger & Zajicek, 2000) as well as increasing knowledge of the food system (Lautenschlager & Smith, 2007). Gardens also have the ability to provide multi-subject education (Hoffman, Knight, & Wallach, 2007), create community at school (Hussein, 2010; Hoffman, Knight, & Wallach, 2007; Rosenow, 2008), be a place to uncover diversity (Nimmo & Hallet, 2008; Matias, 2016; Lautenschlager & Smith, 2007) and impact communication (Bowker & Tearle, 2006). Finally, gardening can affect volunteerism attitudes (Robinson, 2002), interpersonal relationships, and attitudes toward school (Waliczek, Bradley, and Zajicek, 2001).

Research has found school gardens to have an impact on cultural education and understanding. Lautenschlager & Smith found that, through school gardens, students experienced, “heightened values for other people and other cultures” (2007: 245). Hoffman, Knight, and Wallach found that, in a community college education setting, gardening programs can create “a sense of interdependency and positive self-empowerment” (2007: 403) as well as found the gardens’ ability to create interactions which eventually increase self-esteem and decrease ethnocentrism (2007). This shows that gardens, when having an effect on the community, can also have positive effects on the individual in regard to self-empowerment and self-esteem.

In fact, Michelle Ratcliffe, noticed that gardens can have an even broader impact. Ratcliffe hypothesized that positive feedback loops are formed when, “relationships between schools’ learning environments, individuals’ personal characteristics and behaviors, and community level factors” interact (2007). The idea is that gardening can have a ripple effect from the community to the bioregion (Ratcliffe, 2007). Bowker and Tearle, along a similar vein of thought, propose that school gardens encourage communication between students, stimulating thoughts and conversation regarding global environmental issues (2006). Bowker and Tearle’s thoughts seem to run parallel with the positive feedback loop referenced by Ratcliffe, showing that the effects of gardening can start at a local level and expand to broader global scope.

## Horticultural Therapy

Presently, definitions of horticultural therapy proliferate. Currently, the American Horticultural Therapy Association (AHTA) defines horticulture therapy as, “the engagement of a client in horticultural activities facilitated by a trained therapist to achieve specific documented treatment goals” (2012). That definition emphasizes the role of the trained therapist with specific, documented treatment goals. Rutgers School of Environmental and Biological Sciences defines horticultural therapy as, “the use of plants and gardens for human healing and rehabilitation” (2013), while the Chicago Botanic Garden define horticultural therapy as, “the use of professionally directed plant, gardening, and nature activities for the purpose of optimizing the physical and mental health of its participants” (2013). However, the North Carolina Botanical Garden defines horticultural therapy as, “the purposeful use of plants and gardens to promote individual mental, emotional, physical, spiritual and intellectual well-being” (2016). Some definitions emphasize the need for a trained therapist while others, such as North Carolina Botanical Garden, include the effect of the plants and gardens on spiritual well-being. In addition to the term “horticultural therapy,” there exist a variety of closely related terms that have definitions similar to that of “horticultural therapy”.

The closely related terms focus on the positive, therapeutic health and/or educational effects of gardens and gardening. Some of these include: sensory gardens (Hussein, 2010: 25), therapy gardens (Bubel, 1990:1), school garden (Matias, 2016; Moulton, 2008), garden-based learning, gardening (Nimmo and Hallet, 2008: 2), green outdoor settings (Taylor et al., 2013: 71), green space (van den Berg, Maas, Verheij, &

Groenewegen, 2010: 1204), and nearby nature (Wells & Evans, 2010: 311). What is similar in all definitions is the idea that human interactions with plants and gardens are of benefit to human life.

Interdisciplinary research suggests a positive effect on human minds, bodies, and communities from either active or passive interaction with plants. Human minds are affected by an increased ability to attend and concentrate, influenced through interactions with plants and gardens. For example, Attention Restoration Theory (ART) by Stephen Kaplan explains how natural environments can restore concentration (Kaplan, 1995: 169). According to Kaplan, ART, “provides an analysis of the kinds of experiences that lead to recovery from...fatigue.” (1995: 169). Kaplan, in 1995, asserted that, “Natural environments turn out to be particularly rich in the characteristics necessary for restorative experiences” (169). Further, interactions between humans, and plants, and/or gardens can also alleviate the symptoms of mental illness such as depression and anxiety. The American Horticultural Therapy Society currently speaks to horticultural therapy in its ability to, “improve memory”, “cognitive abilities”, and “task initiation” (2012). As we have seen, gardening can affect our minds in terms of attention and concentration, recovery, and mental health. Gardening, as a people-plant relationship, has also been shown to have a positive effect on the human body.

Authors have published on the effects of people-plant relationships on the human body. Ulrich (1999) and Van Den Berg and Custers (2011) discuss the effects of nature (Ulrich) and gardening (Van Den Berg & Custers, 2011) on lowering blood pressure

(Ulrich) and reducing stress (Ulrich and Van Den Berg and Custers). Along this vein, van den Berg, Maas, Verheij, and Groenewegen noticed that green has potential to help people handle stressful life events (2010). Wells & Evans discuss nature in its capacity to reduce stress in rural children, including stress from school (2003). Reducing stress is not the only way plants and gardens can have a positive impact on our bodies.

Gardens also impact our bodies via being a food source. Produce is a very important component of our food system. People the world over use gardens as one way to supplement their diet through growing produce. With the increasing awareness of food issues, people have been motivated to take control over some of their livelihood through gardening. This brings gardening into another dimension: effects on the community.

The interactions between plants and people have had impacts on communities in regard to food security as well as perceptions of serious life issues. In a study by Courtney Gallaher (2012) sack gardening, which is gardening in a sack or bag by filling the bag or sack with soil and then growing plants out of the soil, was researched as a livelihood strategy. Results showed it to be a viable livelihood strategy. Gallaher states that the sack gardens, “contributed to improved household food security directly” as well as left farmers, “feeling more food secure than non-farmers...and...resulted in an increase in social capital” (2012). Kuo, in 2001, conducted a study including residents of Urban Public Housing living with and without nearby nature. Those without nearby nature reported higher levels of procrastination and “assessed their issues as more severe,

less soluble, and more longstanding than did their counterparts living in greener surroundings” (2001:22). However, the benefits on the community do not stop there.

Examples of nearby nature can now be seen in city neighborhoods, with gardens powered by people in the community. One such example of this is Milwaukee’s “Growing Power” initiative wherein the community works together to utilize space by growing food upward rather than outward (Growing Power, 2016) South Central Los Angeles also has a gardening initiative (Finley, 2013). Members of the neighborhood have gotten together to plant gardens in as many spaces as possible in an effort to bring healthy, nutritious food to the neighborhood as well as the knowledge and community to grow it. Finley hopes to start a “(horti)cultural revolution” (Finley, 2013).

Another component to gardening that may have a broader impact is that of Landscape Architecture. Just as neighborhood gardens can build community, so can larger community gardens. This impact would start with some people who like to participate in the designing of gardens. The American Society of Landscape Architects’ (ASLA) mission statement is, “to lead, to educate, and to participate in the careful stewardship, wise planning, and artful design of our cultural and natural environments”(2013). These gardens are pleasing to many human beings, perhaps explaining why they are found at prominent places throughout small towns and cities (i.e., academic campuses, gardens and arboreta and as part of land planning, landscape art and earth sculpture, monuments, parks and recreation areas, residential areas, therapeutic gardens, urban design, and water resources, etc) (2013). This architectural

design could impact people via creating and implementing gardens that emphasize community beautification which may cultivate empowerment, physical health, and mental health through the interaction with the plants, either actively or passively. One place where this community beautification takes place is at school.

### Gardens' and Plants' Diverse Needs

Gardening and farming-based settings for people with diverse needs have been shown to improve quality of life for these individuals. Gardening and farming based residential settings also create a stimulating, experiential education that teaches life skills such as growing food. Empirical evidence has shown that the interactions between people with diverse needs and plants can be beneficial in regard to those areas of need.

Benefits of plants or gardening activities and people with diverse needs are found in the work of Taylor Kuo, and Sullivan (2001) and Justin Wilson (2012). According to a study conducted by Taylor, Kuo, and Sullivan, green settings increase attention span in children with ADD (2001). Justin Wilson, a landscape architecture student at the time, conducted research citing the benefits of gardens on people with diverse needs, specifically those experiencing depression. The results showed that those of whom gardened, or were life-long gardeners, had lower instances of depression than non-gardener peers. More benefits have taken places at green settings in public places which help to create an inclusive setting among other potential benefits.

Inclusive gardening has been cultivated in public and semi-public spaces. Brooklyn Public Library designed an accessible garden program using multiple intelligences and universal design principles, allowing all children to participate (Banks, 2013). The goal of the garden is to, “help every child, regardless of his or her abilities, fit seamlessly into OGC’s planned activities and feel truly welcome” (Banks, 2013). Other public locations also participate in gardens designed inclusively.

The Chicago Botanic Garden created a “barrier-free or Enabling Garden”. Rothert, when discussing the garden, states,

In the Enabling Garden, and through our outreach training program we have learned a great deal about adapting gardens and associated programming to accommodate most anyone of any ability at any stage of life. Invaluable to these experiences are the many therapists and teachers with whom we have worked over the years but more importantly the thousands of gardeners with disabilities who are the real masters of adaptation. (Rothert, 2002: 1)

The benefits can extend from inclusion to an array of skills. For example, Funkenbusch and Downs mention benefits of gardening for children being, “improved fine and gross motor skills, improved social skills, enhanced self-esteem, enhanced sensory perception and creativity” which would be extremely positive (2010:1). Many of these benefits fit very well into the context of a self-contained class.

#### Gardens and People Identified as Having Disabilities in an Educational Context

The question then comes; do the benefits claimed for horticulture therapy extend to the environment of that of a garden equipped self-contained class? The benefits from

gardening target areas of need and challenge found in self-contained classrooms as well as provide an outlet for the strengths and abilities of many of these students. However, prior to understanding how this is possible, one must have an understanding of the self-contained classroom.

Self-contained classrooms consist, like all classrooms, of an exciting blend of learning styles. Some children learn in a visual way, others a bodily/kinesthetic way, others yet learn best from an auditory presentation, etc. Children in self-contained classrooms, however, have been identified as having disabilities, and therefore require, and have a right to, specialized supports and instruction. Therefore, an education specialist, or special education teacher plans, designs, and/or implements strategies to help all children be as successful as possible in our present day school system. Some of the challenges children identified as having disabilities experience are: maintaining attention, self-regulation, sensory integration, social skills, reading, mathematics, writing, life skills, fine and gross motor skill acquisition, speech/language, and communication, to name a few. One could argue that many of these areas of need could be met through gardening or people-plant interactions.

The majority of the, still limited, research on school gardens for children identified as having disabilities is in regard to sensory gardens. Sensory gardens are, essentially, gardens that are designed with the sensory experience of the students in mind (Thekidsgarden.co.uk, 2015). This sensory experience can be one of a calming or invigorating nature. Hazreena Hussein discusses the potential of using a sensory garden

to enhance educational development and social interaction with kids with special needs (2010). The purpose of each garden is to benefit each student with special needs, considering their physicality, abilities, challenges, and areas of need. In 2008, in an article written titled, “Integrating the Autistic Child into Mainstream Education”, a garden is listed to be used for sensory purposes and as one of the components to a sound classroom design (Arnold).

Heidi Moulton, when mentioning the use of gardening in providing students with vocational options states,

“pupils who had severe problems communicating now enthusiastically debate who gets to sell our legendarily misshapen organic cucumbers. One pupil, with Asperger’s syndrome, who started the course not liking plants and hated getting dirty, is now our resident potato expert”(2008:50).

Other benefits, beyond teaching vocational skills and encouraging communication and inspiring enthusiasm, include practicing healthy interactions with living things. Children learn how to care for one another and living things through providing care for plants (Rosenow, 2008). Knowing that some children also would benefit from learning to practice nurturing behaviors, I think this is great and definitely worth taking into consideration due to the fact that each garden could be adapted in a way to suit each user.

As we have seen in the review of horticulture therapy, gardening could be beneficial to many of the challenges faced by the children identified as having disabilities. Though there were brief articles and blogs related to gardening/horticultural therapy and the potential health benefits in regard to people identified as having

disabilities, there was extremely limited research on the implementation of a gardening project in schools for children identified as having disabilities.

Having reviewed the literature, from the broader context of horticulture therapy, gardens and people, gardens within an educational context, gardens specifically including people identified as having disabilities, and gardens specifically including people identified as having disabilities within an educational context, it seems reasonable to conclude that a garden could have a positive benefit on students identified as having disabilities in an educational context. Therefore, it seems reasonable to conduct research into how gardening might benefit children receiving services for special needs in an educational context.

Specifically, this study will focus on mood, through surveys and journaling, the feeling about the experience, and will also observe for episodes of social interaction, leadership, team building, self-esteem, etc. It will be designed in a way that will support an understanding and respect of culture, environment, and diversity as well as facilitate knowledge.

## CHAPTER FOUR: RESULTS, DISCUSSION, AND ANALYSIS

### Effects of Gardening on Mental and Physical Well-being and Community

In this chapter, I will present diverse forms of evidence from my field research to explore the claims made in the literature about the positive effects of gardening for children identified as having disabilities. I will address the effects of gardening on children's mental well-being, physical well-being, and community.

Throughout this section, I present images and charts which are representative samples of what the group was experiencing as a whole. There was more data from the gardening experience that is not directly included in this written component of the thesis. The data included represents the themes that were most prominent, overall, from my perspective. Where explicit, I present evidence concerning the specific experiences of individual students that resonate with the literature in particular ways. The charts present information from the surveys students completed before and after gardening (see appendix); these charts depict how gardening affected students in regard to their mental and physical well-being and community.

#### Mental Well-Being

The effects of gardening on mental well-being can be observed in different areas. These areas include: emotional well-being, ability to attend and concentrate, and enhanced self-esteem. I will explore the observed mental and emotional effects of the gardening exercises and consider those observed effects in light of what the literature

states. In general, the results from my field research support claims in the literature about the positive effects of gardening on mental well-being.

### Emotional Well-Being

The effects of gardening on children's emotional well-being can be observed by: drawings, surveys, and my own observations. The literature addresses the potential of gardens being something that can affect our emotions in a number of ways. Hartig et al. (2003), Wilson (2012), and Hussein (2010) emphasized the positive impact of gardening on people identified as having disabilities.

Hartig noticed that people experienced a decrease in anger after experiences in nature (2003). My results contain a good example of this. Figure 1 demonstrates that gardening, for one student, was a place where angry or mad feelings dissipated. This information, from the surveys filled out before and after gardening, shows that this child felt mad 14% of the time before gardening and did not feel mad ever (0% of the time) either during or after gardening. This supports the claims in the literature by Hartig (2003) which demonstrated the positive effects of nature on calming anger.

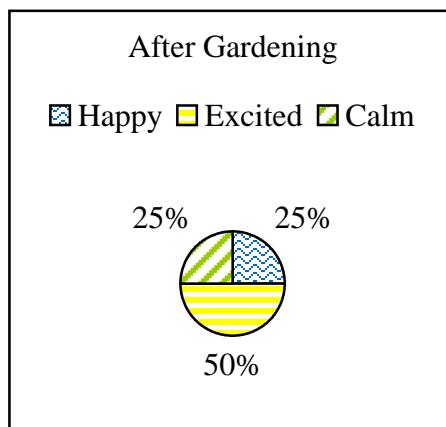
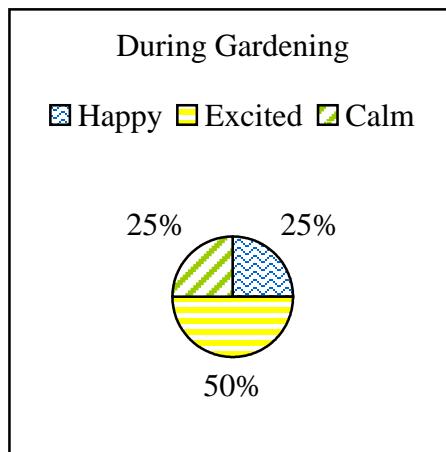
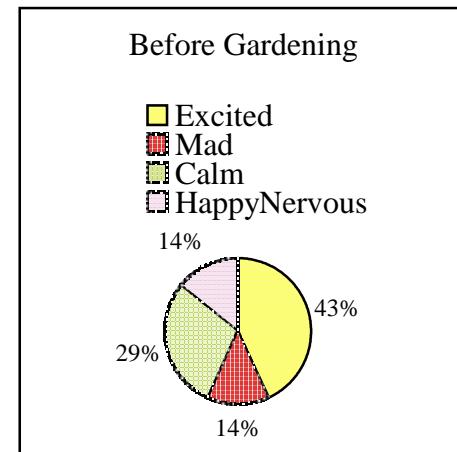


Figure 1: Student Emotions Before, During, and After Gardening

My field research also supports Hussein's (2010) argument that gardening is a pleasant experience for people with disabilities. For example, Figure 2 is a picture of a child feeling happy while gardening. This picture was drawn after the gardening experience was completed for the day.



Figure 2: Student Drawing After Gardening

Another piece of evidence is found on the survey form in Figure 3, which a student completed after the gardening experience; it shows how the child was happy in the garden. This is just one of many examples of children feeling happy gardening. These findings confirm the work of Hussein (2010), which claims that gardening is a pleasant experience, and increases feelings of happiness.

1. How do you feel right now?

Happy	Excited	Jittery	Calm	Sad	Nervous
Other	<b>HAPPY</b>				

2. How do you feel when you are in the garden?

Happy	Excited	Jittery	Calm	Sad	Nervous
Other	<b>HAPPY</b>				

3. Did you like gardening today? Yes/No

4. How would you rate your school experience this week on a scale from 1-10? **10**

5. What words would you use to describe this experience? **rainy**

Figure 3: Student Survey After Gardening

The chart in Figure 4 demonstrates that, for some students, gardening had a calming effect. This evidence complements the research by Hussein (2010), which demonstrated a similar relationship between gardening and calmness. The student represented in the pie chart below described his or herself as being “happy” 86% of the time before gardening and “happy/calm” 72% of the time during gardening. During gardening, however, this student showed they were “calm” for 14% of the time. This information came from the surveys filled out before and after each gardening day. This suggests to me that the student felt more full calmness in the garden in comparison to before gardening. This student showed that he/she was fully calm 67% of the time after gardening upon returning to the classroom. Though this shows a slight decrease in “happy” feelings from before to during gardening. I find the increase in “happy/calm”

feelings to be encouraging as, for some students, feeling calm could be quite an accomplishment if being calm is an area of challenge. Gardening may have helped the child to feel calm in the classroom afterwards which would be positive if this was the kind of student who had difficulty being calm in the classroom. Also, the fact that the student chose to circle two emotions, “happy” and “calm” on their survey form, rather than one or the other, is interesting. It seems that the student identified having both feelings at once. I am left wondering if this student was also better able to feel “focused” while in the classroom after gardening when he reported feeling only “calm” for 67% of his survey form responses.

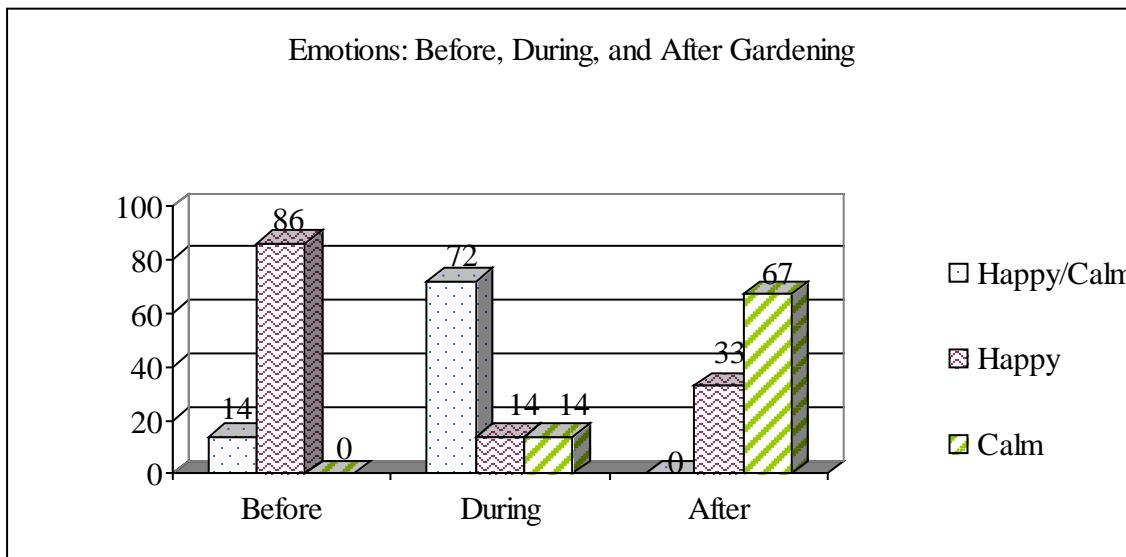


Figure 4: Student Emotions: Before, During, and After Gardening

My field research results also affirm the work of Wilson (2012), which suggests that gardening positively affects mood. Surveys reveal that for multiple students gardening shifted her/his mood in a positive direction. For example, the following chart

shows a change in mood from sad to more positive emotions on 3 different occasions.

This shows that gardening was an activity that helped this child improve his/her mood.

Gardening improved the mood of one student from sad to “SoSo” or even excited.

Though this child may not have been experiencing some form of clinical depression, this

chart supports Wilson’s claims (2012) that gardening positively effects mood.

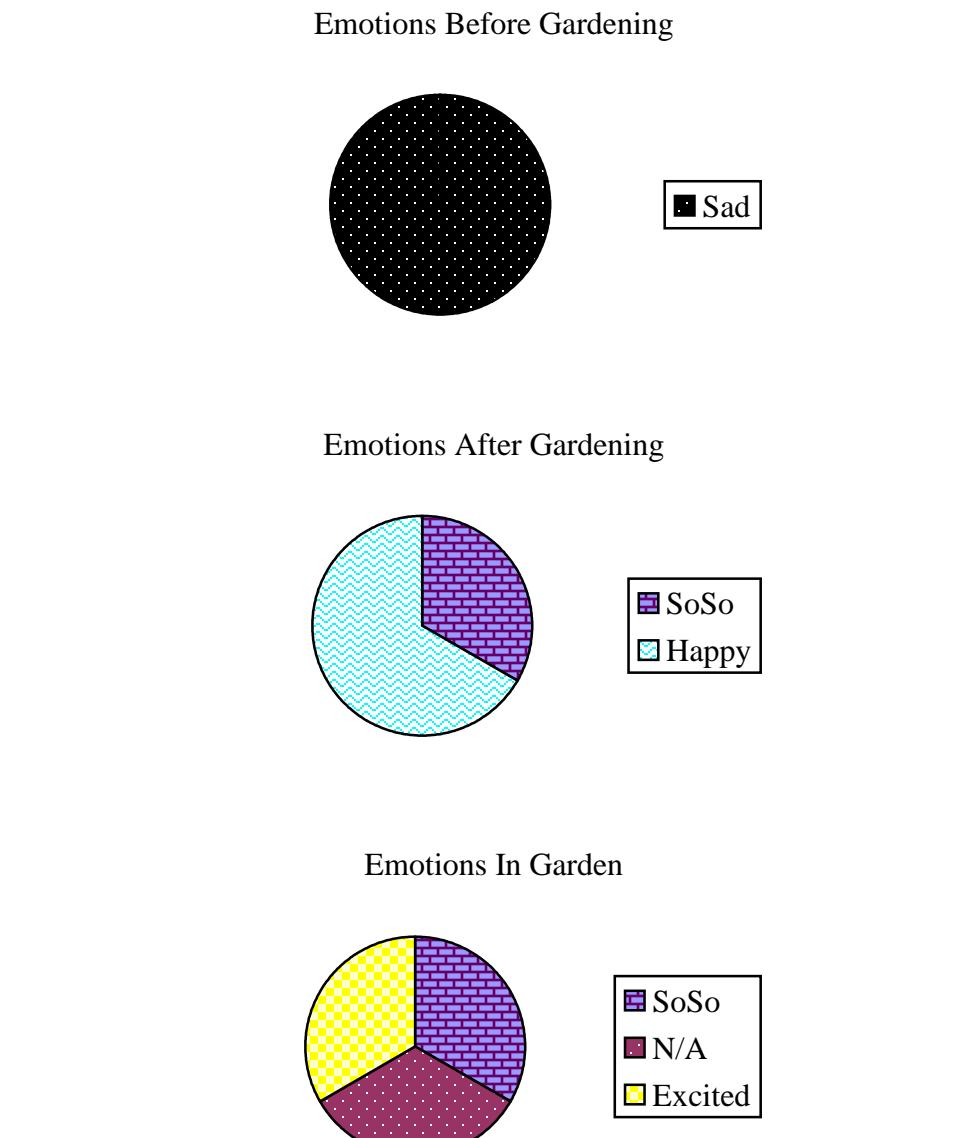


Figure 5: Emotions Before Gardening, After Gardening, and in the Garden

Figure 6 is a pie chart that represents another child's experience before, during, and after gardening as found on her/his survey forms. This child, though responded with "sad" 50% of the time prior to gardening, felt happy in the garden 100% of the time. Gardening improved the mood for this student from sad to happy. This also speaks to the positive effects of the benefits of gardening on mood by Wilson (2012).

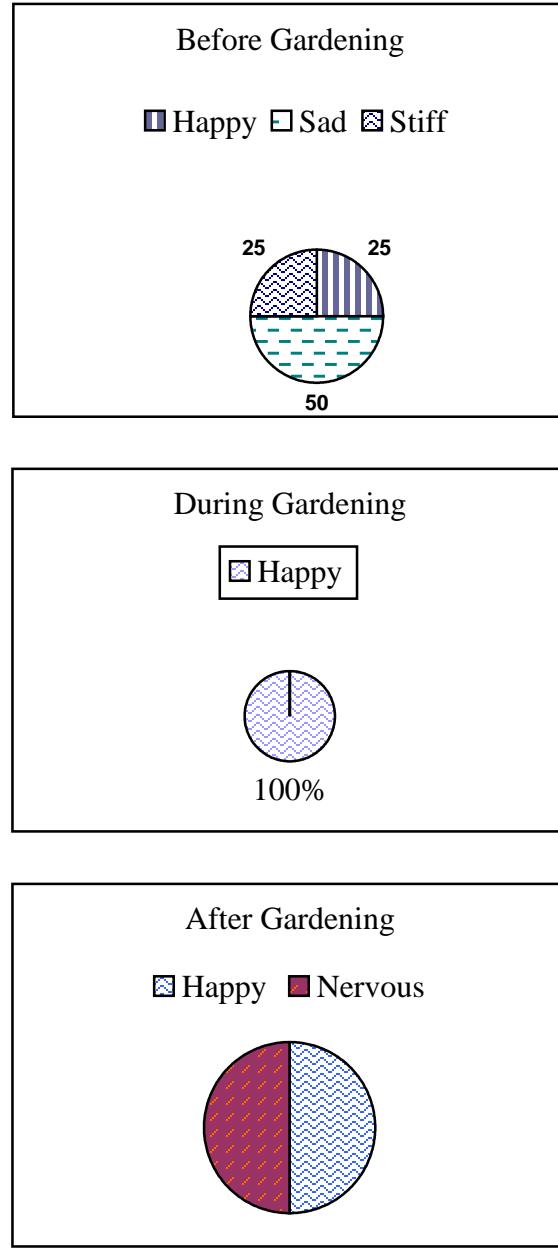


Figure 6: Emotions Before, During, and After Gardening

This drawing in Figure 7 shows that this child thought gardening was fun and happy. This sample was from “thank-you” cards assigned by the student's teacher for which the students all put in extra effort to say thank you. They also represent their finest

writing and drawings about the gardening experience. These results support the claims by Hussein (2010) that gardening can be an enjoyable and pleasant activity; they also add further weight to Wilson's (2012) contention that gardening can improve mood or at least that the student learned to express emotions due to this experience.

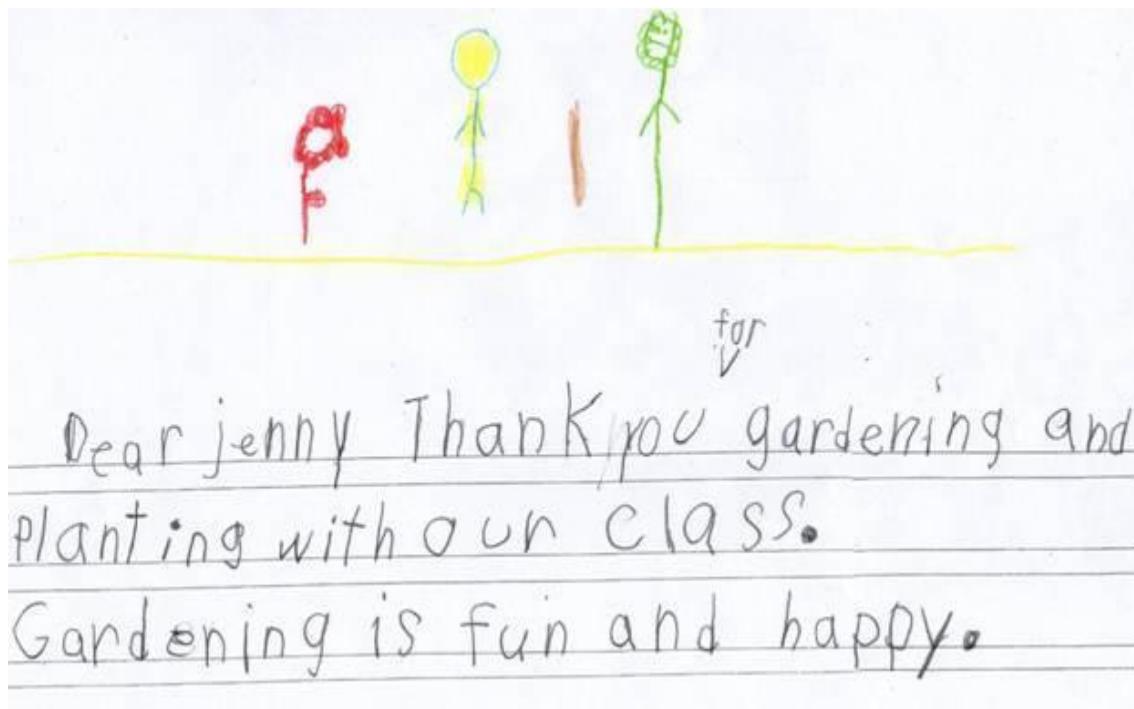


Figure 7: Student Writing

Finally, figure 8 conveys how gardening was a happy experience overall for students. This further confirms the work of Hussein (2010) described above. In this chart “H” represents the emotion response option of “happy” and E represents the emotion response option of “excited”. The numbers represent the number of students who responded with these answers. So, 8 students responded that they felt “happy” this day and 1 student responded that they felt “excited”. There were no other answers given

on this day. So, everyone who responded felt either happy or excited. This information is from the before and after surveys that students filled out on gardening days.

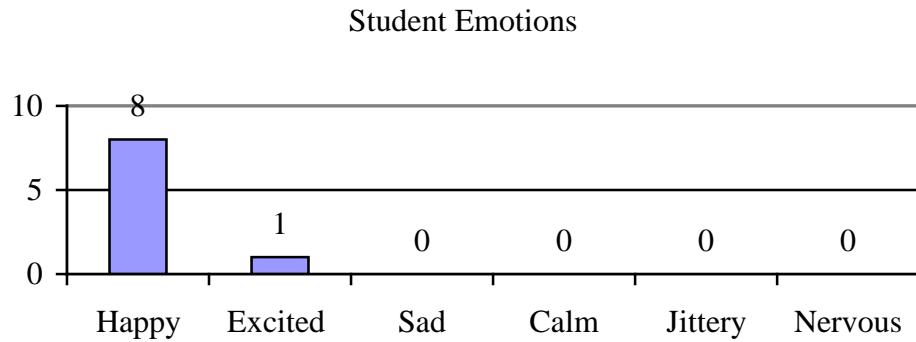


Figure 8: Student Emotions

#### Ability to Attend and Concentrate

Gardening had a beneficial effect on some students' ability to attend and concentrate. Evidence for this includes an interview response from the teacher who mentioned that students who typically "space out" were better able to focus after gardening. My own observations also support this claim. I was able to see a very calm classroom after gardening on many occasions. The students came in calmly, got into their seats, and filled out their surveys in a relaxed way. These research results support the claims by Taylor et. al (2013) and Kaplan (1995) that spending time in a natural environment can reduce attention deficit symptoms and restore concentration.

### Enhanced Self-Esteem

Based on my anecdotal observations, the group of students participating in the gardening exercises seemed to experience enhanced self-esteem. It appeared to me that the students felt good about contributing to something positive as a class and for the school, lifting self-esteem. I also feel that one or two students in particular found pride in their gardening endeavors and seemed to experience a lift in self-esteem over the duration of the project. Students appeared to walk with heads held high and with confidence in their actions and choices during gardening. These observations seem to support the claims of Funkenbusch and Downs (2010) that there is potential for gardening to enhance self-esteem claimed.

Gardening clearly benefited the emotional well-being of the children. Some children were able to experience a shift in emotions while gardening that resulted in feeling happy or calm rather than sad or angry. This suggests that gardening does provide the conditions for children to be able to not only experience more positive emotions but also for being able to better regulate emotions. It is also possible that it was a setting more conducive to students practicing the self-regulation skills they already had.

### Physical Well-Being

Motor Skill Development. The gardening project had a positive effect on physical well-being. The physical nature of gardening activities provides general exercise and helps strengthen fine and gross motor skills. The students were able to participate in many activities that provided opportunities to build strength and dexterity.

Some of those activities included: holding spades or shovels, turning on the hose, planting seeds, weeding, watering the flowers, digging holes, etc. The gardening also involved a lot of movement such as: walking, squatting, getting up and down, reaching, stretching, weeding, and digging. Over the duration of the gardening curriculum some students clearly became much more skilled in planting and digging. Figure 9 shows garden's ability to support students in strengthening fine motor skills.



Figure 9: Student Art

Figure 10 demonstrated an improvement in handwriting abilities for this student between the beginning of the project and the time of this writing. Evidence such as this supports claims by Funkenbusch and Downs (2010) about the ability of gardening to strengthen fine and gross motor skills.

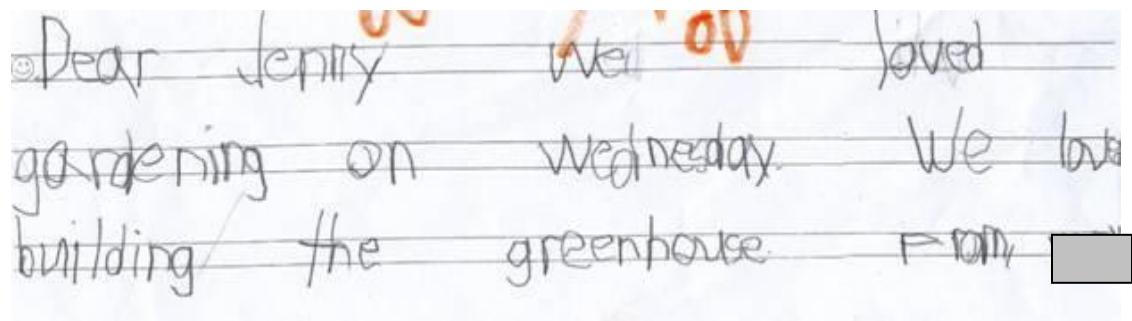


Figure 10: Student Writing

#### Attitudes Toward Vegetables

Positive attitudes toward vegetables perhaps reflect a willingness to eat a healthy diet, which of course can improve physical well-being. Interview questions and my own fieldwork journal entries reveal insights about the effects of gardening on children's attitudes toward vegetables. For example, journal entries from 1/12/11, show enthusiasm about having chard by quoting a student that excitedly and enthusiastically yelled out loud, "We have chard!" Journal entries from 2/2/11 document that one student was, "excited to bring home some rosemary and lavender" in addition to noting that students enjoyed, "scented plants". Students also showed a strong desire to learn about the seeds, many of which were vegetables. They also expressed enthusiasm about gardening daily. My 2/2/11 journal entry states, "last week there was a lot of enthusiasm for planting

potatoes" and furthermore, that "kids...are interested in many different things...growing food". The students were overwhelmingly enthusiastic during our gardening experience. Much of our gardening involved growing and planting vegetables. Students were interested in learning about, growing, and sharing vegetables. It appears to me that students' attitudes toward vegetables were positive, overall. The positive attitudes and enthusiasm for gardening, seeds and vegetables I observed are consistent with the literature on this topic, e.g. McAleese & Rankin (2007), Morris and Zindenberg-Cherr (2002), Ratcliffe (2007) and Lineberg & Zajicek (2000).

This piece of writing in figure 11 shows that the student enjoyed parts of gardening, such as planting and watering peppers and string beans. The narrative demonstrates that this student not only enjoyed the activity but also understood how peppers and string beans grow. This supports claims in the literature that gardening can increase knowledge of the food system positively affect attitudes toward vegetables (McAleese & Rankin, 2007; Morris & Zindenberg-Cherr, 2002; Ratcliffe, 2007; Lineberger & Zajicek, 2000).

I thank you Jenny for gardening with us.  
I liked planting and watering the peppers and  
string beans. Here is a picture.

Figure 11: Student Writing

### Knowledge of the Food System.

Knowledge of the food system also relates to eating healthy, local foodstuffs. My field research journal entries indicate that gardening positively effects children's knowledge of the food system. For example, journal entries from 2/2/11 show that students started asking questions about seeds as well as started trying to plan for the garden. A journal entry from 2/17/11 describes how a student was especially interested in the video about the bag garden and "requested the African bag garden again...seemed to really enjoy the visual". Another piece of evidence comes from my memory of students experiencing what it takes to grow food first hand. They were growing food. They were planting seeds and small plants, watering, measuring, observing, planning, and truly growing food. The lessons for this gardening project included topics such as local farmers, famous farmers, and global gardens. Through participating in these lessons and growing food students increased their knowledge of the food system, in a manner consistent with the claims made by Lautenschlager and Smith (2007) concerning the effects of gardening on understanding.

### Community

This section explores the effects of gardening on community. As seen in the literature, gardening helps create community through a variety of mechanisms as Nimmo and Hallet noticed (2008). Gardening facilitates diverse relationships, promotes an inclusive culture and encourages interaction with peers (Nimmo and Hallet, 2008). It

helps students learn to care for living things (Rosenow, 2008). It encourages volunteerism as Rosenow (2008) noticed and helps create empathy for other people and their unique cultural backgrounds as found in the literature (Nimmo & Hallet, 2008; Matias, 2016; Lautenschlager & Smith, 2007). Lastly, it can help students learn vocational skills (Moulton, 2008) and communication skill development (Nimmo & Hallet, 2008) via writing, art, and words.

### Diverse Relationships

Gardening can foster diverse relationships by promoting interaction with peers and through creating an inclusive culture.

During one gardening lesson, Danielle Allred, another current Environment and Community graduate student, was an extra support person. She remarked on the extensive peer interaction among the student gardeners. Her notes from 1/19/2011, state, “lots of high-fives,” – a good example of enthusiastic peer interaction.

The students certainly interacted as teams, in small groups, in partners, and by parallel play which are all examples of peer interaction which helped to foster diverse relationships amongst this diverse group of individuals. For example, Figure 12 is a photo of students interacting together to create a bag garden.



Figure 12: Students Working Together on Bag Garden

Creating an inclusive culture is another way of fostering diverse relationships.

This gardening project was designed with activities that included opportunities for many types of learners at many different levels in their development and with an overarching attitude that everyone mattered and was important. There was something for everyone to do, be it providing moral support, weeding, planting seeds, digging, watering, or just enjoying the environment and providing company to the rest of the group. There was an expectation that everyone feel included during the project. If we had more time, we would have invited other students from other classrooms to participate with us. The fact that this group of students was diverse in age, ability, and need, and that we were able to conduct many gardening lessons peacefully and enthusiastically speaks highly to the potential of a gardening environment to create an inclusive culture. Through gardening, students learned not only how to interact with humans but with all living things. Any environment can be an inclusive culture, it just requires thoughtful planning.

#### How to Care for Living Things

Ronsenow (2008) commented on how gardening creates opportunities to learn how to care for living things. In my research this was observed through student attitudes towards volunteerism, heightened values for people and their unique cultural backgrounds, and the development of vocational skills. Journal entries, artwork, and photos from my research illustrate these relationships and effects

Volunteerism is one way of expressing care for living things. There were many examples of volunteerism throughout the gardening project. A journal entry on 3/3/11, states that two students were really into the bag garden. Further, those two students were able to recruit another two students to help as eager volunteers. Later that day, three students helped carry that bag full of soil out to the gardening shed. Notes from 3/3/11 also state that, when approaching things as though we all needed each other, and that everyone could help, things really went well. A journal entry from 2/2/11 describes a day when one student decided that she wanted to show me how she was watering the plants in gardening boxes of other classes. This showed that she cared about the success of the gardens of other classrooms and the plants that were in them. She seemed proud to do this, and another classmate eventually joined in, agreeing it was a good idea. Another journal entry describes a student who wanted to bring home the rosemary and lavender to share with her Mom. This shows that the care we were taking with the plants in the garden was extending to other human beings as well. Notes from 1/19/2011 state one student offered to help another, and that one student in particular was very enthusiastic

about helping others. These various examples suggest that gardening increases volunteerism, a conclusion that is consistent with the claims Robinson (2001) makes.

Through gardening students learned to care for living things in a number of ways. A journal entry describes how two students worked together to plan how to build a fence to protect the plants. The students had learned how to care for other living things and were inspired to take the initiative in figuring out how to provide the plants protection. In Figure 13, there is a writing sample taken from one of the “thank you” cards students made. The student was grateful for the gardening experience because it was where he met a snail to which he felt connected and named, “Snailey”.

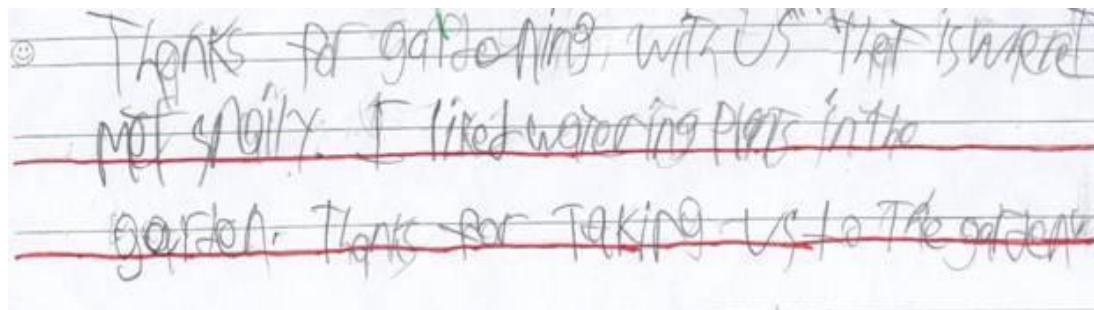


Figure 13: Student Writing

It appears that there is a strong argument for the potential of gardening to teach children how to care for one another and other living things.

Nimmo and Hallet (2008) noticed the effects of gardening on heightening values for other people and other cultures. Learning to value other people and other cultures is another way of learning how to care for living things. Participation in the garden project seemed to promote these values. One example is the bag garden lesson. During this

lesson, the students seemed impressed by the bag garden technique, and it appeared that their appreciation for other cultures did increase. This was evidenced by the enthusiasm I observed for both this project as well as the video that showed children in Africa making a bag garden. The students also showed interest when learning about famous farmers from diverse cultural backgrounds such as Cesar Chavez and Vandana Shiva. The students also really enjoyed the clip of the Vienna Vegetable Orchestra. My journal entry 2/17/11 notes that students were attentive during the video. Overall, the students had enthusiasm for one another as a whole; they showed respect for each other, their teachers, and for me. We had a wonderful time together. I feel that gardens have the potential to heighten values for other people and other cultures if designed with that end in mind.

Caring for living things happens in a variety of ways that are all interlinked. When we care for living things, we provide the necessary groundwork for forming diverse relationships which inspires volunteer attitudes and promotes vocational interests in people that will benefit the group. Diverse relationships and caring for living things directly affect our desires to work as a community. Communication skills also are necessary pieces to the puzzle. Communication skills help us to understand each other which aides in the formation of diverse relationships and which are strengthened by the knowledge of how to care for living things.

### Communication Skill Development

Participating in the garden project strengthened communication skills, which were expressed through outlets such as art, writing, words, or a combination of the three.

Students identified as having disabilities sometimes have speech and language challenges, making traditional verbal and/or written communication difficult to impossible, so a variety of communication outlets were made available to the students throughout this project.

The drawing in Figure 14 reveals two people in the garden, perhaps looking up at things in the view of a child, always looking up for protection and support. This drawing shows this child was able to express his/her gardening experience through art. This shows that art is a form of communication.

5. What words would you use to describe this experience?

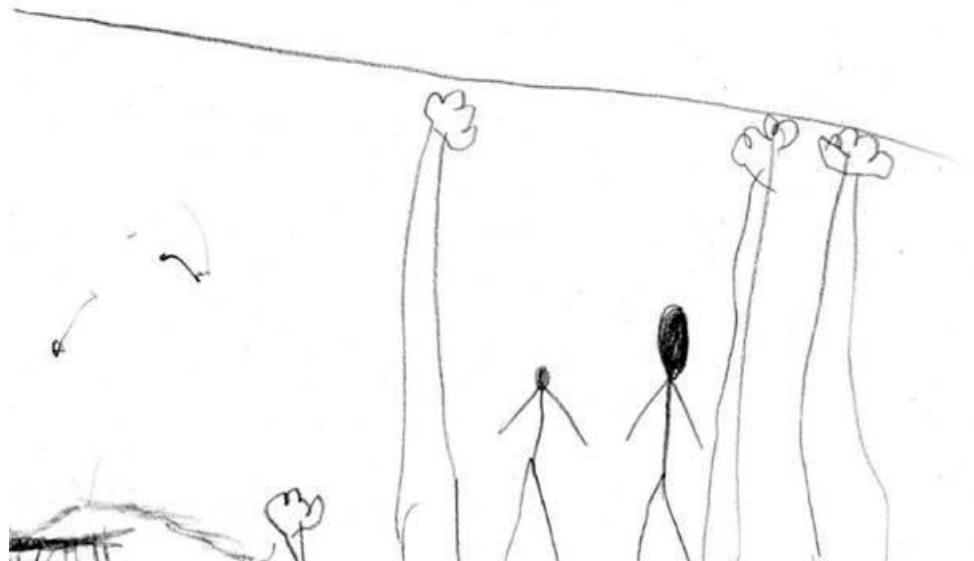
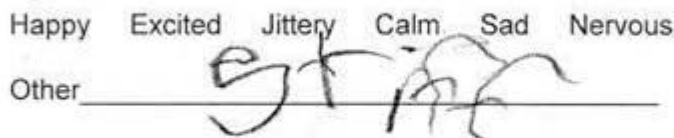


Figure 14: Student Drawing After Gardening

Students practiced expressing complex feelings. Figure 15, one of the post-gardening surveys shows that this child wanted to garden and was able to learn to express other feelings beyond the more common emotion options through writing.

Student Questions Pre-Gardening

1. How do you feel right now?



2. Do you want to garden today?

Figure 15: Student Survey Before Gardening

Figure 16 shows that this student loved gardening, and that he/she was able to form a relationship with the gardening teacher so much so that he/she missed her. The student wrote these words on the “thank you” card she had made. This speaks to the positive effect of gardening on forming diverse relationships as claimed by Nimmo and Hallet (2008).

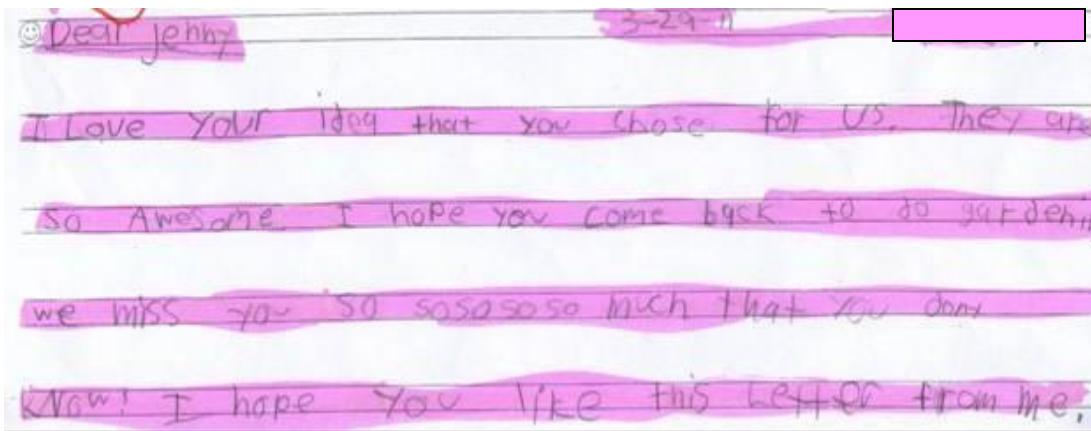


Figure 16: Student Writing

The following writing sample shows that this student had a good time gardening and enjoyed it all: watering, planting, etc. It also showed that this student had good wishes for the gardening teacher's future...full of good times, and he included these wishes on his "thank you" card.

I had a good time with you. It was fun when we watered. It was fun gardening. It was fun planting. everything was fun. Have a good time Jenny.

Figure 17: Student Writing

I also have memories of students constantly talking and communicating throughout the gardening project. Students were excitedly talking about gardening and

occasionally personal experiences for which gardening sparked memories throughout the project. It was a lively, talkative group consistently. This certainly supports claims by Bowker & Tearle (2007) and Hussein (2010) that gardening strengthens communication skills and can enhance social interaction with children identified as having disabilities. All in all, it appears that gardening creates the opportunity for communication skill development in reading, art, drawing, and feelings.

The concept of gardening as an agent for creating community is found throughout the literature in both direct and indirect ways. When analyzing the literature, what unfolds is that most of the positive benefits of gardening link to the broader theme of community. For example, in the literature benefits of gardening include peer interaction, communication skill development, and creating an inclusive culture, forming diverse relationships, and learning how to care for living things, all of which are components of developing a healthy community. Many authors in the literature review spoke to these themes. If we talk to each other or express ourselves to each other and care for each other and living things, we will create relationships amongst diverse groups which create community. Facilitating diverse relationships includes creating an inclusive culture and facilitating interaction with peers. Fostering the knowledge of how to care for living things happens through increasing volunteerism attitudes, heightening values for other people and other cultures, and teaching vocational skills. All of these things can be done through gardening.

Mental and physical well-being were two other themes discovered during this project. Mental well-being can be cultivated through gardening by restoring our ability to attend and concentrate, and, in some cases, decreases emotions such as sadness or anger. Mental well-being can also be cultivated through activities that create happiness within us as gardening did for so many students. Gardening may even allow us to feel moments of awe in observation of the beauty around us and at our very fingertips. Our physical well-being is of course linked to our mental well-being. Our physical well-being, when attended to appropriately, can also impact our mental well-being, and our physical well-being can be cared for through gardening by the exercise we get and by the healthy food we eat.

## CHAPTER FIVE: CONCLUSION

A holistic approach to education provides diverse students with what they need to thrive. School gardens are an important part of a holistic approach.

This study offers support for claims made in the published literature concerning the emotional benefits of gardening generally as well as the benefits of gardening in an educational context and gardening with people identified as having disabilities. Gardens and gardening do provide positive, therapeutic health and educational benefits. Gardens and gardening create community at school and offer students with disabilities particular benefits. As discussed in the prior chapter, the benefits of gardening in educational settings, particularly for self-contained class, include enhanced mental and physical well-being and a strengthened sense of community.

There were limitations to this study in regard to the design of the study, overall. One limitation was the length of time of the study and the small sample size. If we would have had more time or a larger sample size, we could have better understood, confirmed, or denied what was emerging in the results. It also would have been nice to have data collection that would have focused in on the benefits of gardening more deeply and precisely by, for example, assessing students for growth in areas such as fine motor skill development, speech and language, self-regulation skills, etc. An additional limitation included the lack of a regular observer. Another limitation included my novice level of teaching and researching. Had I developed different methods of analysis, it might have

been possible to see if students could start to choose emotions that were more complex on their surveys rather than selecting from the simple set of options provided on the survey form. That being said, there was a space where students could write in a different emotion if they felt something other than was on the list. Limitations of this study could be resolved in future research.

Future research might include a lengthier study with a person regularly in the role of observer. It would be interesting to see if the results are replicable. Future studies might include focusing in on other aspects to gardening that may be of benefit other than the prominent themes of physical and mental well-being and community. For example, data collection techniques could focus on self-esteem, empowerment, peer interaction, formation of diverse relationships, and how gardening may compare to other restorative experiences or other times of the school day such as recess. Gardening could also be compared to other activities in restorative environments at school. It might also be interesting to develop other data collection techniques that may have focused more on assessments for growth in various areas such as: understanding and communicating emotion, fine and gross motor skill development, social skills, attitudes toward vegetables, vegetable consumption, and health. Additional research, if this has not yet been done, might focus on the correlation between students' response of feeling "calm" and ability to focus at school. Further, what is the significance of identifying the feeling more than one emotion at once? Were the feelings of "happy/calm" that one student felt a possibility for more students, or was that student just able more able to expand his sense of how he was feeling beyond that of peers to identify two feelings at once? Perhaps

there was a better word for what he was feeling. Future research might also include other activities that might also contribute to mental and physical well-being and community for students.

This study serves as a reminder of the need for a holistic approach to education which fosters physical and mental well-being and community. Without such a multidimensional approach, we are sure to fail students in their great attempts to learn and develop. We will leave students falling short of their human potential. It is only with a holistic approach to education that we can develop thriving young human beings. School gardens are an essential component of this approach.

Of course, gardening is not the cure all. A thriving school culture requires services that encompass all essential human needs. Not all students are going to respond to gardening nor is gardening always going to be available to students or people. Students also need access to healthy food and to receive services for strengthening their mental and emotional health; in some cases this may include therapy. Students need access to medical care and need loving adults in their lives. Students need to feel included. School gardens are part of this bigger picture, holistic approach.

Our school systems are full of wonderful people committed to student success. Many people working at schools have a strong desire to educate and to dedicate their lives to education. However, schools still struggle greatly. For example, due to budget constraints, schools struggle to provide students with the services they need, such as interesting elective classes and therapeutic services. These things are not impossible to

have - we just need a culture that values education, life, and the development of responsible, healthy human beings.

As a high school special education teacher, I have seen that all humans have a desire to learn. I have yet to meet a human being that does not want to grow and develop. It is something that very well may be innate in all of us, and yet we are often so disconnected from this desire due to factors out of our control. Changes are needed in our school system and culture. We need to place a higher priority on the health and wellness of each child, as well as on our local and global community. If we valued our species and our planet, we would fund education. We would have more elective classes and smaller class sizes. We would have services for our mental and physical health, and we would find more time to work together. At times when these dreams and visions seem out of reach, I still feel that gardening could play a small role in the health of our students and is within my reach and ability as a teacher to provide. If it has a positive and critical impact on the health and future of even one of my students, it is worthwhile.

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## Appendix A

### Gardening Lesson Plans

1. Gardening Safety: We will discuss tool safety and care (in the event that tools are not the best idea, the children will simply use their hands, and Jenny will do all digging) as well as good distances to work from each other. We will also discuss how to dig and reach in a safe manner.
2. Digging Dialogue: We will practice Digging while chatting
3. Compost Tea: We will make a compost tea and then pour it into the soil.
4. Planting (how to plant a seed, where, and at what distance from each other)/Watering (how much water to give and when)
5. Food and Nutrition: Garden Snacks
6. Super Senses: We will Plant aromatic herbs
7. Global Gardens (discover what gardens look like throughout the world)
8. Seed Collection (site permitting, we may take a walk and collect seed)
9. Cycles of Life: From Seed to Stomach or Soil
10. Just Being: Spending Time in the garden
11. Garden Writing
12. Plant Needs/People Needs (We will discuss commonalities among the diverse nature of plants and people and the things we all need)
13. Local Vegetable Farmers
14. Famous Farmers: Cesar Chavez, Vandana Shiva

15. Garden Rhythms: Make percussion instruments out of beans and seeds.

## Appendix B

### Surveys

#### Student Survey Questions Pre-Gardening

1. How do you feel right now?

Happy      Excited      Jittery      Calm      Sad      Nervous

Other \_\_\_\_\_

2. Do you want to garden today?

#### Student Survey Questions Post-Gardening

1. How do you feel right now?

Happy      Excited      Jittery      Calm      Sad      Nervous

Other \_\_\_\_\_

2. How do you feel when you are in the garden?

Happy      Excited      Jittery      Calm      Sad      Nervous

Other \_\_\_\_\_

3. Do you like gardening today? Yes No

- a. Why?
4. How would you rate your school day today on a scale from 1-10?