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HORTICULTURAL ACTIVITIES PRESENTED TO
PRESCHOOL-AGED CHILDREN IN AN INCLUSIVE
SETTING AND THE INFLUENCES OF THE
ACTIVITIES ON PEER INTERACTION AND TASK
ENGAGEMENT

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**Horticultural Activities Presented to Preschool-Aged Children in an Inclusive Setting
and the Influences of the Activities on Peer Interaction and Task Engagement**

Synopsis:

This study will investigate the possible influences of horticultural activities with two classes of preschool children in a theoretically inclusive setting. As well as considering the influences of using Horticulture activities in a science methods course on students in Higher Education as part of a Teacher Preparation program and their perceptions of teaching science in PreK-4.

**Horticultural Activities Presented to Preschool-Aged Children in an Inclusive
Setting and the Influences of the Activities on Peer Interaction and Task
Engagement**

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Abstract

There is great concern by teachers, school administrators and parents regarding the increase in the number of preschool-aged students who exhibit challenging behavior in early childhood settings (Benedict, Horner & Squires 2007). There is a need for early intervention procedures that focus on young children who may be at risk for developing patterns of challenging behavior is evidenced. The Pyramid Model formerly recognized as Positive Guidance principles which are similar to Positive Behavior Support principles are often incorporated into preschool programs, however there has been relatively little attention given to Program-Wide Positive Behavior Support (PWPBS), as defined by Positive Behavior Intervention Supports (PBIS), in preschool settings (Hemmeter, Fox & Broyles, 2007).

Research has also documented that early intervention programs, as well as complementary alternative therapies, have been successful in providing children with opportunities to develop age appropriate academic, physical, social, and behavioral skills (Boso, Emanuele, Minazzi, Abbomonte, & Politi, 2007). Complementary alternative therapies include art, music, movement or horticultural activities.

The activities suggested for this study incorporated the use of plants and/or plant materials in a variety of non-invasive activities that provided an opportunity for everyone in the class to participate. Twenty-one students and six adults from two preschool classrooms participated over a 16week period. There were four students in each class identified as presenting challenging behaviors. These students were consistently observed for behavioral performance. In addition, two randomly chosen students from each class were observed. Peer interactions and task engagement observational data was collected and analyzed along with

qualitative data in this mixed methods investigation. Data collection methods included behavioral checklists, direct and indirect observations, teacher interviews, surveys and classroom artifacts.

The researcher sought to uncover if horticultural activities would encourage positive peer interaction and task engagement. These activities were modeled by the researcher who was not a horticulture therapist. The results were promising. It was determined through the course of the study that, task engagement and positive peer interactions increased after the implementation of the horticultural activities.

KEY WORDS: Horticulture, horticulture therapy, horticultural activities, school gardening, Positive Guidance, Positive Behavior Support (PBS).

Introduction

Press headlines in 2007 reported that the rate of expulsion of preschool children because of behavior issues exceeded the rates of elementary and secondary age students. These headlines may be surprising to the general public; they are not, however, surprising to early childhood educators and researchers (Hemmeter, Fox, & Broyles, 2007).

A number of studies conducted over the past few years have suggested that many preschool students are at risk for severe behavior and emotional issues. It has been estimated by the National Scientific Council on the Developing Child (2008) that 10-20 percent of preschool students present behavior issues that place them at risk for future academic and social struggles (Burke, Kuhn, Peterson & Bandura-Brack, 2010; Sandrock & Andrews, 2016). It has also been suggested that early onset of behavior problems can be predictive of future, socially significant

and problematic outcomes especially when these severe behaviors are not addressed, leading to issues such as juvenile delinquency and school dropout (Dunfrene, Doggett, Henington & Watson, 2007; Dunlap, Strain, Fox, Carta, Convoy, Smith, & Kern, 2006; Fox, Dunlap, & Powell, 2002; NEA, 2016; U.S. Department of Health & Human Services, U.S. Department of Education, 2015). Many children who present these behaviors are eventually placed in special education classes, alternative placements, and/or possibly drop out of school (Koertering & Braziel, 1999 in Burke, et al., 2009; NEA 2016; U.S. Department of Health & Human Services, U.S. Department of Education, 2015).

Challenges Teachers Face

Today many teachers feel they are unprepared to manage students with challenging behaviors and many of those rely heavily on punitive practices (Pattan, 2010; Sandrock & Andrews, 2016). Educators have reported the need for training in order to successfully work with students presenting challenging behaviors as one of their highest priorities (Hemmeter, Fox, & Broyles, 2007; Sandrock & Andrews, 2016). How then do teachers, educators, and administrators in a tight economy meet the needs of each and every student, while increasing student performance and decreasing administrative costs? Several low-cost, non-invasive approaches show promising results when implemented in a variety of settings, including schools, correctional facilities and hospitals. The researchers discuss three approaches that when used in combination could provide teachers with the tools necessary to increase positive peer interaction and task engagement.

Horticulture Activities

Horticultural activities may include but are not limited to contact with plant material, growing and caring for plants, viewing landscapes, arranging cut flowers, mixing potting soil,

and walking in a garden or arboretum. The overall objective of horticulture therapy is to improve the quality of life by using a variety of activities involving plants and nature (Parsons, 1991). In the past, these activities have been utilized in therapeutic settings; however, for the purpose of this study, the activities took place in the school yard and the classroom, not a therapeutic setting.

The delivery of horticultural activities as an early intervention strategy in conjunction with the Pyramid Model principles and Positive Behavior Support (PBS) appeared promising. Horticultural activities, the Pyramid Model and PBS have demonstrated to be effective with students at risk, and students with and without disabilities in a variety of settings (Fox et al., 2002). The importance of identifying, intervening, resolving and preventing challenging behaviors early in childhood development was noted by Dunlap et al., (2006).

Historically, horticultural activities were commonly used in hospitals and correction facilities as a method of physical and emotional rehabilitation, and early school gardening programs focused mainly on growing vegetables for consumption at home and in school (DeMarco, Relf, &McDaniel 1999). Gardening programs have been utilized in schools; however there is no clear evidence that it is being used with preschool children. The Waldorf School in Saratoga Springs, New York, is one of a handful of schools in the United States to take the concept of outdoor education and nature to a new level. These schools have implemented what is called “forest kindergarten.” These concepts, which include an emphasis on the natural environment and art, are based on Rudolf Steiner’s teachings. During the preschool years, education is largely experiential, imitative and sensory-based (McClellan, 2010). This type of instruction is becoming increasingly common in Europe, particularly Austria, from where Steiner originally comes (McClellan, 2010).

The Reggio Emilia approach, developed in Reggio Emilia, Italy, is an approach to early childhood education that encourages parents, teachers and students to have an equal voice. It is an approach based around an emergent curriculum that builds upon the interests of children and utilizes documentation through photographs, drawings and conversation to determine future activities (Schroeder-Yu, 2008). The Reggio Emilia approach is consistent with Gardner's theory of multiple intelligences, calling for the integration of the graphic arts as tools for cognitive, linguistic and social development. While not necessarily horticulture therapy, Waldorf and Reggio lend themselves to the successful implementation of horticultural activities into the preschool curriculum.

Complementary Approaches

Complementary or alternative therapies/activities are other approaches which can be incorporated into the preschool setting as measures to assist in meeting the specific needs of students. These approaches provide all students the opportunity to participate in various activities that could enhance their overall social-emotional well-being and promote academic success. Complementary or alternative therapies, as defined by the National Center for Complementary and Alternative Medicine, are a group of therapies that do not fit into what is currently considered conventional medicine or education, and include art, music, dance/movement and horticultural activities. These therapies have been utilized with populations in healthcare and correctional facilities as well as educational settings with interesting outcomes. While the research is limited, the studies that have been conducted produced promising results (Pratt, 2004). Alternative or complementary therapies are often

presented in the typical classroom and supported by the classroom teachers and staff (Boso, Emanuele, Minazzi, Abbomonte, & Politi, 2007). Horticultural activities are non-invasive activities that can be presented in a variety of settings and can provide an environment where all individuals can participate, therefore encouraging positive peer interaction and task engagement (Hewson, 1994; Miller, 2007, Moore, 1989; Relf, 1992; Sempik, Aldridge, & Beckers, 2003; Witt, & Kimple, 2008). Although the literature uses the term *horticulture therapy*, the term horticultural activities will be used because the term therapy connotes the need for treatment or healing. The term “activities” is a more accurate reflection of the intended strategy to be used in this study. Horticultural activities are activities using anything to do with plants, including soil, seeds, insects, arts and crafts and garden friendly creatures. Unlike horticultural therapy, horticultural activities are presented by someone other than a registered horticulture therapist (HTR) in a non therapeutic setting. The purpose is to expose, through investigation, observation and hands on experiences, individuals to the natural environment in a non invasive, manner. It has been noted by Catlin, 2012 that horticultural activities are multi-sensory, assisting individuals develop communication, social, cognitive, motor and sensory skills. It appears that horticultural activities offer benefits to participants with or without illnesses, disabilities, or specific needs. Therefore, it may prove to have an overall positive effect on individuals participating in these activities.

Behavior issues? What to do?

When significant behavior issues are not addressed and treated, the problems tend to be long lasting, thus requiring increased services over a longer period of time (Dunlap et al., 2006). The likelihood for peer rejection, poor educational outcomes, and adult mental health issues increase (Dunlap et al., 2006). Based on the success of early intervention programs in regard to

reducing behavior challenges, it may be beneficial to incorporate horticultural activities as a preventative strategy for young children. Teachers today have the challenge of educating a widely diverse population of students. These students reflect cultural and linguistic diversity, as well as social, emotional, economic and behavioral differences (Hester, Baltodano, Gable, Tonelson, & Hendrickson, 2004; NEA, 2016; Trout, Epstein, Nelson, Synhorst & Hurley, 2006; U.S. Department of Health & Human Services, U.S. Department of Education, 2015). Art, music and movement therapies, which are complementary therapies, are commonly included in these programs, however, to date, horticultural activities are not typically a part of a therapeutic program for young children. This may be due in part to the need for specific materials or a lack of a formal curriculum or lesson plans.

Positive Behavior Support/Positive Guidance

Positive Behavior Support (PBS) is an evidence-based framework that offers the components to address the specific needs of individual students, schools, and families. PBS includes interventions and supports that focus on the environment of the large group as well as the individual (Fox et al., 2002). These strategies are used to encourage parents and teachers to teach the students appropriate behaviors, and provide strategies and support where necessary (Fox et al., 2002). However, there has been relatively little attention given to program-wide Positive Behavior Support in preschool settings (Hemmeter et al., 2007). This is changing as state like Georgia are adopting frameworks (the Pyramid Model) that encourage all stakeholders to be actively involved in shaping the overall future of school-wide behavior (Sandrock & Andrews, 2016). The Pyramid Model allows for various levels of behavioral intervention based on specific student needs and response to interventions (Sandrock & Andrews, 2016).

Many nursery schools and daycare centers have initiated the Pyramid Model formerly called “Positive Guidance Techniques” which are utilized by teachers and staff in the facilities. Pyramid Model principles require a shift in thinking and focus mainly on building a child’s self-control rather than on behavioral outcomes. Like PBS, the Pyramid Model encourages positive reinforcement, positive phrasing, problem-solving strategies and offering choices (McFarland, Saunders & Allen, 2009; Sandrock & Andrews, 2016).

Positive Behavior Support (PBS) and Pyramid Model are processes that provide school staff, administration, teachers and parents with the knowledge and the tools to positively meet the needs of all students (PBIS.org, 2011; McFarland et al., 2009; Sandrock & Andrews, 2016; Strain & Timm, 2001). Pyramid Model and Positive Behavior Supports can lead to an increase in academic achievement (Horner & Sugai, 2006; McFarland et al., 2009; Sandrock & Andrews, 2016), which increases the overall school performance, presenting better numbers for school reporting. Studies in developmental preschools, rural school districts, and secure juvenile correctional facilities have shown decreases in undesirable or inappropriate behaviors, increases in positive behavior, increases in social engagement, and improved overall climate and culture of the environments benefiting staff and youth (Fox & Little, 2001; Horner & Sugai, 2006; Jolivette & Nelson, 2010; Leedy, Bates, & Safran, 2004; Sandrock & Andrews, 2016).

Social Cognitive Learning Theory

One task of early childhood teachers is to encourage positive social interaction with peers and others. These positive interactions at an early age have been linked to social acceptance and competency throughout the school years (Merrell & Walker, 2004). Based on the characteristics of prosocial behavior, which include sharing, helpfulness, cooperation and showing empathy, intervening at an earlier age may be the key to decreasing aggressive behavior being exhibited by

preschool children. Social events provide opportunities for motivation of behavior through external rewards and punishment (Grusec, 1992). Social Cognitive Learning Theory is based on the concepts that individuals learn by watching what others do with the environment, behavior, and cognition all as chief factors in influencing development (Bandura, 1986, 1973). These factors are not independent but rather are all reciprocal. For example, each behavior witnessed can change an individual's way of thinking based on consequences that are presented that reinforce or discourage the witnessed behavior. By modeling appropriate behaviors such as sharing, being helpful, cooperation in various forms, and empathy toward other living creatures perhaps pro-social skills will be taught, practiced and learned.

It might be suggested that daily or commonplace activities, demonstrated by educators and peers, could be taught and learned through observation, modeling and imitation. Horticultural activities may be one way to bring these concepts together in a noninvasive and comfortable manner. Modeling desired behavior is an integral part of the learning process. As noted earlier, teachers play the role as model in a child's learning acquisition. Teachers model academic material and daily living skills. Students learn from observing and modeling other people's behavior, which is a central idea of Social Cognitive Learning Theory and self-efficacy (Bandura, 1973; 1974; 1986). This idea asserts that individuals can observe the behaviors of others then reproduce the same or similar behaviors. As a result, individuals learn from others' mistakes and can behave more appropriately in similar situations. This is particularly true when students observe an individual demonstrating appropriate behavior successfully. The demonstration of horticultural activities model skills such as empathy, caring, sharing and cooperation, and engaging in these activities provides natural opportunities for young children to

practice these skills and get feedback from adults and peers. Students can gain confidence through practice.

The researcher of this study attempted to show that by incorporating horticultural activities into the preschool routine in tandem with Positive Guidance principles which were already in place, behavior management skills might be enhanced, and this may assist educators in meeting the social, emotional and behavioral needs of all students. By utilizing already existing Positive Guidance procedures and horticultural activities in combination, it may prove to be more time and cost effective academically and behaviorally. Horticultural activities, PBS and Positive Guidance address behavioral issues in a positive and “*kid friendly*” manner. There is benefit to the teachers in using these concepts as it aids in classroom management and decreasing time spent addressing non-academic issues (Scheuerman & Hall, 2008).

Rationale

There is nothing like watching children engaged in fun, dirty, hands-on activity. Horticulture offers children the opportunity for many kinds of physical and mental activities, but also may foster an experience that can become a lifelong interest. As indicated by research, when students are truly engaged in an activity that is personally relevant, learning occurs (Miller, 2007; Smith & Motsenbocker, 2005; Witt, S.D. & Kimple, 2008).

When we think of horticulture, plants, trees, flowers, fruits and vegetables possibly come to mind. Perhaps the act of gardening presents pleasant thoughts and images of beauty. However, horticulture is much more than tending plants and trees, gardens and flowers. Researchers have suggested that horticultural activities have enabled individuals to clear their minds and calm their bodies (Hewson, 1994). Some suggest that horticulture therapy has helped

some people increase their mobility, decrease their blood pressure, and for some, it has provided prevocational training that can now assist them in being proud, productive participants in society (AHTA, 1999).

It has been implied that the utilization of horticultural activities has encouraged individuals' self-esteem and encouraged social interaction (Hewson, 1994). There is research that supports using horticultural activities with children with disabilities (Ackley & Cole, 1987; Fabor-Taylor, Wiley, Kuo & Sullivan, 2001 and 2008; Hewson, 1994; Morgan, 1989; Relf & Dorn 1995). Horticulture is a non-invasive form of therapy that provides an environment in which all individuals can participate. Horticultural activities use plants as a tool to heal or rehabilitate individuals who are sick or have disabilities (Flagler, 1993). The overall goal of therapy is to increase a patient's physical and mental wellness (Hewson, 1994; Relf, 1992). The goal of this study is to incorporate horticultural activities as a means to encourage increased task engagement and positive peer interactions.

It appears as though horticultural activities have had positive effects on individuals of all ethnicity, socio-economic situations and religious backgrounds (Hewson, 1994; Relf & Dorn 1995; Sempik, Aldridge, & Beckers 2003). The delivery of horticultural activities as an intervention strategy in conjunction with PBS and Positive Guidance appears to be promising. The importance of identifying, intervening, resolving and preventing challenging behaviors early in childhood development was noted by the Commission on Mental Health (2003) and Dunlap et al. (2006). By introducing horticulture to younger children, the opportunity for success increases by providing a set of skills that they can use for the rest of their lives. This type of activity provides teachers with the opportunity to model caring, empathy, cooperation, and community oriented behaviors, and for students to observe and imitate those behaviors. The

researcher hopes that these activities will be incorporated into the daily classroom routine throughout the year and will encourage cooperation, positive peer interactions and improved task engagement.

While there is little research that demonstrates the influences of horticultural activities with preschool-age children, the following chapter presents and evaluates the existing literature on horticultural activities, Positive Guidance and Positive Behavior Support. Chapter 3 presents the methods and data collection strategies that will be used to investigate the following research questions:

1. How does the use of horticultural activities in an inclusive preschool setting influence students' active engagement, passive engagement, and off-task behavior?
2. How does the use of horticultural activities in the preschool setting influence students' physical and verbal peer interaction?
3. What are the teachers' perceptions of the use of horticultural activities with preschool students in an inclusive setting?
4. What are the students' perceptions of the horticultural activities in an inclusive setting?

The following chapter presents a detailed literature review which includes the evolution of horticultural therapy, Positive Behavior Support/Positive Guidance, childhood behavior issues, complementary alternative therapies, Social Cognitive Learning Theory, history of horticulture therapy, horticulture from 1980 to today, horticulture in the justice system, and bringing gardening programs back into the schools.

Literature Review

Educators throughout history, including Socrates, John Dewey, Maria Montessori, Immanuel Kant, and Howard Gardener, have attempted to meet the needs of their students utilizing a variety of approaches. In today's global society, where finance is king, educators struggle with pressures of reduced budgets, loss of funding and the reduction of services all the while attempting meet the needs of all students. Many educators continue to ask whether they are truly meeting the diverse needs of all students, or are they putting Band-Aids on sore spots?

The literature review explores several important concepts that can be woven together to create new possibilities across the fields of horticulture, education and behavior. The history and evolution of horticulture therapy and the impact it has had in schools, special education settings, healthcare facilities, prisons, juvenile detention facilities and vocational settings and a basic overview of Positive Behavior Support and Positive Guidance are included. The utilization of other complementary therapies (art, music, dance/movement) in some of the same settings as well as in preschool settings were considered. In studying horticultural activities as a complementary therapy, the researcher considered the influences that horticultural activities might play in peer interaction and task engagement as they relate to observation, imitation and modeling. The hypothesis was that by introducing horticulture to younger children, the opportunity for success would increase by providing a skill set that could remain useful throughout the students' lives.

The literature review is divided into nine major sections: Positive Behavior Supports and Positive Guidance; preventing early childhood behavior problems; Social Cognitive Learning Theory; complementary alternative therapies; horticulture defined; the history of horticulture therapy, horticulture therapy from the 1980s to today, horticulture therapy in the justice system,

and bringing horticulture back into the schools. The literature uses the word “horticulture therapy” and describes the benefits to those who participate. Horticultural therapy is provided by a trained professional who assists in creating expressed goals as part of a treatment plan. These goals are to address the specific physical, cognitive, and social challenges of an individual in a therapeutic setting (AHTA, 2012). The researcher will be using the term horticultural activities that align more with the intended strategies which will be presented to the entire class and is instructional in nature, not therapeutic. Horticultural activities utilize anything to do with plant with the purpose of exposing individuals to the natural environment in a non invasive, non therapeutic manner, through investigation, observation and hands on experiences. These activities can be presented by a person who is not a registered horticulture therapist (HTR) and are presented in a non therapeutic setting. These activities, while planned out, are very flexible and provide opportunities for spontaneous interactions with the environment and others (Catlin, 2012).

The overarching goal was to observe how the introduction of horticultural activities into the preschool curriculum utilized as a complement to the Positive Guidance principles which were already in place, may influence behavior by increasing peer interactions and task engagement among preschool students. Persistent behavior problems that present in early childhood are the best indicators of teenage delinquency, school dropout, and adult incarceration (Dunlap et al., 2006). Thus, implementation of strategies that can effectively reduce or eliminate persistent behavior problems are critically important.

Preventing Early Childhood Behavior Problems

It has been estimated that 10-20 percent of preschool children present behavior issues that place them at risk for future academic and social success (National Scientific Council on the

Developing Child, 2008, in Burke et al., 2010). Over the past several years, there has been an increase in the number of children being expelled from preschools across the nation. Gilliam (2005) reports that the expulsion rate may even be three times the rate of expulsions for students K-12. It seems that without intervention problem behaviors do not diminish but remain stable or increase over time. Early onset behavior problems can be predictive of future, more significant social and problematic outcomes for adolescents, juvenile delinquents, and school dropouts (Dufrene, Doggett, Henington, & Watson, 2007; U.S. Department of Health & Human Services, U.S. Department of Education, 2015).

The children who present these behaviors will likely be placed in special education classes, alternative placements, or possibly drop out of school (Koertering & Braziel, 1999). It has also been shown that when these severe behaviors are presented early and are not addressed, they may lead to further social and academic issues throughout a student's academic career (Dunlap et al., 2006). Based on studies conducted over the past few years by Barnett et al., 2006; Caprara, Barbaranelli, Pastorelli, Bandura & Zimbardo, 2000; Dunlap et al., 2006; and Hemmeter, Ostrosky & Corso, 2012, many preschool students were at risk for severe behavior and emotional concerns. Therefore, early intervention has been implemented years to increase the probability of academic success (Hester et al., 2004; Sandrock & Andrews, 2016), and complementary therapies have also been incorporated into many preschool curriculum (Pratt, 2004).

Disruptive behaviors contribute to approximately one half to one third of the referrals to mental health organizations (Murphy, Theodore, Aloiso, Alric-Edwards & Hughes, 2007). It has become apparent that preschool students who present challenging behaviors are at a higher risk for maladjustment and are expected to display these behaviors throughout childhood and

adolescence (Murphy et al., 2007). Incorporating group interventions with preschool students have been found to be effective in reducing aggressive behavior, decreasing noncompliant and inappropriate behavior, increasing on task behavior, and promoting social interaction among preschool students (Murphy et al., 2007).

Horticultural activities are not a group contingency intervention; however, the idea of presenting the concepts to a group of children as a way to encourage more appropriate behaviors, decreasing physical and verbal aggression, and promoting social interaction through observation, modeling and imitation is promising. Horticulture therapy has evolved into a viable form of therapy for many individuals (Hewson, 1994). Horticulture as a form of therapy has evolved over time, and so has the science of behavior.

Positive Guidance/Positive Behavior Support

Positive Guidance strategies begin with setting and communicating age appropriate limits, teaching, cueing and supporting replacement behaviors, and ignoring behavior when it is appropriate (Education.com, June 2012). Positive Behavior Supports (PBS) is an evidence-based process that offers the components to address the specific needs of individual students, schools, and families. PBS includes interventions and supports that focus on the environment of the large group as well as the individual (Fox et al., 2002; Sandrock & Andrews, 2016).

These strategies are used to encourage parents and teachers to teach the students appropriate behaviors, including replacement behavior when necessary (Fox et al., 2002; Horner & Sugai, 2006). PBS as well as Positive Guidance are built on the concepts of teaching children social skills in their natural environments; developing and fostering respectful relationships among students, staff and parents; supporting and reinforcing positive social and academic

behavior; combining classroom, school-wide and community continuous preventative efforts (Horner & Sugai, 2006). Based on the three-tiered model of PBS, Tier 1 or Primary Prevention strategies are presented to all students. These strategies, in general, are successfully utilized by approximately 80-85% of the student population. A number of studies demonstrate that Positive Behavior Supports assist in decreasing problem behavior, assist with increasing time spent on instruction, and are associated with improved academic outcomes (PBIS.org, 2011).

Social Cognitive Learning Theory

One major theory that involves social and emotional understanding is Social Cognitive Learning Theory (SCLT), based on the premise that behavior is learned through observation and is influenced by reinforcement and consequences (Bandura, 1977). Initially, Social Cognitive Learning Theory (SCLT) emphasized that learning occurred in a social context, through observation and that social behaviors were acquired. Students must attend to a model and the relevant aspects of behavior in order to learn; therefore, attentional processes are paramount. Retention and production refer to transforming observation into symbols that are stored for retrieval at a later time, and the ability to draw on those symbols in order to perform what has been observed. Motivational processes are necessary in order to understand why students attempt to use or imitate the behaviors they have observed. Keep in mind, that based on Bandura's theory, these processes are affected by the developmental level of the learner, and characteristics of the model and modeled behavior (Bandura, 2001).

Social Cognitive Learning Theory suggests that individuals obtain new behaviors through response-consequences (Miller & Dollard, 1941 in Isom, 1998). According to Bandura (1977), social models are an indispensable means of transmitting behavior, particularly behaviors with costly consequences. Bandura (1997) also suggests that if social learning depended exclusively

on rewards and punishment, most individuals would not survive the socialization process. Human thought, behavior and affect can be influenced by observation and direct experience. Modeling is crucial in order to understand when or why learned behaviors are presented. Individuals do not simply absorb behaviors. Desired behaviors must be modeled by numerous individuals in a variety of situations (Grusec, 1992). We, as adults, model behaviors and skills every day for children and other adults. We observe others modeling behaviors and skills, and adapt those behaviors and skills to fit into our personal belief system. Modeling is strongly related to information coding, storage and the development of rule governed behavior (Grusec, 1992). As shown in Figure 1 (Bandura, 1986), individuals are neither powerlessly controlled by the environment, nor are they free agents doing as they please (Bandura, 1977). Behavior is governed by the reinforced outcome. Students may hold back on their engagement in a behavior if they observe a model experience consequence they would prefer to avoid. The opposite may also occur, students may engage in a behavior they had initially avoided when they fail to see any negative consequences assigned to a model.

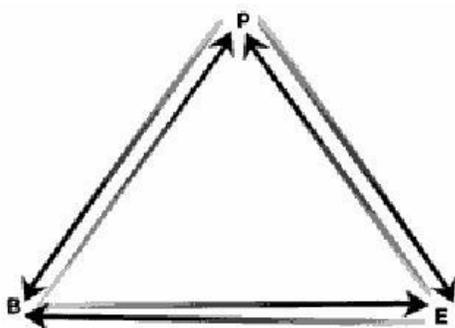


Figure 1. Governing Behavior. **B** represents behavior; **P** represents the person including cognitive, affective, and biological events, and **E** represents the environment (Bandura, 1986).

“Consequence,” as defined in *Positive Behavior Support for the Classroom*, is “an event that follows a behavior that determines whether the behavior will be repeated” (Scheuermann & Hall, 2008, 477). “Reinforcement,” either positive or negative, is “the process in which a behavior is strengthened as a result of a consequence that follows a behavior” (Scheuermann et al., 2008, p. 477). Not only can experiencing reinforcement be highly motivating, so can observing another individual’s consequences (reinforcement or punishment). For example, observers who see others rewarded for performing a specific skill/behavior might attempt to engage in that behavior in hopes of being rewarded as well (Bandura, 1974).

While punishment is not the focus of this study, imitating pro-social behavior is of interest, and while it has been noted that when models were not punished for a behavior (the behavior was reinforced), observers were more inclined to imitate the behavior than if punishment was involved. Individuals in correctional facilities are being exposed to non-aversive activities and can see the benefits, if not immediately, in the future. While horticultural activities do not encourage punishment, modeling and imitation are being encouraged. Although these activities may not provide instant gratification, they do provide the opportunity to model and imitate desired behaviors at the same time recognizing accomplishment and achievement. For some individuals this may simply be a feel good activity. For others, it may be life changing.

Aggression.

Researchers are reporting a drastic increase in the number of children presenting challenging behaviors. This seems to be particularly true in preschool students where 7% to 25% of children meet the criteria for an oppositional defiant disorder diagnosis (Conroy, Dunlap,

Clarke, & Alter, 2005). If these behaviors are left unchecked, the behaviors are likely to increase in both severity and rate (Conroy et al., 2005). Early aggression has been linked to more severe behaviors in adolescents and adults.

Aggression takes many forms; physical aggression includes hitting, pushing, punching, threatening gestures (Ostrov et al., 2009). Physical aggression is defined by Ostrov et al. (2009, p. 15) as the intent to hurt, harm, and injure using physical force or the threat of physical force. Verbal aggression includes spreading rumors and gossip as well as inappropriate language and voice tone. These behaviors have been associated with a variety of disruptive behavior disorders, including Attention Deficit Disorder (ADD), Conduct Disorder (CD) and Oppositional Defiant Disorder (ODD) (Ostrov et al., 2009).

Aggression has become an increasing problem for teachers, parents and childcare providers in preschool and nursery schools (Webster-Stratton, 1996). It has been suggested that children who present aggressive, oppositional defiant behavior are at a higher risk for developing future difficulty including school dropout, conduct disorder, interpersonal violence and delinquency (Webster-Stratton, 1996). In a study by Caprara et al. (2000), pro-social and aggressive behaviors were examined to determine the impact on academic achievement. The researchers discovered that not only did engaging in aggressive behavior at an early age adversely affect academic development, but it adversely affected interpersonal relationships. Children who consistently exhibit pro-social behaviors were found to be more socially accepted and had greater academic success than those students who presented less pro-social competence (Capara et al., 2000). This knowledge enables individuals who influence children's behavior and development to promote socially valued behaviors and ultimately prevent detrimental, social

outcomes; therefore, it is important to focus on the impact of negative influences and promote positive factors.

Modeling and teaching basic pro-social skills which include sharing, helpfulness, cooperation and empathy may be a significant strategy when attempting to decrease some of the aggressive behavior being exhibited by preschool students. Social events provide opportunities for motivation of behavior through external rewards and punishment (Grusec, 1992).

Educators and researchers have long suggested that providing interventions early has a more positive impact than intervening at a later time (Conroy, 2005; Snadrock & Andrews, 2016). These interventions can come in many forms: Interventions to increase academic performance, and interventions to assist in decreasing unwanted behavior. Although horticultural activities have been utilized in many settings, there is limited evidence of research into the benefits of horticultural activities with preschool-aged children, which if presented at an early age, may contribute to their social, behavioral and academic development. Many complementary therapies, including the utilization of horticultural activities, have been shown to be beneficial, therefore additional research is needed to demonstrate and document the effects. Early intervention programs have been utilized for a wide variety of needs in very young children. These programs range from fine and gross motor issues to sensory, language acquisition and behavioral deficits. Without early identification and the implementation of interventions, at risk behavior, social/emotional issues, and academic struggles are likely to continue or develop (Hester et al., 2004).

Complementary Alternative Therapies

Although research is limited and data is predominately anecdotal, the introduction of many complementary or alternative therapies as a way to promote pro-social behaviors, self-

esteem, and overall well-being have yielded positive results in a variety of environments and have been incorporated in some preschool programs. Music, art, dance/movement (creative arts), and horticulture are therapies that have also been utilized with populations in healthcare, correctional facilities, and educational settings. Complementary alternative therapies such as art, music and dance/movement therapies have been incorporated into preschool and special education programs with interesting results, not only behaviorally, but academically as well.

The researcher conducting the study endeavored to show that by incorporating horticultural activities (which are often referred to as a “complementary therapy”) into the preschool curriculum, task engagement and peer interaction can be positively influenced. In order to understand the importance of horticulture as a complementary therapy, a definition and an understanding of the history are important as is understanding the evolution of horticulture as a form of therapy.

Horticulture Therapy Defined

Many people think of maintaining the garden or planting flowers as a hobby or even work; however, these activities among others have evolved into a legitimate and popular form of therapy: *horticulture therapy*. Horticulture is a non-invasive form of therapy that provides an environment in which all individuals can participate (Hewson, 1994). Horticulture therapy uses plants as a tool to heal or rehabilitate individuals who are sick or have disabilities (Flagler, 1993). While horticultural therapy is used as a component of a treatment plan to address specific physical, mental and social challenges being presented by an individual in a therapeutic setting, the researcher conducting this study did not use horticulture as a form of therapy. The researcher used horticultural activities as a complement to the Positive Guidance system that was in place in an preschool setting. These activities, like therapy revolve around using plant materials as a

means to engage and are easily adaptable, safe and provided opportunity to generalize skills. They were set up to be used in a group setting, and provided students a safe environment to interact with their peers and the natural world. The activities were presented in a classroom setting by the researcher who is not a horticultural therapist.

History of Horticulture Therapy

Throughout time, the concept of utilizing plants and plant materials has evolved from a simplistic, less-structured set of activities to a more studied and organized method of incorporating plants in a variety of forms to rehabilitate and heal individuals with an array of physical, emotional and mental health disorders. Although horticulture therapy has been in existence for centuries, it has evolved over time to meet the needs of individuals during different periods of history.

Horticulture has a long history as a therapeutic tool. In ancient Egypt, horticulture therapy was recommended to calm and soothe those who were mentally ill. Although there is research that appears to support the use of horticulture therapy with a wide range of individuals, the researcher could find little evidence to support or dispute the effects and benefits of horticulture therapy with preschool-age children. Some of the literature suggests that because horticulture therapy is successful with older children and adults with physical, mental and emotional disabilities, it could be assumed that it would be successful with young children (Relf, 1992; Adil, 1994; Simson, 1998). Given the data in support of the effectiveness of horticulture therapy with elementary and secondary children, adjudicated juveniles, and adults, one can hypothesize that horticultural activities are an appropriate preventative strategy for preschool children (Davis, 1998; DeMarco, Relf, & McDaniel, 1999; Finch, 1995; Hewson, 1994; Jiler, 2007; McClellan, 2010; Moore, 1989; Relf, 1992; Waliczek, Bradley, & Zajicek 2001).

Creative art therapies were firmly established as part complementary medicine in the twenty-first century; however, before this time, these therapies were conducted on an informal, but continuous basis in both western and eastern medicine (Pratt, 2004). The creative arts include music, art and dance therapies which were used primarily in hospital, hospices and other healthcare facilities (Pratt, 2004). Originally, the results of these therapies were reported anecdotally by describing the restoration in a person working toward wholeness in mind and/or body (Pratt, 2004). There has been a trend since the 1950s to incorporate descriptive and experimental research into the evaluation of the effectiveness of alternative therapies (Pratt, 2004). Along with these therapies, horticultural activities have evolved into what has become a viable course of treatment for many individuals, promising educational implications and a new career path for many professionals.

Recorded evidence shows that the concepts of horticulture therapy began early in time when the Pharaohs ruled Egypt (Davis, 1998). Court physicians prescribed walks in the palace gardens for those with mental challenges (Davis, 1998; Lewis, 1976). However, it was not until the 1700s that horticulture was considered a legitimate form of therapy in the United States, England and Spain. Dr. Benjamin Rush, a noted psychiatrist and professor at the Institute of Medicine and Clinical Practice of Philadelphia, initiated the use of horticulture in the treatment of mental health concerns (Davis, 1994). He was the first psychiatrist in the world to open the door for horticulture to be included in treatment programs for individuals with mental health disorders. Professionals in the healthcare profession began to note that improvement could be seen with individuals involved with horticultural activities (Davis, 1998). The Asylum for Persons Deprived of their Reason, now known as Friends Hospital, in Philadelphia, was the first private psychiatric institution to open in the United States (Davis, 1998). They built the first

greenhouse used specifically for therapeutic purposes which took horticulture therapy to a new and less physically demanding level (Lewis, 1976). Healthcare providers were able to individualize the treatment to meet the specific needs of the patient.

By the early 1800s, hospitals in Europe were emphasizing the use of horticultural activities in treating people with mental health disorders and cognitive disabilities. Dr. Gregory found that his patients with mental health disorders (schizophrenia and depression) seemed to have a new sense of purpose and were focused and calm when horticultural activities were used (Griffiths & Griffiths, 1976). In addition, hospital officials in Spain noticed the benefits of horticultural activities for patients with mental health disorders, specifically depression and schizophrenia (Griffiths & Griffiths, 1976). Horticulture as therapy continued to evolve as several leading psychologists made horticulture therapy more available to their patients.

World War II brought about a wider acceptance of horticulture as therapy (Davis, 1998). Volunteers from emerging garden clubs across the country provided services for hospitals, rehabilitation facilities, and schools. Patients and students appeared to benefit physically, mentally and emotionally. By performing physical activities, patients increased their strength and improved their emotional well-being as demonstrated by a decrease in blood pressure and an increase in self-esteem and calmness. The individuals were also more open to social interactions (McDonald, 1995). With these results, horticulture programming continued to grow. Horticulture therapy was promoted by members of the healthcare community as a treatment for individuals with physical disabilities, depression and mental illnesses (McDonald, 1995). During and following World War II, complementary therapies such as art and music therapies were also being incorporated into treatment programs for individuals with a variety of health and psychiatric issues (Pratt, 2004).

In the 1950s and 60s, Alice Burlingame examined the use of horticulture as therapy by including it in treatment plans for other populations of individuals with disabilities, specifically geriatric patients (Lewis, 1976). Through direct observation and information recorded by other healthcare workers, Burlingame was able to gather additional data to support horticulture therapy and note the benefits with her geriatric patients (Lewis, 1976). As a psychiatric social worker, she found that her patients responded to care in a more positive manner, they appeared to be calmer and more relaxed, and they appeared to enjoy the activities. She was convinced that horticulture therapy would evolve as a new profession for healthcare providers, including nurses, and occupational and physical therapist (Davis, 1994).

During this time, Rhea McCandliss, a horticulture therapist at the Menninger Clinic, surveyed 500 hospitals, rehabilitation facilities and mental health institutions across the nation (Lewis, 1976). She documented existing programs, the interest in new program development, and the need for increases in the number of qualified individuals practicing horticulture therapy in hospitals and other facilities. These findings supported the development of a new profession, the idea of educational programming and the utilization of qualified individuals to perform such duties suggested by Burlingame (Lewis, 1976). The demand for horticulture therapy programming was evident; however, the supply of qualified individuals to bring the program to fruition was lacking.

In the 1970s, individuals at the Millwood Horticulture Training Center for Persons Who are Developmentally Disabled evaluated the need for formal and professional organizations as well as therapists to support horticultural activities in the treatment of individuals with autism and intellectual disabilities (Davis, 1994; Lewis, 1976). This led to the birth of the National Council for Therapy and Rehabilitation through Horticulture (NCTRH), an organization devoted

to developing educational programming, and publications, networking nationally and internationally, as well as networking with horticultural and healthcare professionals and trade associations. In 1988, the NCTRH changed its name to the American Horticulture Therapy Association (AHTA). This organization continues to work with therapists, students, patients and healthcare workers providing information, training, research and support around the world.

Horticulture Therapy from 1980 to Today

With the evolution of the Americans with Disabilities Act (ADA) and assistance from gardening programs across America, horticulture therapy and gardening became more evident. If horticulture therapy can help adults make behavioral changes, further study is necessary to determine the effects it might have with children.

Relf and Dorn (1995) ascertained that one way to encourage horticulture therapy was to have gardens and appropriate tools easily available to enable individuals with disabilities to actually work in the garden. The Americans with Disabilities Act (ADA) mandated that public gardens be accessible to individuals with disabilities. This would enable more individuals to enjoy and participate in horticultural activities. Adil (1994) described several easy ways to make gardens more accessible for those individuals with physical disabilities. In her book, *Accessible Gardening for People with Physical Disabilities* (1994), Adil described methods, plants and tools (assistive technology) that have contributed to making the act of gardening an exciting and useful part of an individual's life. While many of these activities were conducted in private facilities, there were organizations that promoted horticulture therapy in public facilities. Schools could provide a feasible venue for presenting horticulture therapy to a large number of individuals.

Horticulture therapy is often used as a complement to occupational and physical therapies, which can be physically and emotionally demanding. A study by Ackley and Cole

(1987) described the effects of horticulture therapy on 44 children with cerebral palsy living in residential facilities. The participants had a wide array of physical and cognitive challenges. They ranged in age from 6 to 21 years. The participants were randomly assigned to one of two groups: a treatment group (those receiving horticulture therapy) or a control group (not receiving therapy). Each participant was given the American Association on Mental Deficiency Adaptive Behavior Scale for Children and Adults test prior to the start of treatment (Ackley & Cole, 1987). The same test was administered upon completion of the program. It was determined that there was no significant difference between the two groups based on the AAMD; however, because the sample was limited to a small number of children housed in one facility, and the horticulture therapy was administered by volunteers, not trained individuals, the results were inconclusive. They determined that further research should be done in order to support or rule out horticulture as a viable therapy for children with cerebral palsy. However, it was noted by therapists that most of the children enjoyed the horticultural activities (Ackley & Cole, 1987).

Horticulture therapy in the justice system.

Studies have suggested that horticulture therapy has been beneficial for individuals in correctional facilities and in the juvenile justice system. The presence of plants and nature can provide relief from the stresses of being confined particularly for those individuals in overcrowded facilities. Jiler (2007) started and ran a program for the inmates at Riker's Island in New York; however, this was not something new.

Over the past 150 years, prisons in the United States have used horticulture therapy as an intervention with prison populations (Jiler, 2007). Riker's Island is an example of a prison that uses horticulture as therapy. There is a greenhouse on the grounds that enables prison administration to provide job training for specific prisoners. The program helps prisoners cope

with issues of anger, frustration, depression, substance abuse, and traumatic injury, which are common challenges for prisoners, by providing an outlet for their energy. The skills developed can then be transferred and used in the world outside of prison. Jiler (2006) stated that prisoners were taught to make educated and informed decisions, a skill that can be utilized both in and out of prison. Individuals learn to connect work, care and responsibility, and the pleasure of cultivating not only plants but themselves as well (Jiler, 2007). The Greenhouse program continues to provide male and female prisoners an opportunity to learn and use life skills in and out of prison as well as showing a measured reduction in recidivism among the participants (25% compared to the 65% of Riker's general population). Unfortunately, only 1-2% of Riker's population participates in the program.

Studies have also shown that horticulture therapy can also be beneficial for individuals in the juvenile justice system. In 1992, the *Green Brigade* was created in Bexar County, Texas, in which the Juvenile Probation Department and the County Parks department provided a "*learn and earn*" opportunity for 20 juvenile offenders (Finch, 1995, p. 119). This program was based on a similar belief held by Maria Montessori, that gardening has a positive effect on an individual's well-being and sense of community. In order to be part of the brigade, participants must work on completing their GED. This had two positive effects on the juvenile offenders; they earned their GED and received on-the-job training. The overall effect not only had positive results for the offenders providing opportunities for increased self-esteem, but it had positive effects on the neighborhoods in the San Antonio area where these juveniles lived (Finch, 1995). Approximately 140 juveniles participated in the program, joining forces with master gardeners (Finch, 1995). Law enforcement reported that there was a decrease in the number of physical altercations among juvenile offenders as well as a reduction in vandalism (Finch, 1995). It was

reported that 21 of the participants moved onto better jobs and two entered college programs during 1993-94.

McGuinn and Relf (2001) also studied juvenile offenders and the use of horticulture curricula in vocational programming. The participants were males age 14-16 who had been expelled or suspended from their local high school. Data was collected to determine attitudes of school staff, teachers, peers, and personal success and utilized to determine their level of appreciation of the environment (McGuinn & Relf, 2001). Pre- and post-tests measuring social bonds and attitudes were administered and the results compared. In general, the young men had a positive change in attitude about themselves, the importance of school and teachers, and an increased level of appreciation of the environment. Student journals revealed very personal thoughts regarding the project and the positive impact of the program. The journals provided McGuinn and Relf (2001) with material pertaining to social bonds, career aspirations, behavioral reports, job placement and mentoring logs for each of the participants.

Bringing horticulture back into the school.

Gardening programs have been utilized in schools; however, there is no clear evidence of them being used with preschool children. Marcia Eames-Sheavly, a horticulture educator at Cornell University in Ithaca, New York, suggested integrating horticulture into the school science curriculum (Eames-Sheavly, 1998). She noted that some interdisciplinary pilot programs in secondary schools in New York and Los Angeles improved the school attendance rates and decreased drop-out rates when horticulture therapy was incorporated into the school curriculum (Eames-Sheavly, 1998). School gardening programs, by their very nature, encourage cooperative learning and teaching experiences. The interdisciplinary makeup of these gardening

programs was reported to enhance student learning by building community, self-confidence, as well as independence and problem solving skills.

Master Gardener programs in classrooms benefited not only the students, but the teachers, families and Master Gardeners as well (Alexander, North & Hendren, 1995). Fifty-two second and third grade students from inner-city San Antonio, Texas, participated in horticulture therapy activities presented by Master Gardeners. Some of these children came from impoverished homes, where violence and chaos were prevalent (Alexander et al., 1995). One of the main points of interest observed was that with the support and encouragement of the Master Gardeners, the children were able to recognize and express that they felt anger and frustration which occurred when things they valued (plants and flowers) were damaged due to neglect or violence. Horticulture therapy in the classroom appeared to have improved motivation to attend school regularly, fostered independence, encouraged a sense of community and given the children a sense of control over their environment. Parents reported that their children had less challenging behavior at home and showed pride in their success which was then transferred at home. The results of the Alexander et al. (1995) study indicated that the school gardening project provided opportunities for children to build independence and self-esteem, to delay gratification, to work cooperatively, and it also exposed children to role models from outside of their community. Most experts agree that long-term success of interventions is dependent upon continuity and consistency across environments over time (Hester et al., 2003). The importance of identifying, intervening, resolving and preventing challenging behaviors early in childhood development was also noted by the Commission on Mental Health (2003) and Dunlap et al. (2006) studies.

Preschool philosophies and horticultural activities.

In the late 1940s through early 1950s, Loris Malaguzzi introduced the Reggio Emilia philosophy which is founded in the concept that education is built upon the relationships encompassing the nature of children, teaching and learning (Garrett, 2012). Parents, teachers and students all have a voice in the educational process. The Reggio Emilia philosophy espouses that children have enormous potential and curiosity and emphasizes respect and responsibility as well as community. Through exploration and discovery children attempt to understand the world, creating their own theories and constructing their own intelligence through social groups and interactions with the environment. In Reggio schools, the children's needs and interests are paramount, time is not set by the clock and its teaching is truly student centered. Reggio Emilia theory is not a set curriculum, but a knowledge in theory and values through community that are consistently being transformed into quality early education practices (Garrett, 2012). Reggio Emilia, as an education philosophy allows the teacher flexibility to utilize teachable moments. Problem solving and project based learning are encouraged as are expression and communication in various forms. Reggio Emilia is collaborative and because students have a degree of control it is relevant, motivating and engaging (Garrett, 2012).

Similarly, Rudolph Steiner, founder and developer of the Waldorf schools divided learning into three stages: early childhood, which is experimental, sensory-based and imitative; elementary, which is imaginative, artistic and situationally guided; and adolescent, which emphasizes developing abstract thought, conceptual judgment, developing intellectual understanding and social responsibility (Oppenheimer, 1999). Nature education is a relatively unknown concept in the United States; however, it has gained popularity in Europe, particularly in Scandinavia. The Waldorf School in Saratoga Springs, New York, is among a handful of

schools scattered throughout the United States that offers such an education. They are now incorporating “Forest Kindergarten” into their curriculum. Basically, students, ages 3 ½ to 6 spend a majority of the day outdoors, regardless of the weather (McClellan, 2010). This philosophy addresses the physical, emotional, and intellectual capacities of the developing child through an age-appropriate curriculum all while they are developing their large motor skills, imaginative play and learning to work out social issues while using all of their senses (Leyden, 2009). The students spend their time digging, exploring, climbing and discovering under the supervision of teachers and aides (McClellan, 2010). The students use their imaginations to create learning opportunities, “using a woodpecker hole as a megaphone, looking under rocks for new discoveries and jumping in puddles” (McClellan, 2010 p. 26).

While the Reggio Emilia Approach and the Waldorf School’s Forest Kindergarten do not specifically promote horticulture therapy, both approaches lend themselves to the successful implementation of horticultural activities in the curriculum. One of the most telling connections is that horticultural activities engage students in growth and development through exploring, planting, observing and collecting data on plants. When seeds are planted, preschool students eagerly attend to their personal containers, watching for any sign of growth. Once they see a sprout above the soil, they become excited and observe each day how much the plant has grown. In addition to getting their hands into the soil and manipulating it with other plant friendly ingredients such as vermiculite meets a critical tactile need to explore their environment. Horticultural activities, like Reggio Emilia and Waldorf/Steiner philosophies, encourage parental/community involvement through discovery and exploration which lends itself to high quality early childhood education where all are involved in the educational process. More recently, Miller, 2007 and Witt & Kimple, 2007, raised the importance of presenting “green”

issues to preschool students by providing them with hands on gardening and greenhouse activities. It could be suggested that the information learned during the early years, where the students actively engaged and the learning was shared, will be carried with them through adolescents and into adulthood (Miller, 2007; Witt & Kimple, 2007). Therefore, it stands to reason that horticultural activities embedded into a classroom curriculum may be helpful for preschool children in order to increase pro-social behavior and on task behavior as well as decrease physical and verbally aggressive behavior by building capacity to make better choices and solve social issues more easily and more independently.

Conclusion

Horticulture has a long history as a therapeutic tool. In ancient Egypt, horticulture therapy was recommended to calm and soothe those who were mentally ill. Horticulture therapy today has evolved into a viable and accepted form of therapy for individuals with mental illness, physical disabilities, emotional and behavioral disorders, and juvenile offenders and prisoners in correctional facilities (Davis, 1998; Flagler, 1993; Jiler, 2007). There seem to be no age, gender, ability or cultural restrictions with horticulture therapy. Studies have implied the effectiveness and benefits of horticulture therapy to juvenile and adult offenders, children with physical and intellectual disabilities, and individuals with mental illnesses. It can be utilized in a variety of settings such as schools, rehabilitation and correctional facilities, adult day service centers, hospitals and institutions. Although there is research that appears to support the use of horticultural activities with a wide range of individuals, little evidence to support or dispute the effects and benefits of horticultural activities with preschool-age children was found. Some of the literature suggests that because horticulture therapy is successful with older children and adults with physical, mental and emotional disabilities that it could be assumed that it would be

successful with young children. Thus, it could be determined that horticulture therapy is an appropriate preventative intervention for preschool, elementary and secondary children, adjudicated juveniles, and adults. When significant behavior issues are not addressed and treated, the problems tend to be long lasting, thus requiring increased services over a longer period of time (Dunlap et al., 2006). The likelihood for peer rejection, poor educational outcomes, and adult mental health issues increase (Dunlap et al., 2006). Based on the success of early intervention programs in regard to academic achievement, it may be beneficial to incorporate horticultural activities as a preventative intervention for young children.

Methodology

The purpose of this study was to examine the possible behavioral influences of horticultural activities on preschool students, ages 3 to 5. The researcher utilized these activities in an inclusive preschool setting as an instructional strategy based on the Positive Guidance and Positive Behavior Support three tier models. This study used a mixed methods (quantitative and qualitative) , multiple baseline design (Creswell & Plano-Clark, 2008) to investigate the influence of horticultural activities on task engagement and peer interactions with two classes of 3 to 5 year-old children in an inclusive preschool setting. It was intended to serve as a pilot for future larger-scale research for young children in general and those at risk for behavioral/emotional disorders in particular. Mixed methods research is a design for collecting, and analyzing quantitative and qualitative data in a study in order to understand a research problem (Creswell & Plano-Clark, 2008). . The influence of horticultural activities were studied as they related to the following questions:

1. How does the use of horticultural activities in an inclusive preschool setting influence students' active engagement, passive engagement, and off-task behavior?

2. How does the use of horticultural activities in the preschool setting influence students' physical and verbal peer interaction?
3. What are the teachers' perceptions of the use of horticultural activities with preschool students in an inclusive setting?
4. What are the students' perceptions of the horticultural activities in an inclusive setting?

Research Design

The researcher used a mixed methods, multiple baseline design across two classrooms, and triangulation methods to connect the quantitative and qualitative aspects of the data collection in this study. The purpose was to gather different but complementary information to provide the most comprehensive data for analysis to answer the research questions (Creswell & Plano -Clark, 2007). The study was conducted over a 16-week period. Qualitative and quantitative data and analysis are illustrated in Figure 2.

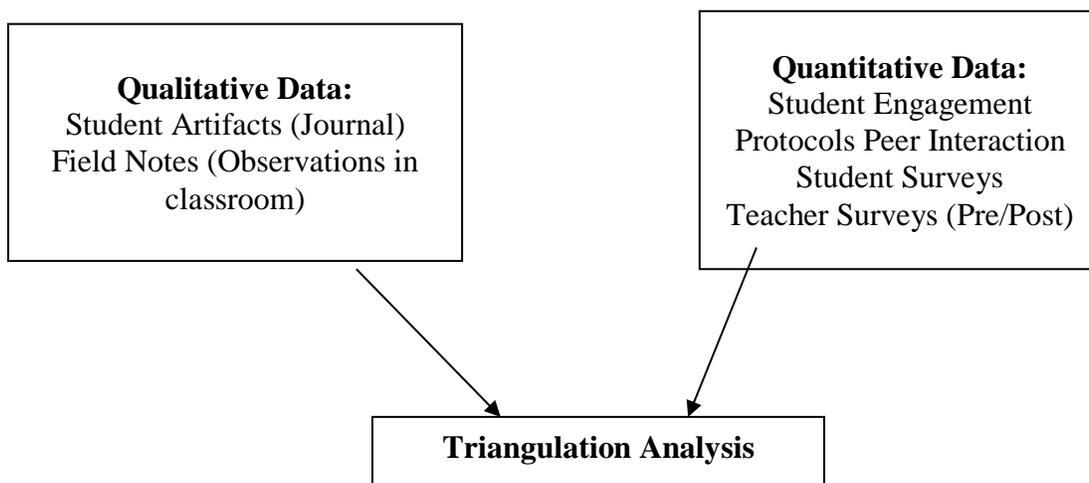


Figure 2: Data and Analysis

The research was divided into three phases. The first phase (Phase 1 – Baseline) consisted of gathering baseline data on observing student engagement and peer interactions within the two selected classes during the morning meeting time. Each class was observed two times per week; Class 1 for three weeks and Class 2 for four weeks. This allowed a multiple baseline data collection strategy in order to have some basis for comparison. Phase 2, or intervention phase, consisted of observing student behaviors 2 times a week immediately prior to the horticultural activities and immediately after the activities (during the kid writing sessions) for a period of 10 weeks. In addition, the teachers and students completed satisfaction surveys at the completion of the intervention phase.

Phase 3 or maintenance phase consisted of post-baseline or maintenance data collection 2 times per week; Class 1 for three weeks; and Class 2 for two weeks. This allowed both classes to be observed for sixteen weeks. This data is recorded using the Student Behavior and Task Engagement Data Collection Form (Appendix A).

The qualitative data was designed to identify student and teacher perceptions of the horticultural activities before and after the introduction of horticultural activities and included head teacher (Teachers 1 and 2) and assistant teacher (Teachers 3 and 4) interviews, researcher field notes, and student journals. The researcher reviewed student journals which were directly connected to the KidWriting activities students completed immediately following the horticultural activities. The journal entries were used by the researcher to determine what the students liked or disliked about the horticultural activity and, perhaps, what they wanted to study

next. The journals served as more of a personal artifact for each student to take home at the completion of the study. The researcher's field notes served as a way to observe and remember the unusual events that took place. One example is when a guest reader came into the class one day as they were finishing and the children rushed over to share what they had just completed with the guest.

The quantitative and qualitative data collection protocols will be examined further in this chapter. This chapter is organized in four sections that discuss the methodology used for this study—Context, Setting and Participant Selection; Data Collection and Analysis; Research Methods; and Role of the Researcher.

Context, Setting and Participant Selection

Context and setting.

The study took place in a childcare facility set on a corporation's campus in suburban Philadelphia. The center is a free-standing building with windows that line the length of the building, and is filled with natural light that allows the children, from six weeks of age through kindergarten, to observe the outside world. The center has many inviting spaces that mimic homelike elements and natural settings (living room furniture and soft lighting). The program provides year-round care and education to approximately 100 children, ages six months to six years in 10 classrooms staffed by approximately 30 professionals. The targeted population was students 3 to 5 year olds in two distinct preschool classes. The staff/child ratio in each of these classes was 1:10.

Indoor setting.

The classrooms were large and spacious (approximately 25 feet x 30 feet). There were tables and chairs, as well as a rug area for large group activities. The room had furniture that

was easily moved to create space and that could be cleaned following messy activities. There was also a common workroom area available that had a sink and stove/oven which were utilized when we made pizza sauce using the herbs and spices from the “pizza garden.” All of the rooms were well lit with natural lighting that provided the necessary sunlight for seeds and young plants to grow before being transplanted into outdoor gardens. Each of the classes had a comfortable feeling with soft furniture, carpeting and soft lighting produced by floor lamps. The classrooms had tables and chairs that could accommodate up to 30 students. Centers for specific learning activities were stationed around the perimeter of the classroom. Student work was neatly displayed throughout the classroom.

Outdoor setting.

There were two raised gardens and a large area that was converted into a garden area in and near the playground. A fence used to support sunflowers surrounded the playground. A teepee frame was constructed on the toddler playground so the older students could plant beans to climb the poles. Classroom teachers planned to use these areas as part of Earth Day activities and follow-up activities in the spring months. The plans for Earth Day included activities for students and parents. Some of the activities included making paper pots, sowing the herb garden, creating a food garden, and planting a variety of flowers. Many of the seedlings planted for Earth Day activities were started in the 3 to 5 year-old classes. These are the students studied by the researcher and are evidence of follow through on the teachers’ and centers’ participation.

Philosophy of the center.

Based on information from the site director and the center’s web site, the facility’s philosophy is to provide a quality early childhood program by offering a variety of developmentally appropriate opportunities to meet the individual needs of young children and

their families. Meaningful education incorporates child center experiences reflecting the child's interests (Director interview, 3/21/2011; facility's web site). The center was very environmentally conscious, as evidenced by a "Green Team" which encouraged faculty, staff, students, and parents to make environmentally sound decisions such as recycling and utilizing a playground comprised of recycled materials. The front hallway was filled with bins for students and visitors to recycle all types of materials including plastic bottles and food wrappers as well as a composting bin in the schoolyard.

Curriculum and "Green Team".

This preschool facility believed in using an emerging curriculum focusing on developing skills and interests; therefore, the activities chosen for this study were based on what the children expressed an interest in and what they already knew. The preschool utilized multidisciplinary learning activities through the use of centers and direct instruction which stimulated creativity and academic advancements. Environmental education was encouraged through academic curriculum as well as through the "Green Team." This team, comprised of teachers, staff and administrators, provided support for the classroom. It encouraged parental participation by providing consistent activities in which the entire center could be involved. One example was Earth Day activities planned for the end of April. These activities were scheduled to take place during the Week of the Young Child celebrations. The staff and faculty planned to present games, recycling and planting activities.

There was a special request to incorporate a study of ladybugs and butterflies into horticultural activities; however, due to the timing of the study (early spring) the researcher was unable to incorporate live insects. Instead the researcher used a worm factory to incorporate living creatures in horticultural gardening activities.

Positive guidance/positive behavior support.

The teachers, staff and administration worked together on the “Green Team” and other environmental issues. They also incorporated a Positive Guidance model (currently called the Pyramid Model) along with Positive Behavior Support (PBS) for behavior in the center. Positive Guidance is a system that encourages proactive strategies to support and encourage positive behavior (Barakat & Clark, 2007). This system is similar to the PBS framework previously presented. Both PBS and Positive Guidance encourage problem-solving strategies, consistent positive language, positive learning environments and offering choices (McFarland et al., 2009). The center-wide rules and expectations were clearly displayed, as were the specific classroom rules in each of the classrooms. The teachers and staff had been trained by the corporate office, and they have taught these rules to the children across environments (classrooms, playground, and corridor). These rules/expectations are common among and are observed in each classroom. Each year, parents are given a copy of the handbook that includes the rules and expectations as well as consequences. Parents are encouraged to use the same language at home to add further consistency across many environments.

Plant time rules.

The researcher along with the teachers and students created “plant time” rules that were reviewed at the beginning of each activity. A tri-fold poster, with the “plant time” rules created by the researcher and the students, was used as the first horticultural activity. These rules were the same as the facility and classroom rules: share with your friends, listen to the teacher, be careful, keep your hands and feet to yourself, and be kind to everyone. After the rules were written on the tri-fold poster, each student, teacher, staff and the researcher wrote their name on the poster. Prior to beginning horticultural activities, the researcher taught what each expectation

looked like in a horticultural activity setting, which included a roundtable in the classroom and the raised bed gardens in the playground area. These rules also were reviewed prior to each of the horticultural activities.

Classroom Rules

1. Share with your friends
2. Listen to your teacher
3. Be careful
4. Keep your hands and feet to yourself
5. Be kind

Plant Time Rules

1. Share the plants things with your friends
2. Listen to Miss T (the researcher)
3. Work carefully and gently
4. Keep your hands and feet to yourself
5. Be kind to everyone

Participants.

Teachers and students from two preschool classes participated in this study. Once a signed letter from the facility and IRB approved participation consent forms (Appendix B: Participation and Consent Form for Teachers and Appendix C: Participation and Consent Form for Parents/Guardians) were created, they were presented to teachers and parents of students in each class. The horticultural activities were presented to the entire class so forms were distributed by the center. The researcher was present one morning as students arrived to meet their parents or guardians and answer any questions regarding the study or the activities. Three

or four parents did not sign the consent forms as their children were often not present during the activities. The forms included a description of the proposed study. The center included a photo release form; however, the researcher did not take photographs of students during the study. Photographs were taken only on the final projects for each activity.

The classrooms.

The two classes invited to participate were inclusive classrooms. There were two students with formal behavioral diagnoses attending these classes. One student in Class 1 had a formal diagnosis of Pervasive Developmental Disorder (PDD). A second student who was initially identified by the teacher as presenting challenging behavior was evaluated. The evaluation began before the study and was completed toward the end of the study. The evaluation resulted in a diagnosis of Oppositional Defiant Disorder (ODD). The other student who was formally diagnosed was in Class 2. He had an Individualized Education Program (IEP) analysis that described communication and processing challenges. Based on information from the teachers, staff and administration, there were three additional students in each class who exhibited challenging behaviors that may require further evaluation in the future. In the past, these students have presented behaviors on a weekly and sometimes a daily basis that have required the faculty and staff to intervene. This information is based on the office notifications made by the teachers and staff. However, there were no other students attending with formal diagnoses of emotional or behavioral disorders, pervasive developmental disorders, cognitive impairment, or autism.

Preschool participants.

The students were in one of two preschool classes recommended by the director and chosen in collaboration with the teachers who had previously agreed to participate. Depending

upon the day of the week, there was 10 to 15 students in each class. This number varied because some of the children attend the program on a part-time basis. Both classes had students ranging from 3 to 5 years of age (Table 1). Although 15 students were enrolled in each class, only those students who produced a signed consent letter were included on Table 1. Table 2 shows the demographics of the students observed, including which ones were consistently observed.

Table 1

Consenting student participants

Class 1				
Gender total		3 years old	3 ½ -4 years old	4 ½ -5 years old
Boys	8	2	4	2
Girls	5	1	3	1

Class 2				
Gender total		3 years old	3 ½ -4 years old	4 ½ -5 years old
Boys	6	1	3	2
Girls	6	3	2	1

Table 2

Demographics of Students

Class 1				
Gender		3 years old	3 ½-4 years old	4 ½ -5 years old
Boys		2	4 (3CO)	2 (1CO)
Girls		1	3	1

Class 2				
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Gender	3 years old	3 ½-4 years old	4 ½-5 years old
Boys	1 (CO)	3 (1CO)	2
Girls	3	2 (1CO)	1 (CO)

Note: CO: Consistently observed.

Teacher participants.

Four teachers were invited and agreed to participate in the study (Table 3). During the initial interview at the facility with the directors and the researcher, they expressed an interest in incorporating horticultural activities into their routines. These teachers also worked with preschool students ages 3 to 5, which was the target age group. The experience level of the teachers ranged from 5 to 15+ years in the classroom. The demographics of the teachers and administrators are presented on Table 3.

Administrator participants.

The preschool director and site director participated in the study with students as time allowed. Often they were an extra pair of hands in the classroom during activities. The program director had over 30 years of experience working in the field of early childhood. The site director had 14 years of experience working in this facility, as well as additional experience in early childhood while working on her Bachelor of Science degree in elementary education. Initially, there was a parent worker with 10+ years of experience who also was going to participate; however, after the winter holiday break, it was determined he was needed on a more permanent basis in another classroom, and he did not participate in any of the actual horticultural activities. Table 3 presents the consenting teacher and administrator participants.

Table 3

Consenting teacher and administration participants

Staff	Pseudonym	Years of Experience	Education Degree and Certifications
Site director		14	BS Elementary Education
Preschool director		30	M.Ed Early Childhood Education
Head teacher	Teacher 1	15	BS Elem. Ed/Early Childhood
Teacher	Teacher 3	7	BS Early Childhood
Head teacher	Teacher 2	10	BS Elementary Education
Teacher	Teacher 4	5	BS Early Childhood

Trained observer participant.

The trained observer was a recent college graduate earning a Bachelor’s degree in Human Services. This individual does not have a background in education; however, she has an extensive interest in behavior as well as having 4+ years of experience working with students with autism.

Data Collection and Analysis

Five major forms of data collection were utilized: observations, surveys, student journals, teacher student interactions, and researcher field notes (see Figure 2). Quantitative research tests a theory composed of variables, measured with numbers, and analyzed with statistical procedures (Creswell & Plano-Clark, 2008). The researcher included observations, and teacher and student satisfaction surveys. Behavioral data was collected to provide observational validation to the use of horticultural activities and the resulting changes in

behavior should they occur as predicted. Qualitative data is based on information gained through inquiry and explores social or human questions. The researcher details the views of the participants and conducts the study in the natural environment (Creswell & Plano-Clark, 2008). Qualitative data included student journals, field notes, observations and teacher interviews. Teachers' perceptions of the ease of implementation and social validity were addressed through the interviews and surveys.

Quantitative Data

Observations.

Student interaction was observed and recorded by the researcher and a trained observer. There were four students in each class identified by teachers and administration as presenting challenging behavior. The students were consistently observed. In addition, randomly chosen students were observed for two minutes in 15-second intervals prior to and after the activity behaviors being observed for active or passive engagement, off-task behavior, and physical and verbal peer interactions. The observations were coded on the Student Behavior and Task Engagement data collection form (Appendix A).

Definitions.

Active Engagement (AE) included remaining in an activity area, answering questions, reading along with the adult, and making eye contact with the person making the presentation.

Off-task (OT) was defined as not participating, not paying attention, or doing something other than the task at hand.

Passive Engagement was defined as being in the area where the activity was being presented and not causing any disruption, but not actively participating in the activity.

Task Engagement was a twofold concept which included Active and passive engagement and off-task behavior.

Physically aggressive behavior (P-) was operationally defined as any physical contact to another individual that causes harm including direct physical contact or contact through an inanimate object or third party. This could include hitting, kicking, pushing, biting, and throwing.

Positive peer interactions was defined as a friendly verbal (V+) and/or physical (P+) contact between peers. This might include a student asking a peer for help, playing together, working cooperatively on a project, asking a peer to join an activity, appropriate touch (a pat on the shoulder), or a compliment.

Verbally aggressive behavior (V-) was operationally defined as any verbalization directed at another that was meant to cause discomfort, disruption or harm. This could include name-calling, yelling, screaming, bullying, making fun of another individual, and swearing.

Teacher and student satisfaction surveys.

The teachers completed a short satisfaction survey (Appendix E) after completion of the intervention phase to share the perceived benefits, likes and dislikes of horticultural activities in the classroom. This was anonymous as the researcher wanted the teachers and staff to feel they could answer honestly. The purpose was to gain an understanding of the teachers' and staff's perceptions of the actual activities, the benefits to the students, how horticultural activities could be best used in the curriculum, whether they were easily implemented, and whether they would recommend these activities to others. Each question on the survey was analyzed independently and changes to the activities were made if the researcher, in collaboration with the classroom teachers, deemed it appropriate.

The students completed a student satisfaction survey after the completion of the intervention phase (Appendix F). Students met one-on-one with the researcher who read each question on the four question survey to the student. The student was asked to color in the face (happy, neutral, or sad) that best represented how they felt in answer to each question. The purpose of the survey was to gain an understanding of the students' perceptions, likes and dislikes in regard to the horticultural activities. Like the teacher survey, each question was analyzed individually.

Qualitative data

Student Journals.

Each student was provided with a journal page to use after each of the horticultural activities. The students met with the teachers to work one-on-one or in small groups to complete each entry. The students were asked to draw a picture about the activity just completed. Kid Writing, which was part of the preschool curriculum, was used as a means to complete the written portion of the journal. The researcher collected the pages for analysis and later bound and returned them to the students. By creating the journal, the researcher hoped to provide the students and their families with a positive lasting memory of the experience. The journals were primarily a personal artifact for the students.

KidWriting prompts.

During the post horticultural activity which was comprised of KidWriting , students were provided with specific handwriting paper, crayons, colored pencils and markers in order to complete the journal assignment. Students were asked to draw and write what they like most and/or last about the activity in which they had just participated. Students were also encouraged to free draw/write about the activity. Specific prompts were consistently used for the writing

activities The prompts included: What part of today’s activity did you like best? What didn’t you like about today’s activity? How did this activity make you feel today? What other activities would you like to do?

Researcher field notes.

The field notes were used as a form of self-reflection. There were also parents who approached me with some comments regarding the activities presented to their children. researcher also spoke with the teachers on an informal basis almost weekly to discover whether they, the teachers, had seen any changes in the students and whether any parents had commented to them about their child. These notes were used to make adjustments to the books chosen, activities implemented, and the length of activities.

Research Methods

Intervention design.

Observation was the primary form of data collection for decision making throughout the study. The study had three phases: baseline, intervention/horticultural activities, and maintenance as shown in Table 4.

Table 4

Activity schedule Classes 1 and 2

Week	Class 1	Class 2
1	Baseline data	Baseline data
2	Baseline data	Baseline data
3	Baseline data	Baseline data
4	Initial horticulture activity	Baseline data

5	HA intervention	Initial horticulture activity
6	HA intervention	HA intervention
7	HA intervention	HA intervention
8	HA intervention	HA intervention
9	HA intervention	HA intervention
10	HA intervention	HA intervention
11	HA intervention	HA intervention
12	HA intervention	HA intervention
13	HA intervention	HA intervention
14	Maintenance	HA intervention
15	Maintenance	Maintenance
16	Maintenance	Maintenance
Summary	Observations 2X weekly	Observations 2X Weekly
	Baseline: 6 observations	Baseline: 8 observations
	Intervention: 20 observations	Intervention: 20 observations
	Maintenance: 4 observations	Maintenance: 6 observations

Observations.

Prior to collecting data for baseline, the researcher and observer spent approximately four hours watching several commercial videos of individuals with special needs, including;

Educating Peter, Emma's Gift, and Autism the Musical. The researcher and observer were seeking agreement in the observation of active engagement, passive engagement, off-task behaviors, and positive and negative physical and verbal peer interactions, which are more clearly defined further in the methodology. Observations and comparisons continued until there was at least 80% agreement between the observers across all categories. Behaviors were observed in two one-minute intervals and recorded on the Student Behavior and Task Engagement Data Collection Form (Appendix A).

Phase one-Baseline.

During phase one, baseline observations were conducted during the morning meeting which was the first formal activity of the day. Four students in each of the classes were consistently observed based on the presentation of consistent challenging behavior as noted by the facility administration and teachers. Two randomly chosen students from each class were also observed. The students were of varying ages between 3 and 5 years of age. Data was collected two times each week. Each student was observed individually for two minutes and data collected at 15 second intervals. The baseline phase included behavioral data collected prior to the introduction of the horticultural activities. Three weeks two times each week of data were collected for Class 1 (6 observations) and four weeks two times each week of behavioral data were collected for Class 2 (8 observations). Behavioral data included the incidents of positive and negative physical and verbal peer interaction as well as active and passive engagement and off task behavior data. This behavioral data was collected for two minutes in 15 second intervals during the morning meeting which was the first formal activity of the school day in each class. The morning meeting was conducted by the teacher and followed the same format each day. The meeting took anywhere from 15 to 20 minutes and provided a predictable routine to the start of

each school day. Each meeting consisted of some or all of the following activities: morning greeting and song, graphing attendance, morning message, weather tally and recording of temperature, calendar activities (weather, learning songs, tally of days with straws) and the researcher reading specific children's storybooks that supported the theme of the classroom. Data was collected and recorded on the Student Behavior and Task Engagement Data Collection Form (Appendix A).

Baseline data for Class 1 was collected by the researcher and a trained observer for three weeks during the morning meeting before the introduction of the horticultural activities. A baseline was established prior to the beginning of intervention.

Baseline data for Class 2 was collected for four weeks during the morning meeting before horticultural activities were introduced to the class. Classes 1 and 2 participated in horticultural activities. However, Class 2 was one week behind in the activities progression. There were two activities conducted at the same time for Classes 1 and 2. This was due to the availability of the materials and the pertinence of the activity (Mr. Groundhog's visit and floral arrangements for Valentine's Day).

Phase two -Intervention.

Phase two consisted of three sections; pre-horticultural activity observations (pre-HA), horticultural activities, and post-horticultural activity observations (post-HA). Pre-horticultural activities in this phase were the morning meetings. Four students in each of the classes were consistently observed based on the presentation of consistent challenging behavior as noted by the facility administration and teachers. Two randomly chosen students from each class were also observed. Data was collected two times each week for 10 weeks (20 observation opportunities). Each student was observed individually for two minutes and data collected at 15

second intervals. Observational behavior data was collected during the morning meeting which took place immediately prior to the horticultural activities. No data was collected during the actual horticultural activities as the researcher was presenting each activity. However, data was collected immediately following the activities for 10 ten weeks 2 time per week (20 observations) which was during Kid Writing journal time. Each section of the intervention phase (morning meeting, horticultural activity and Kid Writing), was approximately 15-25 minutes in length (20 observations pre and post activities).

During phase two, the researcher and observer observed students' behavior and task engagement prior to horticultural activities sessions and after each activity session. The researcher presented activities to the students with the understanding that the teachers and staff would become involved in the activity, thereby modeling for the students. Data was collected and graphed targeting the percentage of time students were actively engaged, passively engaged, or off-task. Incidents of positive and negative physical or verbal interactions were recorded on the Student Behavior and Task Engagement Data Collection Form (Appendix A), as were teacher and student interactions. The researcher was looking for changes in trends and considering variability.

The students who were consistently observed were chosen based on teacher reports of challenging behaviors and the facility referral system. This system is currently being revised to meet the specific needs of the center. There were four students chosen from each class to be consistently observed. These students were observed during morning meetings (before HA) and journal writing time (after HA) to ensure consistent settings for observation. Additional observations were conducted during the KidWriting journal writing, again to supply consistency to the activity and time of day.

The delivery of horticultural activities was designed as a teaching strategy that addresses the developmental needs of the whole child including academic, social and physical development, and a possible method of preventing students who present challenging behaviors from needing more intensive interventions. These activities were designed so they could be easily incorporated into the daily classroom routine. Horticultural activity sessions were based on hands-on activities presented in 15-20 minute lessons directly tied to literature introduced at the beginning of each lesson and followed by a culminating journal activity. Each activity involved seeds, plants, flowers, plant materials and insects that would be considered important to the garden (ladybugs, butterflies, worms). As previously noted, the researcher and a trained observer collected the behavioral data using a form adapted by the researcher. Each session included:

1. Oral review of the plant time rules.
2. Literature to introduce the concept being presented.
3. Introduce and complete hands-on activity involving plants and plant materials, soil and/or beneficial insects to the garden (Appendix D).

The post-horticultural observations took place immediately following the horticultural activities presented by the researcher. Four students in each of the classes were consistently observed based on the presentation of consistent challenging behavior as noted by the facility administration and teachers. Two randomly chosen students from each class were also observed. Data was collected two times each week. Each student was observed individually for two minutes and data collected at 15 second intervals. These observations occurred during Kid Writing journal time and consisted of students using handwriting paper provided by the teachers. The teachers used the horticultural activities as a topic point to have students complete their Kid

Writing. Kid Writing is a method for teaching young children to write. Children write daily, using phonemic skills they have acquired. This was considered a social activity as students could be found helping each other with spelling or talking about their writing. For the purposes of this study, students were asked to draw a picture in their journal about the horticultural activity presented to the class. For some of the students, teachers wrote the words on another piece of paper and the student copied those words; creative spelling was encouraged. The teacher then had the child read back what he/she had written, and the teacher wrote what the student described under the student writing. The children then had the opportunity to see the words correctly. The teachers conferenced with each student individually and wrote the conventional spelling under the student's writing. Each student received individualized instruction as the students were all at very different skill levels. The focus of the Kid Writing activity was to understand what the students were taking from each activity presented by the researcher. Students were prompted to draw a picture and write what they liked about the activity in which they had just participated. Students produced a variety of illustrations and written responses which were recorded in the student journals. The journals were collected by the researcher and reviewed in order to understand what the children liked or disliked about the activities presented. Students were given the journal in the form of a bound book at the end of the study.

Phase three-Maintenance.

During phase three, observations were conducted during the morning meeting just as they were during the baseline phase. Four students in each of the classes were consistently observed based on the presentation of consistent challenging behavior as noted by the facility administration and teachers. Two randomly chosen students from each class were also observed.

Data was collected two times each week. Each student was observed individually for two minutes and data collected at 15 second intervals. The teachers and students met and sat on a carpeted area of the classroom to begin the day. They greeted each other, read the morning message, graphed the weather, counted and did calendar activities. The teacher usually ended the meeting by reading a book to the children. Data was collected and recorded on the Student Behavior and Task Engagement Data Collection Form (Appendix A).

The researcher continued to observe Class 1 for three weeks after the horticultural activities concluded (6 observations) and Class 2 for two weeks after the horticultural activities concluded (4 observations). We continued to observe for active and passive engagement, off-task behavior and positive and negative peer interactions.

Follow up.

Teachers and staff were asked and encouraged to conduct follow-up activities designed by the researcher to promote student generalization. The activities worked in concert with those presented by the researcher and served as an extension to the previously guided activities. Examples of follow-up activities included seed-plant care for the indoor and outdoor gardens, garden art, drawing, and painting. Follow-up activities and children's literature were provided for each class (Teacher Follow Up Checklist (Appendix H). The researcher requested the teachers complete a log including any follow-up activities and literature used. Some of the follow-up activities were more easily completed by teachers. For example, the teachers were easily able to check the seeds planted and be certain they were watered. However, the literature was not always shared with the students. The researcher recommended that the suggested literature be put in the student library and/or used in the library center. This suggestion was accepted and utilized by the classroom teachers.

Role of the Researcher

By incorporating social learning and horticulture, I believed strides could be made in improving the lives of children before they got into irreversible situations that might adversely affect their lives. I knew horticultural activities were being used in schools, hospitals and prisons, and I wanted to learn whether these activities would be beneficial to a class of children with emotional disturbances in the kindergarten through second grade. Could these activities and their effects extend past the classroom and, most importantly, would the children enjoy these activities?

This is the story behind the use of horticultural activities in an emotional support setting that I had previous to entering the Ed.D. program at Arcadia University and where the seeds for this study were planted. I was fortunate to have a registered horticulture therapist attend my class on a monthly basis. As the seeds grew upon being planted, nourished and nurtured, so did the children in this class. The students observed, imitated, and modeled behavior and skills they had not presented previously.

I believe my overall philosophy around this research and the horticultural activities is that it must be a hands-on experience, and it must be engaging for both students and instructors. These are the type of activities that children can benefit from observing and imitating. They need to get their hands dirty—literally—to see the full benefit of the activity. The children in the class seemed to have developed social skills; they handled teamwork and collaborative tasks, improved their listening and writing skills, and learned about possible future opportunities.

I believe the most important thing they learned was how to nurture something and how to appreciate themselves. Their horticultural experience seemed to make a difference. Perhaps this is my small way of changing the world. I firmly believe that horticulture, when presented to

students, will have a positive influence on social, emotional, and academic outcomes. The activities are non-threatening, gratifying, and provide participants with a specific purpose. To curb my bias in terms of data, I used a trained observer who had no previous experience in the use of horticultural activities, but does have a behavioral studies background. My self-reflections are noted. However, my biases and opinions are in no way included in the data. Changes to activities were based on what the researcher and teachers felt were necessary.

Conclusion

Many educators have expressed a need for strategies when working with students presenting behavioral issues. This study examined the possible influences of using horticultural activities with preschool-age students in areas such as active engagement, passive engagement, off-task behavior, and positive/negative peer interactions. Utilizing a variety of data collection methods provided the researcher with several ways to discern the impact of these activities. Data generated from the three phases of this study provide a clearer picture of how using complementary/alternative activities can be beneficial to all students, but especially to those who present behavioral challenges. Based on teacher input, these activities can be easily implemented in any classroom, as well as at home. When used in conjunction with a Positive Guidance or PBS framework, all students have the opportunity to be successful—academically, socially and emotionally.

Analysis and Results

This mixed method study (Creswell & Plano-Clark, 2008) was designed to explore the influences of horticultural activities on children in an inclusive preschool setting. It is intended to serve as a pilot for future larger-scale research for young children in general, as well as those at risk for behavioral/emotional disorders. The researcher investigated the influences of

horticultural activities with two classes of 3-5 year-old children in an inclusive, preschool setting in regard to peer interaction and task engagement. Quantitative behavioral data was collected for six students in each class during each observation. Four students in each class were observed on a consistent basis based on the recommendations of the teachers and administration. These students were chosen based on the fact that they presented more challenging behaviors than their peers as recorded in the center office referral system. Consistently observed students had one or more reported behavioral incident in the weeks prior to the study. The two additional students were randomly chosen each session to be observed throughout the study. This chapter is divided into sections. Section 1 presents and analyzes quantitative behavioral data related to the number of incidents active and passive engagements and off-task behaviors of the six observed students in each class. Section 2 presents and analyzes quantitative behavioral data on positive and negative peer interactions of the six students in each class. Section 3 analyzes the teacher and student survey data. Section 4 analyzes qualitative data collected through pre and post teacher interviews of horticultural activities. Section 5 analyzes qualitative changes in behaviors of the four students consistently observed throughout the study.

Section 1: Active/passive engagement and off-task behaviors.

Active engagement data was collected across the three phases of the study, as represented in the charts in Figure 3, Percentage of active engagement by Session Across Phases. Phase 1 baseline data was collected two time each week for three weeks in Class 1 (6 observations) and four weeks in Class 2 (8 observations). During those sessions the researcher and observer observed students during the morning meeting which was the first formal activity of the school day. The percentage of time actively engaged during baseline varied from a low of 10% to 50%.

During phase 2, the intervention phase, data was collected for 10 weeks 2 times each week. Observations were conducted immediately prior to (20 observations) and immediately following (20 observations) horticultural activities which were presented by the researcher. Prior to the horticultural activities, the percent of time actively engaged consistently ranged from 10% to 40% with the exception of one lesson presented to both classes at the same time (Ground Hog Day). Due to the availability of materials and other school activities, both classes participated in the pre-horticultural activities at the same time creating a larger group of students. Typically, active engagement was higher following the horticultural activities, during Kid Writing journal time. The researcher found that during this time the students were very much engaged in conversation with each other. They were often heard discussing the activities they had just participated in and helping each other decide what to draw and write about. It was reported by the teachers that this was a phenomenon that had not previously occurred. Another possible reason for the increase in active engagement was that students were working with teachers one-on-one or small group situations, therefore receiving more individualized attention.

Phase 3, maintenance, presented an inconsistent but higher percentage of active engagement than during baseline or during the observations prior to the horticultural activities. The level of active engagement was not maintained at the same level as after the horticultural activities. Data was collected during the morning meeting two times each week (6 observations) for three weeks in Class 1 and two weeks in Class 2 (4 observations). This decrease may be attributed to the fact that the morning meeting is a whole class activity rather than one-on-one or small group activities.

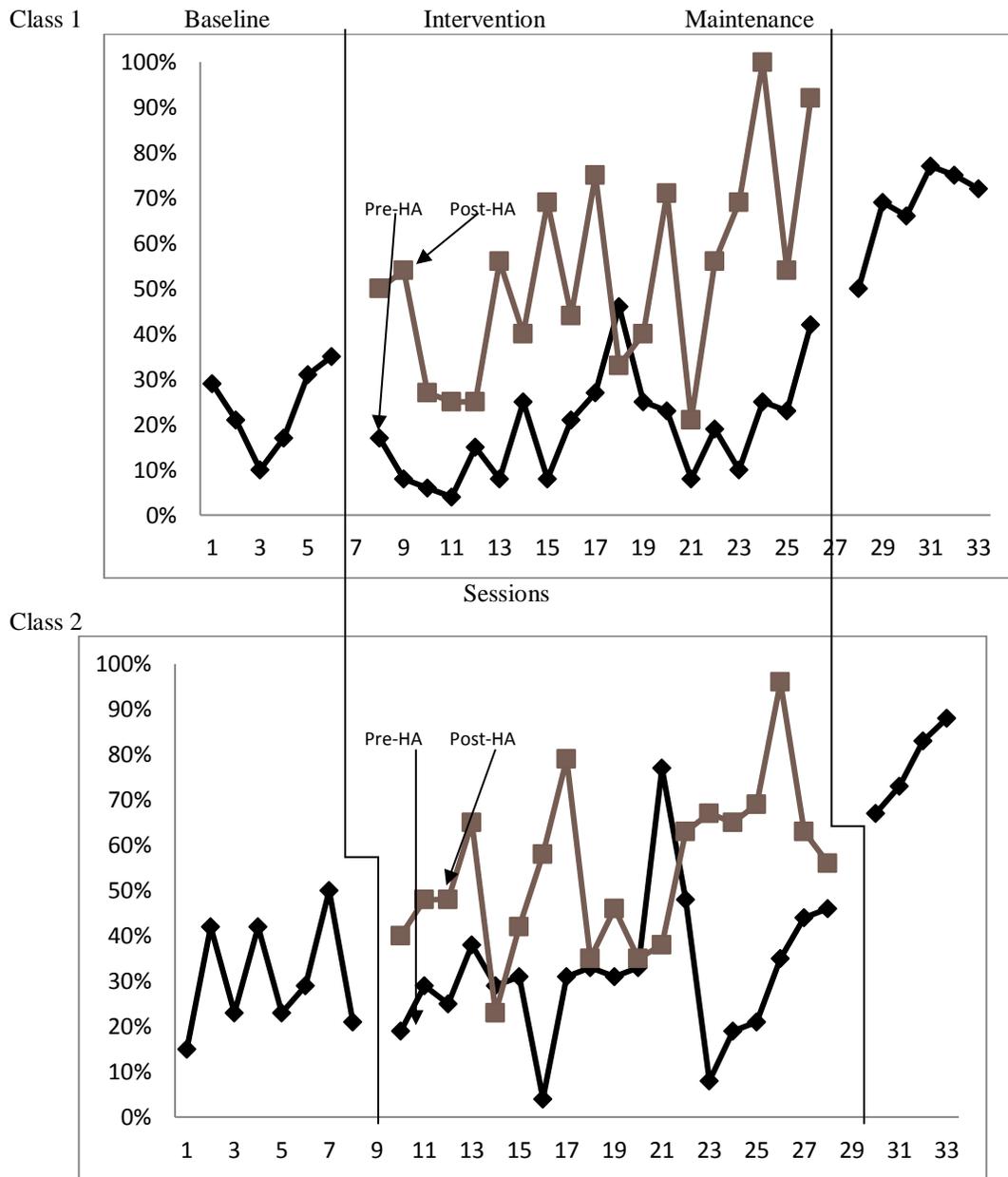


Figure 3. Percentage of Active Engagement by Session Across Phases

The data presented in Figure 4, Classes 1 and 2 Mean Percentage of Active Engagement, demonstrates an overall increase in active engagement across the three phases of the study. There appears to be a notable increase in active engagement in both classes during the post-

horticultural activities section of the intervention phase. Although this increase was not maintained to the same level by session during the maintenance phase, active engagement was more consistent throughout this phase.

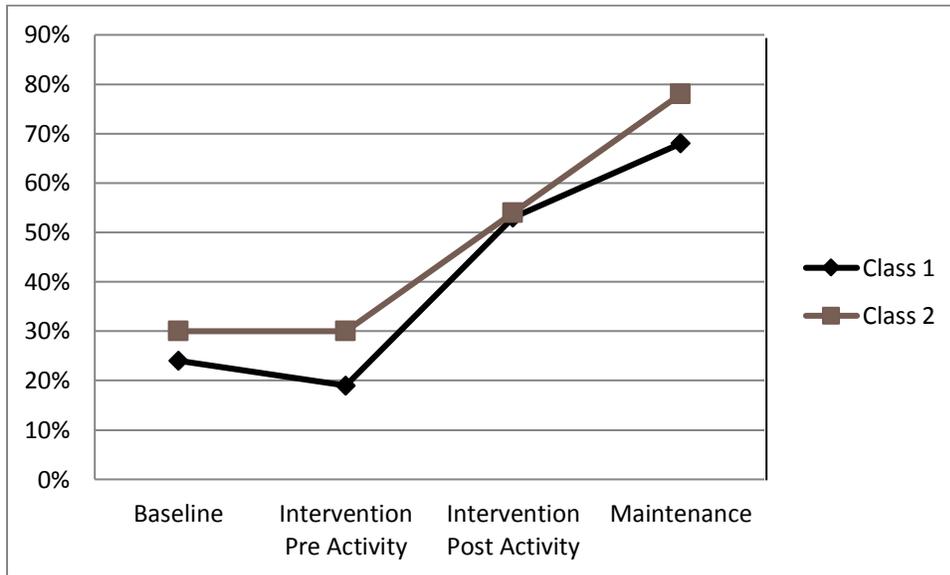


Figure 4. Classes 1 and 2 Mean Percentage of Active Engagement

Figure 5, Class 1: The Percentage of Active Engagement Across Phases, presents a mean rate of approximately 22% during the three week baseline phase of the study in Class 1. The percentage of time actively engaged ranged from a high of 35% to a low of 10%. During phase 2, the percentage of time actively engaged during the pre-horticultural activities ranged from a low of 4% to a high of 46% and a low of 25% to 100% during post-horticulture activities. It is noteworthy that there was a slight decrease in the average amount of time actively engaged immediately prior to the introduction of the horticulture lessons, however, there was an increase to over 50% active engagement during the activity immediately following the horticulture activity. This was over a 30% increase in Active active engagement. There continued to be an

increase in active engagement to almost 70% during the maintenance phase of the study where active engagement ranged from 50% to 78%.

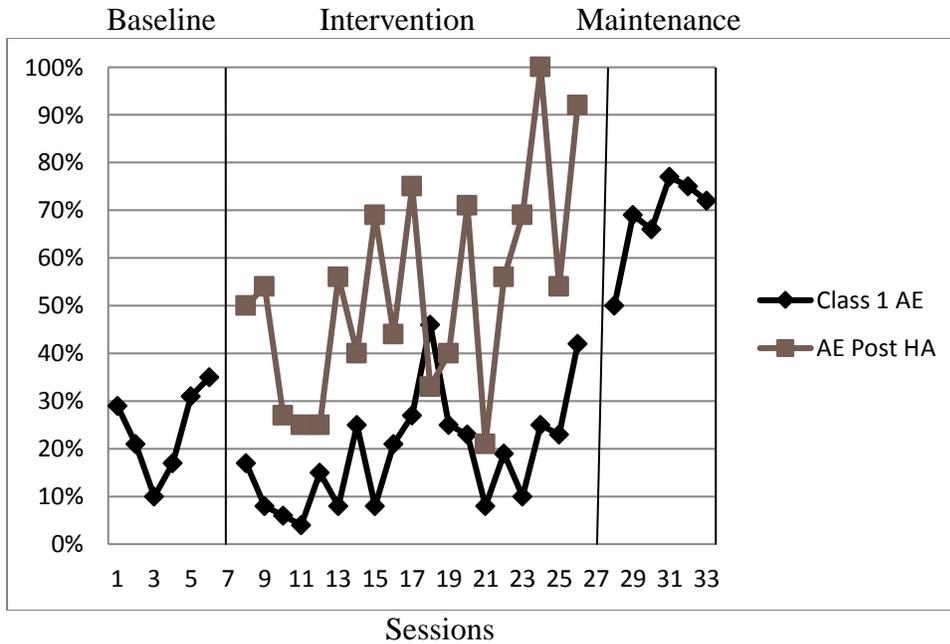


Figure 5. Class 1: Percentage of Active Engagement Across Phases

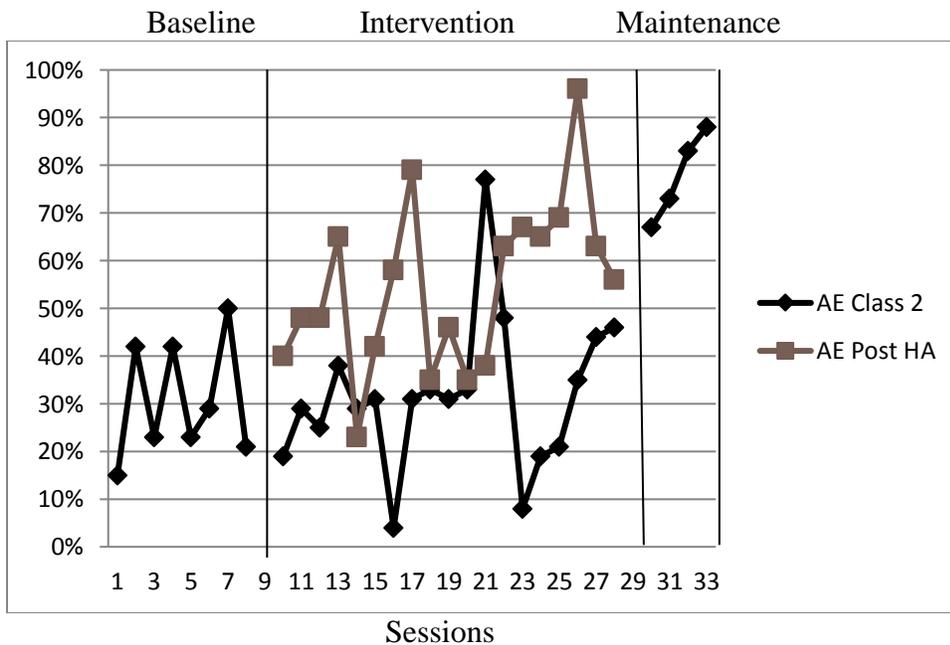


Figure 6. Class 2: Percentage of Active Engagement Across Phases

The Percentage of Active Engagement Across Phases presents a mean rate of approximately 30% during baseline in Class 2. The percentage of time actively engaged ranged from a high of 48% to a low of 21% during this phase. Throughout phase 2, the percentage of time actively engaged during the pre-horticultural activities ranged from a low of 4% to a high of 77% and a low of 23% to 97% during the post-horticulture activities. It is noteworthy that there was a slight increase in the average amount of time actively engaged immediately prior to the introduction of the horticulture lessons, however, there was an increase to over 50% active engagement during the activity immediately following the horticulture activity. This was over a 20% increase in active engagement. There continued to be an increase in active engagement to a mean of almost 80% during the maintenance phase of the study where active engagement ranged from 67% to 88% (see Figure 6, Class 2: Percentage of Active Engagement Across Phases).

Passive Engagement data was collected across the three phases, the Percentage of Passive Engagement by Session Across Phases (Figure 7). Baseline data was collected for three weeks for Class 1 and four weeks for Class 2. Class 1 presented more consistency during the baseline phase than did Class 2. During the intervention phase, passive engagement was very inconsistent. It does appear that the percentage of passive engagement was lower during post-horticultural activities, when active engagement was higher. During phase 3, the maintenance phase, passive engagement was lower than during baseline and post-horticultural activities for Class 2; however, it was higher than the post-horticultural activities for Class 1.

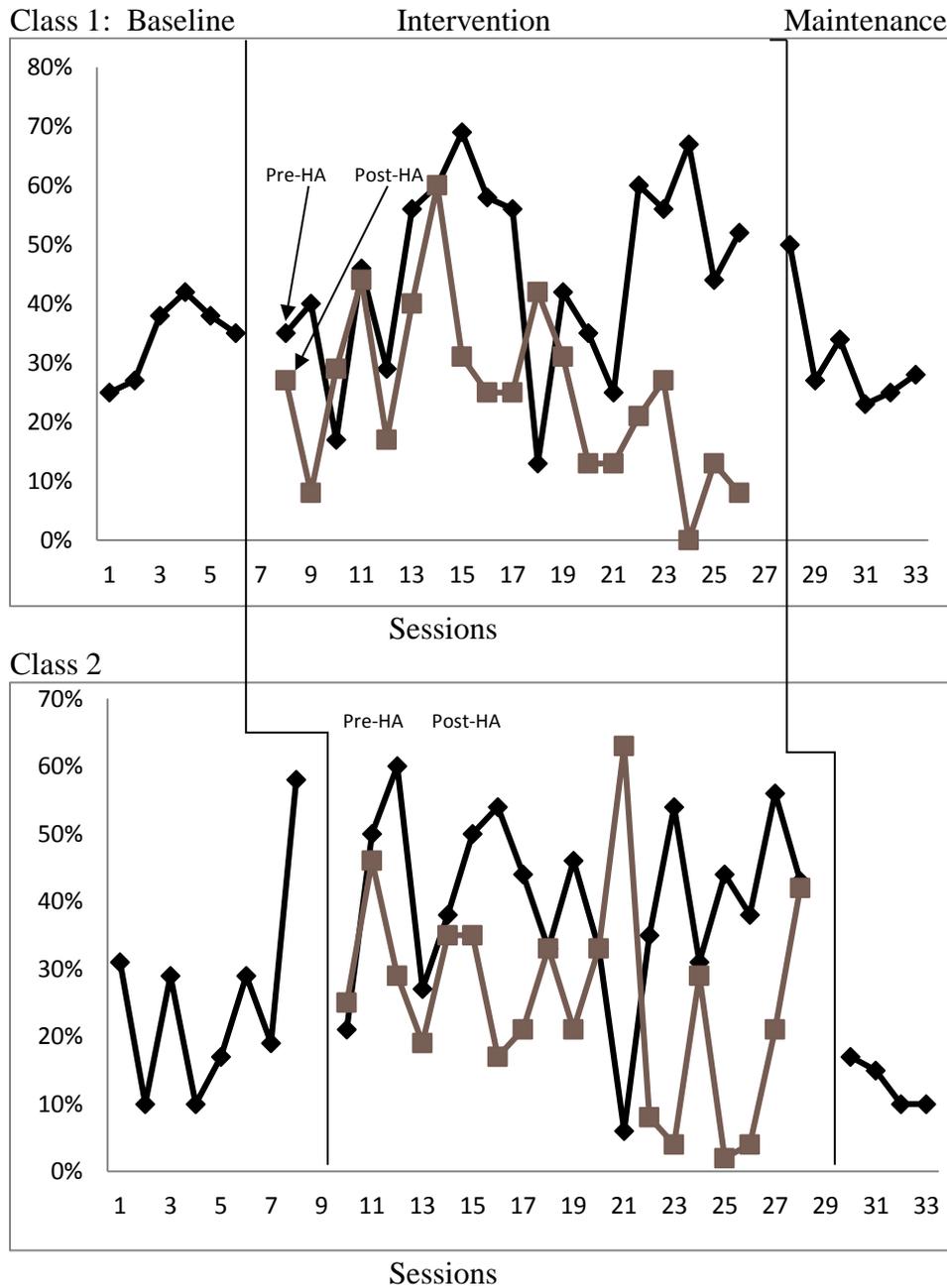


Figure 7. Percentage of Passive Engagement by Session Across Phases

Figure 8, Classes 1 and 2 Mean Percentage of Passive Engagement, presents the mean data across the three phases for Classes 1 and 2. Both classes demonstrated an increase in passive engagement between baseline and pre-horticultural activities in the intervention phase.

Between the pre-activity and the post activity, both classes presented a decrease in passive engagement. This might be attributed to an increase in active engagement. During the maintenance phase, Class 1 presented a slight increase in passive engagement while Class 2 continued to decrease in passive engagement.

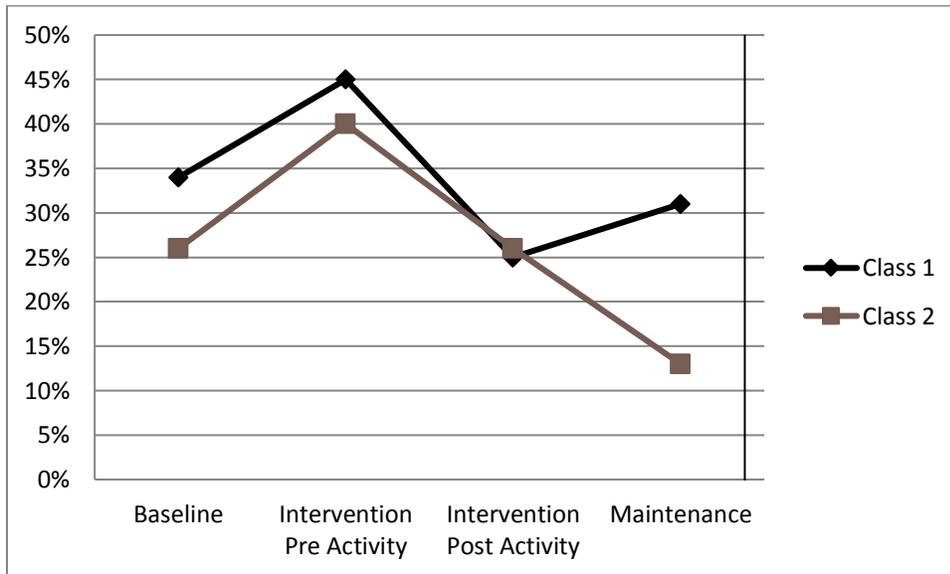


Figure 8. Classes 1 and 2 Mean Percentage of Passive Engagement

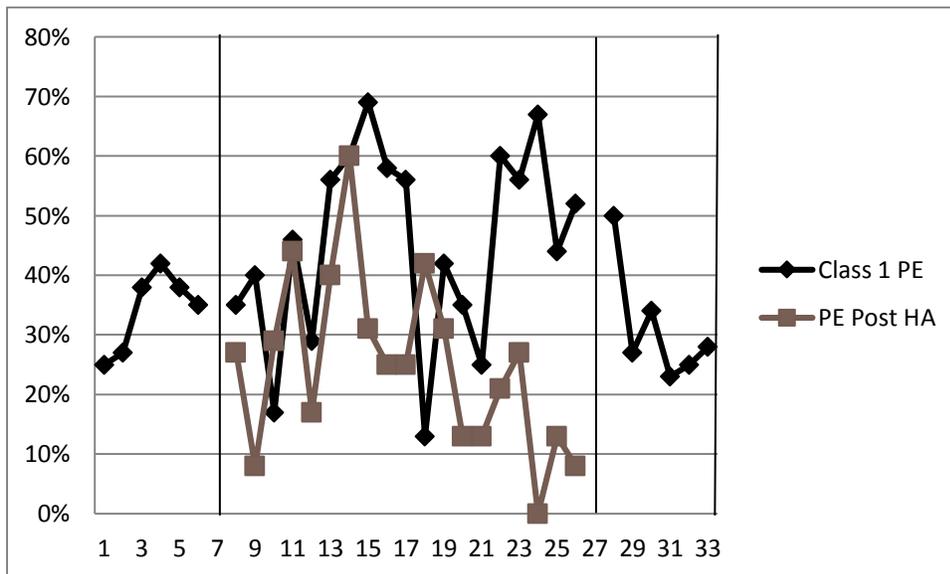


Figure 9. Class 1: Mean Percentage of Passive Engagement

Class 1 began with students being passively engaged at a mean rate of approximately 33% during the baseline phase of the study. (Figure 9) The percentage of time passively engaged ranged from a high of 42% to a low of 25%. During phase 2, the percentage of time passively engaged during the pre-horticultural activities ranged from a low of 13% to a high of 69% and a low of 0% to 60% during the post-horticulture activities. It is noteworthy that there was an increase from 33% to 45% in the average amount of time passively engaged immediately prior to the introduction of the horticulture lessons; however, there was a decrease to 25% passive engagement during the activity immediately following the horticulture activity. There was an increase in passive engagement to a mean of almost 31% during the maintenance phase of the study where passive engagement ranged from 23% to 50%.

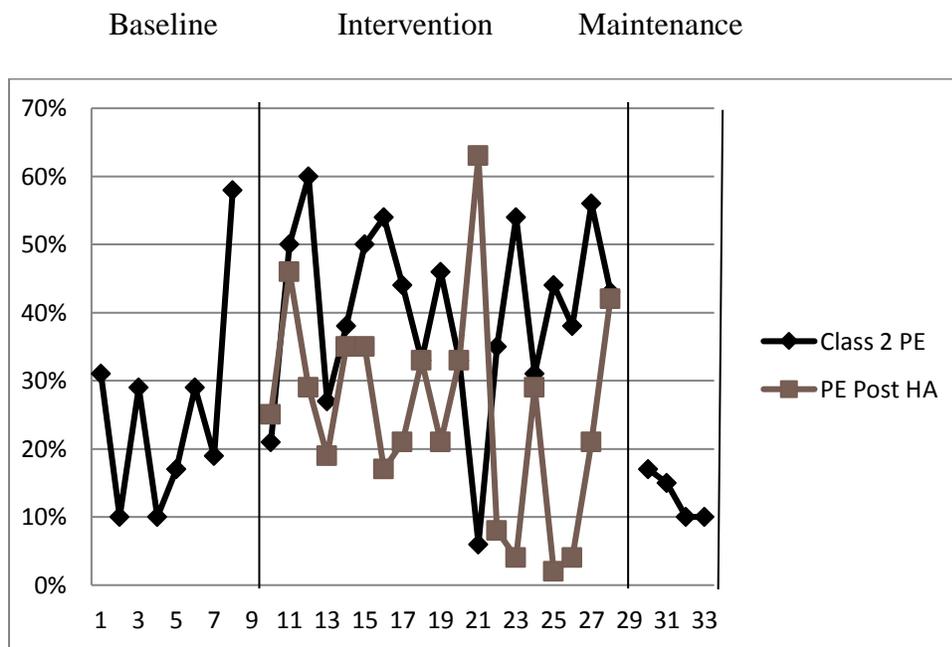


Figure 10. Class 2 Percentage of Passive Engagement Across Phases

Figure 10 presents the percentage of passive engagement in Class 2 across three phases. Class 2 began with students being passively engaged at a mean rate of approximately 26%

during the baseline phase of the study. The percentage of time passive engagement ranged from a high of 58% to a low of 10% during this phase. During phase 2, the percentage of time passively engaged during the pre-horticultural activities ranged from a low of 6% to a high of 60%, and a low of 2% to 63% during the post-horticulture activities. It is noteworthy that there was an increase from 26% to 40% in the average amount of time passively engaged immediately prior to the introduction of the horticulture lessons; however, there was a decrease to 26% passive engagement during the activity immediately following the horticulture activity. Passive engagement decreased to a mean of 13% during the maintenance phase of the study where passive engagement ranged from 10% to 17%.

Off-task behavior data was collected across the three phases of the study, as represented in Figure 11, Percentage of off-task Behavior by Session Across Phases. Phase 1 baseline data was collected for three weeks in Class 1 and four weeks in Class 2. During those sessions the researcher and observer observed the students during the morning meeting which was the first formal activity of the school day. The percentage of time during baseline varied from a low of 15% to 50%.

During phase 2, the intervention phase, data was collected for 10 weeks. Observations were conducted immediately prior to and immediately following horticultural activities which were presented by the researcher. Prior to the horticultural activities, the percentage of time off-task behavior ranged from 0% to 50% with the exception of one lesson presented to both classes at the same time (Ground Hog Day). Due to the availability of materials and other school activities, both classes participated in the pre-horticultural activities at the same time creating a larger group of students. Typically off-task behavior was higher prior to the horticultural activities with Class 1, demonstrating more consistency throughout the three phases. Data was

collected during Kid Writing journal time where the students were very much engaged in conversation, discussing the activities they had just participated in. It appears that the increase in active engagement was influenced by the one-on-one or small group situations that the students were involved with and the more personalized attention presented by the teachers.

Phase 3, maintenance, presented an inconsistent but higher percentage of active engagement than during baseline or the observations prior to the horticultural activities. The level of off-task behavior was maintained at the same level as after the horticultural activities in Class 1; however, Class 2 presented inconsistent results. Data was collected for three weeks in Class 1 and two weeks in Class 2, and was collected during the morning meeting.

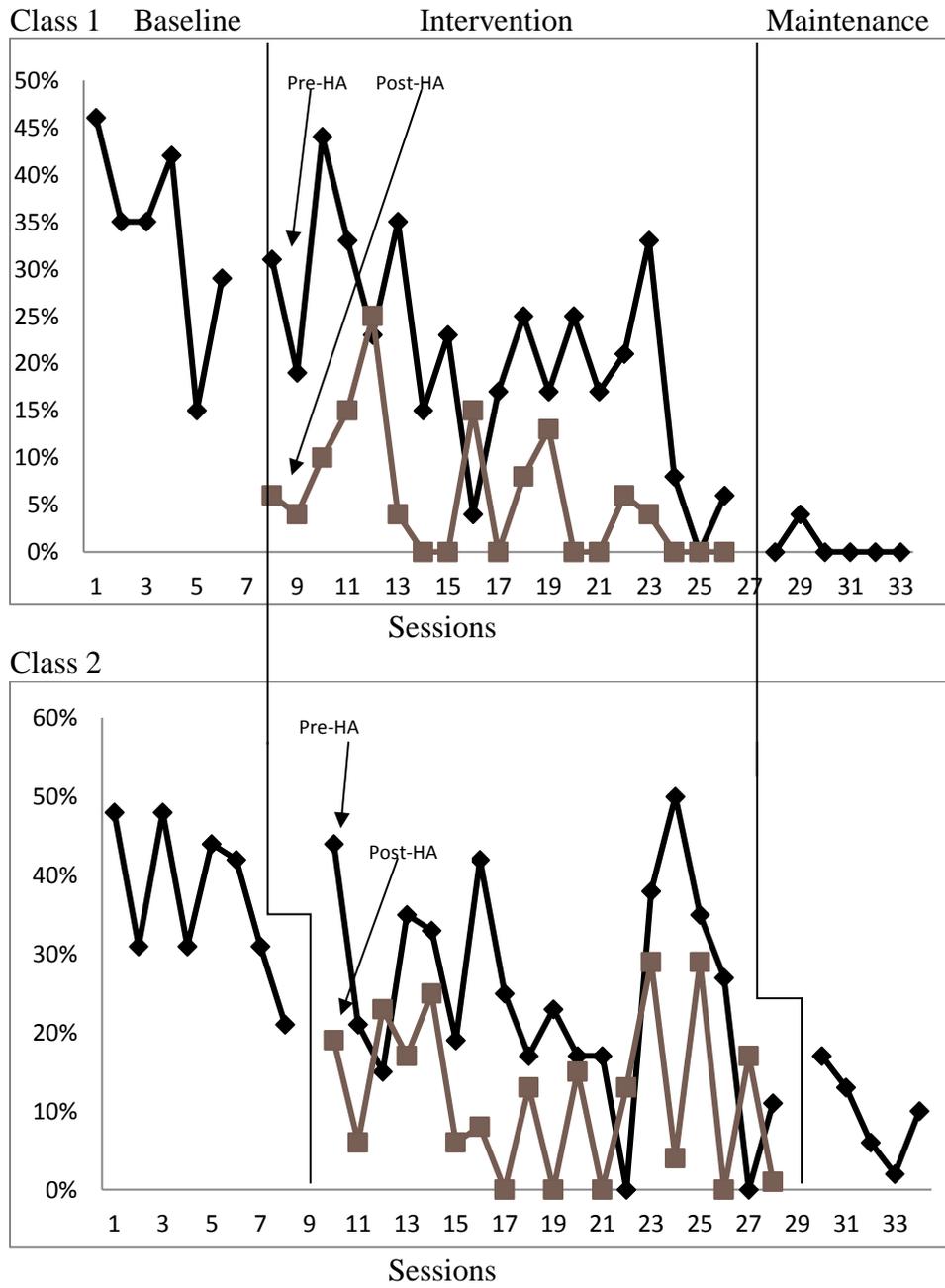


Figure 11. Percentage of Off-task Behavior by Session Across Phases

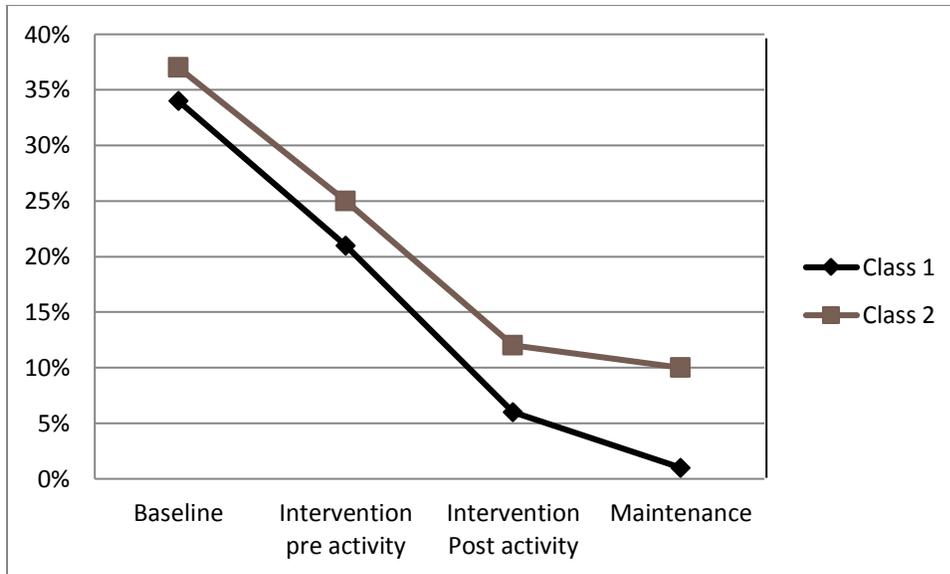


Figure 12. Classes 1 and 2 Mean Percentage of Time Off-task As presented in Figure 12, Classes 1 and 2 Mean Percentage of Time off-task, there was an overall and consistent decrease in off-task behavior beginning during baseline through maintenance for Class 1 and Class 2. This corresponded with an increase in active engagement particularly during the Kid Writing journaling activities following the horticultural activities.

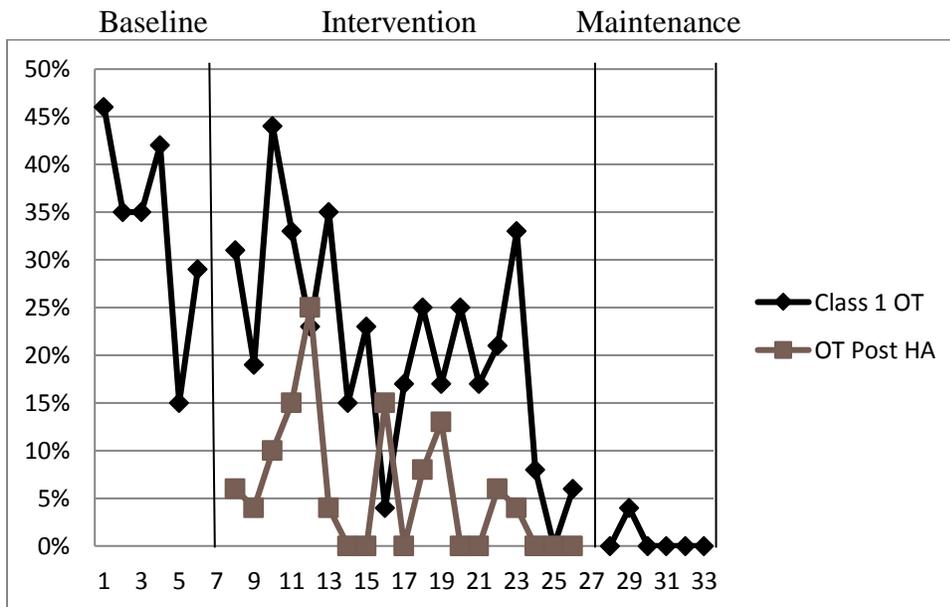


Figure 13. Class 1: Percentage of Off-task Behavior Across Phases

Class 1 began with students being off-task at a mean rate of approximately 34% during the baseline phase of the study. (Figure 13) The percentage of time off-task ranged from a high of 46% to a low of 15% during this phase. During phase 2, the percentage of time off-task during the pre-horticultural activities ranged from a low of 0% to a high of 44%, and a low of 0% to 25% during the post-horticulture activities. It is noteworthy the mean percentage of off-task behavior decreased from 21% to 7% during the intervention phase. There continued a decrease in off-task behavior during the maintenance phase from a high of 3% to a low of 0%. The overall mean of off-task behavior decreased from 34% to nearly 2%.

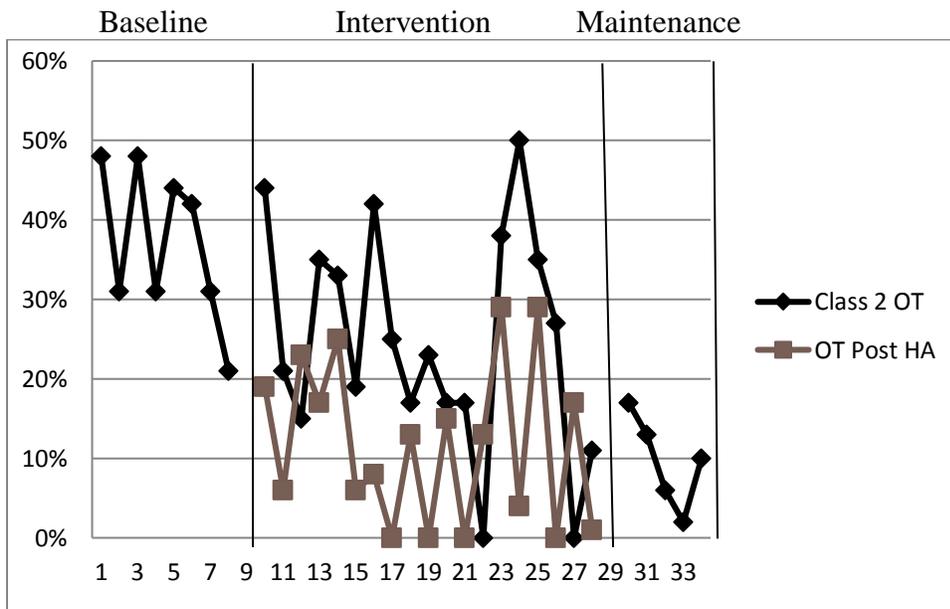


Figure 14. Class 2: Percentage of Off-task Behavior Across Phases

Class 2 began with students being off-task at a mean rate of approximately 36% during the baseline phase of the study. (Figure 14) The percentage of time off-task ranged from a high of 48% to a low of 21%. During phase 2, the percentage of time Off-task during the pre-horticultural activities ranged from a low of 0% to a high of 50%, and a low of 0% to 29% during

the post-horticulture activities. It is noteworthy that mean percentage of off-task behavior was decreased from 25% to 12% during the intervention phase. There continued to be a decrease in off-task behavior during the maintenance phase from a high of 17% to a low of 2%. Overall mean of off-task behavior decreased from 38% to nearly 10%.

Section 2: Positive and negative physical and verbal peer interactions

Positive peer interaction was defined as a friendly verbal (V+) and/or physical (P+) contact between peers. This might include a student asking a peer for help, playing together, working cooperatively on a project, asking a peer to join an activity, appropriate touch (a pat on the shoulder), or a compliment. Physically aggressive behavior (P-) was operationally defined as any physical contact to another individual that causes harm, including direct physical contact, or contact through an inanimate object or third party. This could include hitting, kicking, pushing, biting, and throwing. Verbally aggressive behavior (V-) was operationally defined as any verbalization directed at another that was meant to cause discomfort, disruption or harm. This could include name-calling, yelling, screaming, bullying, making fun of another individual, and swearing.

Positive and negative physical peer interaction data was collected across three phases and is presented in Figure 15, Positive Physical Peer Interaction Across Phases and Figure 16, Negative Physical Peer Interaction Across Phases . The incidents of positive physical peer interaction ranged from zero incidents to seven incidents in Classes 1 and 2. Incidents of negative physical peer interaction were consistently higher ranging from zero incidents to 11 incidents.

During phase 2 the intervention phase, the incidents of positive physical peer interactions during the pre-horticultural activities ranged from zero to six in Class 1 and zero to 11 in Class 2.

During the post-horticultural activities observations incidents of positive physical peer interactions ranged zero to 18 in Class 1 and zero to 22 in Class 2. Incidents of negative physical peer interaction during pre-horticultural activities in Class 1 ranged from zero to six and two to 17 in Class 2. Incidents during post-horticultural activity observations ranged zero to 8 in Class 1 and zero to 15 in Class 2 with the exception of one day where 22 negative physical incidents were recorded.

During phase 3 maintenance phase the incidents of positive physical peer interaction in general were higher than negative interactions in Classes 1 and 2. Positive interactions ranged from five to 27 in Class 1 and three to 23 in Class 2. Negative interactions ranged from zero to two in Class 1 and zero to five in Class 2.

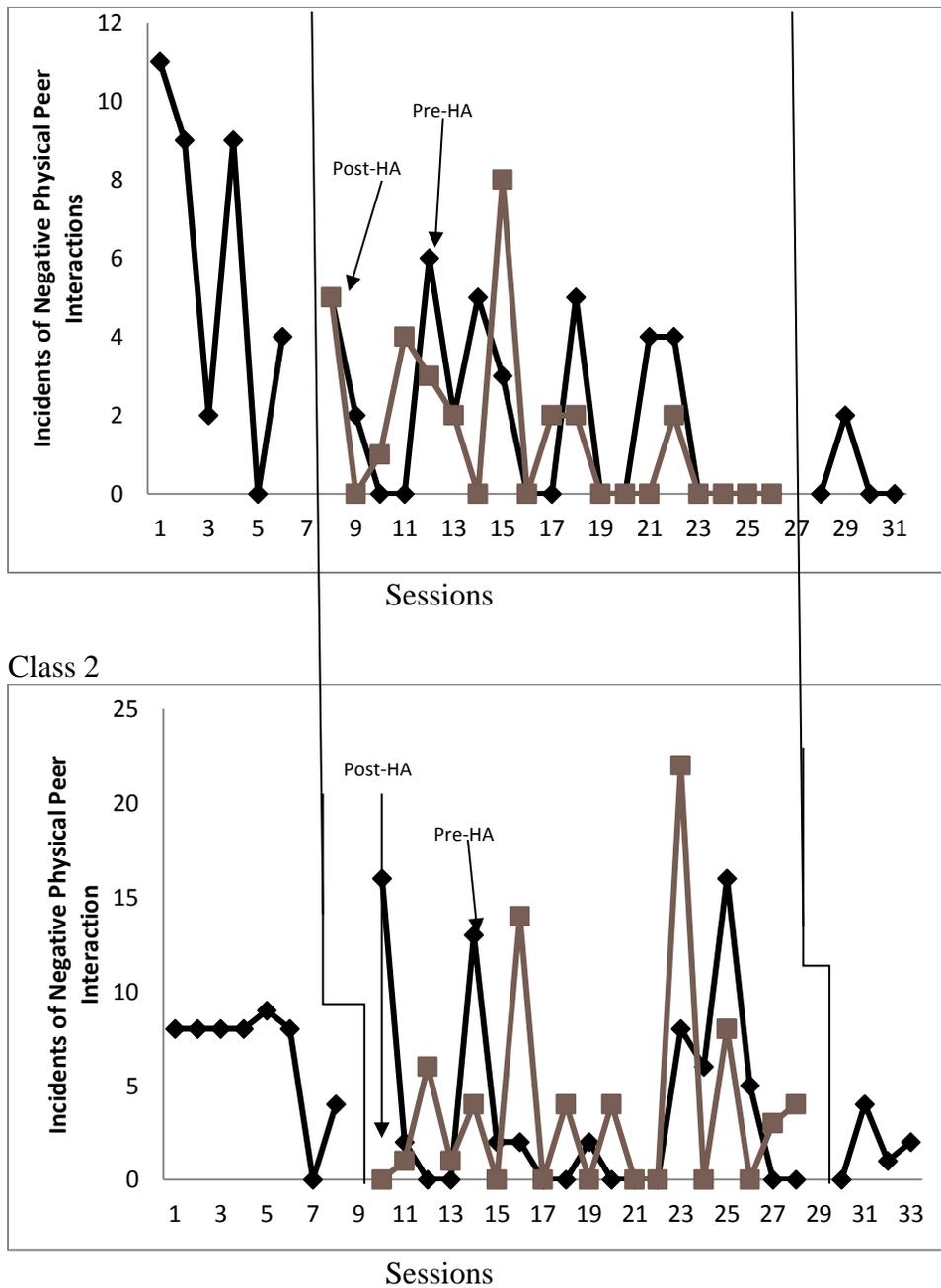


Figure 16. Negative Physical Peer Interaction Across Phases

Class 1 physical interaction data was analyzed considering the mean of physical interaction among peers incidents across the three phases of the study and is presented in Figure 17, Class 1: Mean Incidents of Physical Interaction. Negative physical interactions among peers

were highest during the baseline phase of the study. Negative physical interaction consistently decreased as the study progressed to the next phases. Positive physical interaction among peers increased in the intervention phase during the post-horticultural activity. This positive physical interaction increased dramatically during the maintenance phase.

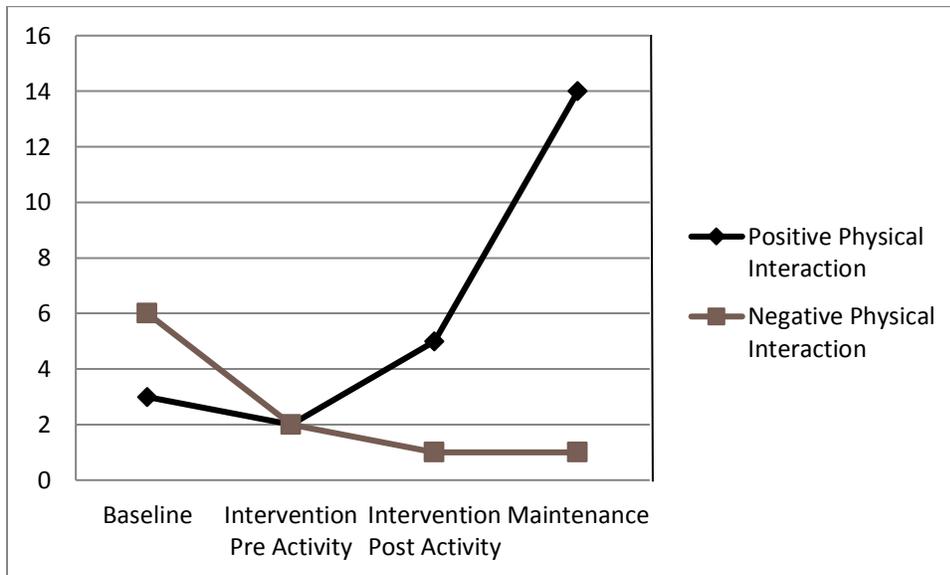


Figure 17. Class 1: Mean Incidents of Physical Interaction

Class 2: Physical interaction data was analyzed by considering the mean of physical interactions across the three phases of the study and is presented in Figure 18, Class 2: Mean Incidents of Physical Interaction. Negative physical interactions among peers were highest during the baseline phase of the study. Negative physical interaction consistently decreased as the study progressed to the next phases. Positive physical interaction among peers increased in the intervention phase during the post-horticultural activity. This positive physical interaction increased during the maintenance phase.

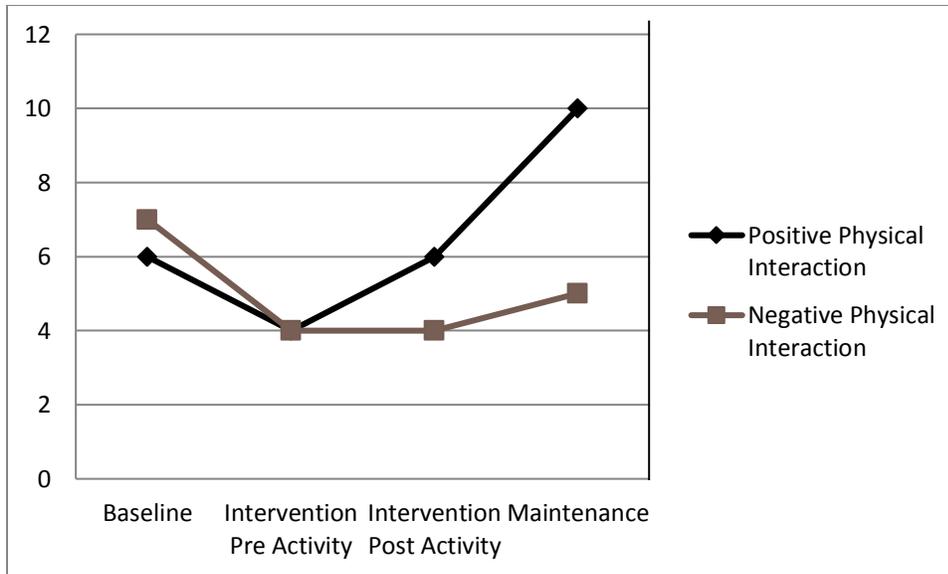


Figure 18. Class 2: Mean Incidents of Physical Interaction

Positive and negative verbal peer interaction data was collected across three phases and is presented in Figure 19, Positive Verbal Peer Interaction Across Phases by Session, and Figure 20, Negative incidents of Verbal Peer Interaction Across Phases. The incidents of positive verbal peer interaction ranged from four incidents to 24 incidents in Classes 1 and 2. Incidents of negative verbal peer interaction were consistently higher ranging from one incident to 17 incidents. During phase 2, the incidents of positive verbal peer interactions during the pre-horticultural activities ranged from two to 20 in Class 1 and zero to 28 in Class 2. During the post-horticultural activities observations incidents of positive verbal peer interactions ranged five to four in Class 1 and zero to 29 in Class 2. Incidents of negative verbal peer interaction during pre-horticultural activities in Class 1 ranged from zero to 13 and zero to 10 in Class 2. Incidents during post-horticultural activity observations ranged from zero to nine in Class 1 and zero to 16 in Class 2. During phase 3, the maintenance phase, the incidents of positive verbal peer interaction in general were higher than negative interactions in Classes 1 and 2. Positive

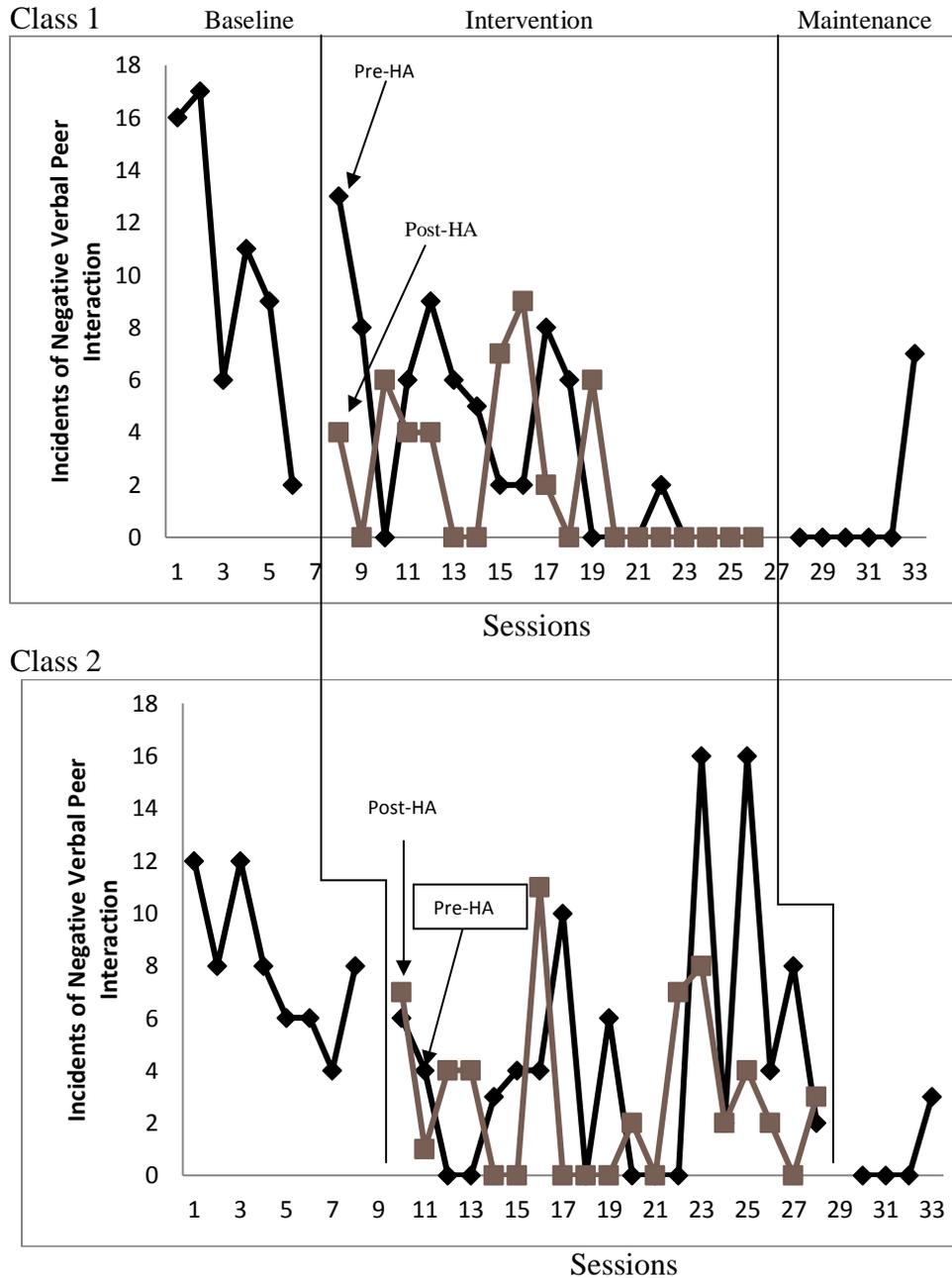


Figure 20. Incidents of Negative Verbal Peer Interaction Across Phases

Verbal interaction data was analyzed by considering the mean of incidents across the three phases of the study and is presented in Figure 21, Class 1: Mean Incidents of Verbal Interaction. Negative verbal interactions among peers were highest during the baseline phase of the study.

Negative verbal interaction consistently decreased throughout the intervention and maintenance phases. Positive verbal interaction among peers was consistently higher than negative verbal interaction. While positive verbal interaction decreased in the intervention phase during the pre-horticultural activity, it increased in the intervention phase during the post-horticultural activity. Positive verbal interaction was maintained during the final phase of the study, the maintenance phase.

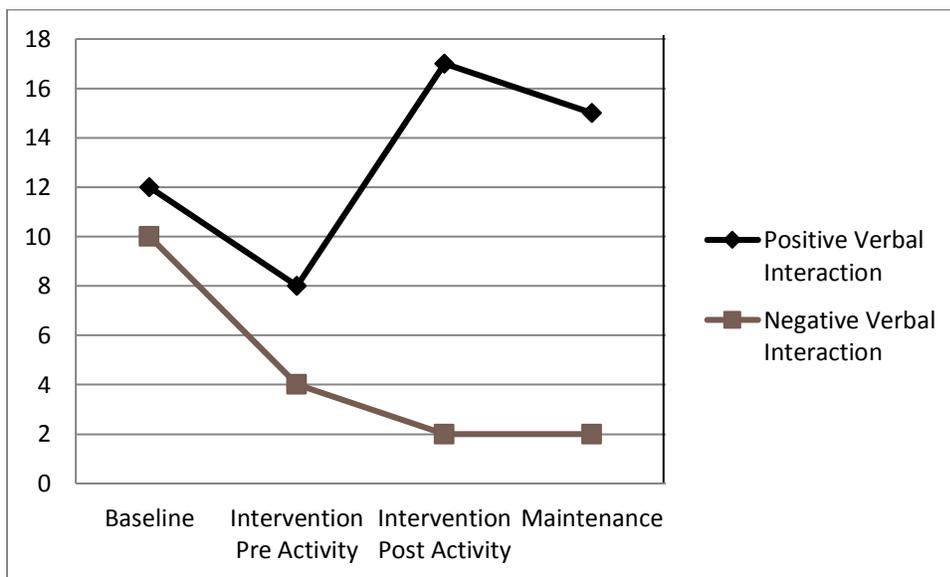


Figure 21. Class 1: Mean Incidents of Verbal Interaction

Verbal interaction data was also analyzed by considering the mean of incidents across the three phases of the study as seen in Figure 22, Class 2: Mean Incidents of Verbal Interaction. Negative verbal interactions among peers were highest during the baseline phase of the study. Negative verbal interaction consistently decreased as the study progressed to the next phases. Positive verbal interaction among peers was consistently higher than negative verbal interaction. While positive verbal interaction decreased in the intervention phase during the pre-horticultural

activity, it increased in the intervention phase during the post-horticultural activity. This positive verbal interaction was increased during the final phase of the study, the maintenance phase.

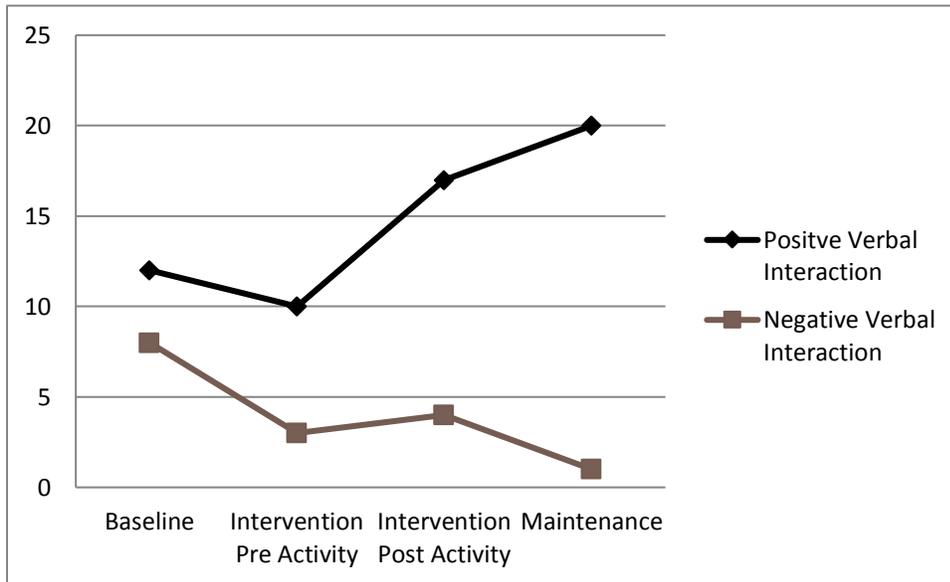


Figure 22. Class 2: Mean Incidents of Verbal Interaction

Section 3: Student and teacher survey data analysis

The Student Satisfaction Survey (Appendix F) was completed at the end of the intervention phase. The researcher read each question on the survey to the students individually, and the student colored in the face (happy, sad, okay/don't know) that indicated how they felt about each question. The students used special markers provided by the researcher. Each student was provided with one-on-one attention in order to complete the survey. The results are interesting with (n=20) students reporting,. Based on the data presented in Table 5, the Student Satisfaction Survey Classes 1 and 2, 90% of the students liked and 10% of the students thought that the activities were okay; 65% of the students felt the activities helped them to behave better;

and 85% of the students said they would like to do more activities at the facility and would like to do activities at home with their families. The researcher and the teachers saw these activities as having a positive influence with the students in the inclusive preschool setting. Table 5 presents the satisfaction data totals and Tables 6 and 7 present satisfaction data by class.

Table 5
Student Satisfaction Survey Classes 1 and 2

	YES	NO	IT WAS OK
I liked the plant activities	☺ 18/20=90%	☹ 0/20=0%	☺ 2/20=10%
I think that the plant activities helped me behave.	☺ 13/20=65%	☹ 0/20=0%	☺ 7/20=35%
I would like to do more plant activities.	☺ 17/20=85%	☹ 0/20=0%	☺ 3/20=15%
I would like to do plant activities at home with my family.	☺ 17/20=85%	☹ 0/20=0%	☺ 3/20=15%

Table 6
Student Satisfaction Survey Class 1

	YES	NO	IT WAS OK
I liked the plant activities.	☺ 10/11=91%	☹ 0/20=0%	☺ 1/11=9%
I think that the plant activities helped me behave.	☺ 8/11=73%	☹ 0/20=0%	☺ 3/11=27%
I would like to do more plant activities.	☺ 10/11=91%	☹ 0/20=0%	☺ 1/11=9%
I would like to do plant activities at home with my family.	☺ 10/11=91%	☹ 0/20=0%	☺ 1/11=9%

Table 7
Student Satisfaction Survey Class 2

	YES	NO	IT WAS OK
I liked the plant activities.	☺ 8/9=89%	☹ 0/20=0%	☺ 1/9=11%
I think that the plant activities helped me behave.	☺ 5/9=56%	☹ 0/20=0%	☺ 4/9=44%
I would like to do more plant activities.	☺ 7/9=78%	☹ 0/20=0%	☺ 2/9=22%
I would like to do plant activities at home with my family.	☺ 7/9=78%	☹ 0/20=0%	☺ 2/9=22%

Teacher survey questions: The researcher sought to uncover the teachers' and staffs' (n=5) perspectives of the social value of horticultural activities in the preschool classroom.

Table 8

Teacher/Administration Satisfaction Survey

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Horticultural activities were helpful to you as the teacher	3/5=60%	2/5=40%			
2. The activities were helpful for students who were previously displaying at risk behaviors		4/5=80%	1/5=20%		
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
3. The students benefited from these activities	4/5=80%	1/5=20%			
4. The horticultural activities added to the curriculum in a meaningful way	4/5=80%	1/5=20%			
5. The horticultural activities were easy to implement and maintain in the class	3/5=60%	2/5=40%			
6. I would recommend horticultural activities to other teachers	4/5=80%	1/5=20%			

The Teacher/Administration Satisfaction Survey and the teacher interviews had some interesting results. Overall, the teachers were satisfied with the horticultural activities presented in the classrooms.

There were no negative aspects of utilizing the horticultural activities in the preschool setting. There were five surveys completed by 2 teachers, 2 assistants and 1 administrator. In each category, more adults strongly agreed or agreed than not; 3 of 5 of the adults strongly

agreed that horticultural activities were helpful to them as teachers; and 2 of 5 agreed they were helpful.

The faculty and staff appeared to be less certain that these activities were helpful to students who displayed at-risk behavior. While 4 of 5 agreed they were helpful, 1 gave a neutral response. What is most interesting about this is that when the teachers were interviewed, there was an overall consensus that the horticultural activities had a beneficial impact in that the students who had previously presented at risk/challenging behaviors appeared to be calmer and more focused. They were able to stay seated and were more willing to participate and stay at centers. One of the most exciting observations the researcher made was that during the Post-horticultural KidWriting activities the students were not only happy to complete their journal entries, but there was an increase in positive verbal interactions during journaling. Students worked together and independently to complete the journals. Based on the researcher's field notes, the students were heard talking about the activities they had just completed, what they wanted to draw and write about and they assisted each other with using creative spelling. One student in particular encouraged her friends to use the letter sounds they had learned in morning meeting. Students for the most part were on the emerging level and used the beginning and ending sounds to represent the words they were attempting to spell. The teachers then took the opportunity to use adult writing to show the students the correct spelling of each word. Some of the students dictated words they wanted to use to describe the activity to the teacher and then they traced over the words repeating them to the teacher. The teachers also reported the students were sharing their thoughts, likes, dislikes and opinions about the activities during the writing process. While this was not necessarily reported by the students, it was discussed during the journal time.

All of the adults strongly agreed (4 of 5) or agreed (1 of 5), that the students benefited from the horticultural activities, that the activities added to the curriculum in a meaningful way, and that they would recommend the activities to other teachers; 3 of 5 strongly agreed that the activities were easy to implement and 2 of 5 agreed that the activities were easy to implement.

There were several unanticipated outcomes of this study. The first unexpected outcome was the parent engagement. The comments from parents were overwhelmingly positive. Parents often stopped the researcher to ask what activities student were going to participate in during the day. Several parents asked for lists of books used during the study and some asked for activities they could do at home. They were excited to see what their children had done and shared that their children were excited about the activities presented. Many of the parents expressed a hope that these activities would continue for the remainder of the school year. The second unexpected outcome involved the KidWriting process. Place in conclusions

Section 5: Qualitative changes in behaviors of the four observed students.

Changes in behavior of the four consistently observed students in classes 1 and 2 are anecdotally presented for each student individually based on observations throughout the study. Student 1-1 (class 1 student 1) was a five year old female who initially presented a high percentage of off task behavior and did not interact consistently with her peers. As the activities were introduced, student 1-1's engagement and incidents of peer interaction increased. She was able to maintain her level of engagement and peer interactions during the final phase of the study.

Student 1-2 was a four year old male who initially presented very little active or passive engagement. He did however, present high numbers of negative verbal peer interactions. As the activities were introduced, student 1-2 increased his passive engagement sitting in the circle for

morning meeting and positively interacting with his peers. He did however continue to prefer to work alone during the Kid Writing process.

Student 1-3 was a 3 ½ year old male who initially presented a higher percentage of time off task a high number of incidents of negative peer interaction. As the study progressed student 1-3 presented more time actively and passively engaged particularly during Kid Writing. He also presented more positive verbal interactions during this time. The interactions revolved around creative spelling and discussing the activity of the day.

Student 1-4 was a four-year-old female who eventually received a diagnosis of oppositional defiant disorder (ODD). Initially there was a high percentage of time actively engaged however there was also a high level of negative peer interactions. As the study proceeded this level of active engagement increased and positive peer interactions particularly during the morning meeting and during kid writing. Student 1-4 was an active participant in the discussions about the daily activities with her peers. She was able to maintain this positive peer interaction throughout the final phase of the study.

Student 2-1 was a four-year-old male who presented with the high percentage of off task behavior and a high number of incidents of negative peer interactions. Although student 2-1 increased his time passively engaged and increases positive peer interaction he was rarely actively engaged in preferred to work off to the side. He seemed to participate more during Kid Writing where he could spend time speaking with his peers. Student 2-1 positive rush to complete his writing assignments in order to move onto the next activity.

Student 2-2 was a four-year-old male who presented the most notable changes in behavior. He initially presented high numbers of negative peer interactions in off task behavior. As the activities were introduced student 2-2 became increasingly actively engaged

particularly during morning meeting where he volunteered to answer questions. He also became more engaged during kid writing. The incidents of positive peer interaction drastically increased during both of these activities and the trend continued through the final phase of the study.

Student 2-3 was a five-year-old male with the diagnosis of communication disorders. The student presented a high incidence of off task behavior and negative peer interactions. Student 2-3 often refused to comply with teacher requests particularly during morning meeting. He very often did not participate in this activity nor did he participate in Kid Writing. As the horticultural activities were introduced student 2-3 began to sit in the circle for morning meeting. He continued to struggle with kid writing however he did sit at the table and at least draw a picture of the daily activity.

Student 2-4 was a four-year-old male who presented off task behavior and little peer interaction. This student was not disruptive however there was little participation in the morning meeting or in other nonpreferred activities. As the horticultural activities were presented student 2-4 slowly became more involved and interactive more consistently with his peers this is particularly true during kid writing went on a number of occasions student 2-4 asked his friends for help spelling words.

Based on the observations the researcher recognized that there were behavioral changes that occurred in each of the consistently observed students in Class 1 and Class 2. Those changes appeared to be more notable during the Kid Writing activities where in the past students had rushed to complete their assignments in order to move onto a more preferred activity.

Kid Writing.

KidWriting , while part of the typical day, changed into a more social, cooperative time. As reported by the teachers and noted in the researcher's field notes, the students as a whole

class were involved in more conversations during this period than they had been before. The children often discussed what they were going to draw or write about, assisted each other with creative spelling or simple shared ideas. As reported by the teachers, even those students, who in the past had difficulty remaining at the writing center became more involved. These same students appeared to be more calm and relaxed when asked to draw/write in their KidWriting journal. Some of the students who in the past were less cooperative at the writing table came more willingly and participated without incident. The students began to incorporate more information from the activity and expressed their ideas and opinions more freely. Students were able to better describe what they had done in the activity as well as their personal likes and dislikes. In reviewing field notes and student journals, the following observations of changes in the four students in Class 1 and Class 2 can be thought of as follows: Students who in the past and refused to sit at the table and complete the written assignments were now participating in small groups where students worked together to creatively spelled words, comment on pictures, and discuss the daily activities. There was an increase in positive verbal peer interaction among all of the students in both classes. Of the eight consistently observed students Student 2-2 presented the most notable changes overall. Student 2-2 in particular presented critical changes in behavior and in his writing. He increased the number of words and details that he incorporated into his kid writing and into the illustrations as well as his positive peer interactions.

Summary

Based on the observation data and the researcher's field notes, the researcher discerned that Class 1 and Class 2 had much in common. Visual examination of Figures 3, 7 and 11, presented changes in the mean percentage of time actively engaged, passively engaged and off-task, across the three phases of this study. While this intervention appears to have been

effective, and the percentage of time actively engaged remained higher than during the baseline, the results were not consistently maintained to the same level throughout the maintenance phase. It appears that during times of high active engagement, incidents of positive physical and verbal peer interactions occurred. Likewise, when there was a high percentage of off-task behavior was presented, there was an increase in negative physical and verbal peer interactions.

Class 1 seemed to have more consistency across the phases. This could be the result of the Teacher 1's involvement. Teacher 1 was more interactive and hands-on. She participated more consistently in the activities. She provided consistent positive reinforcement during the activities and appeared to be more interested in them. Along with the researcher, Teacher 1 modeled the expectations and followed the rules presented at the beginning of each lesson. Teacher 2, while present during the activities, was not as involved. She supported the researcher; however, more often than not she did not reinforce students during the activities.

It appears that there is a relationship between active and passive engagement and positive physical and verbal peer interactions. The results of this study demonstrate that if students are provided hands-on activities that require further attention and responsibility, they will respond in a positive manner. The students who participated in this study were excited, engaged, and learned how to work together on cooperative projects. The students' level of positive verbal interaction increased during their journaling time while negative peer interaction decreased overall. The researcher believes there's so much more that can be done regarding the use of horticultural activities in preschool settings to encourage Positive Behavior Supports and positive family interactions.

The researcher discerned that the teachers were excited and inspired by the activities. While they all had different perspectives, the overarching beliefs were the same. They felt that

the activities were beneficial to the students in differing ways; socially, emotionally and academically. They felt that the activities could and should be incorporated into the daily routine. While the teachers enjoyed the activities, they felt that the study only provided them with a snapshot of a bigger picture. By using these activities throughout the school year and over the summer, a possible school-wide intervention could be provided for all students.

While students, teachers, and administration appeared to enjoy participating in the activities and believed that these activities positively influenced student behavior, the results of this study should be studied carefully. Overall, it appears the implementation of horticultural activities as an intervention to facilitate increased active engagement and positive physical and verbal peer interactions appears to have been somewhat successful, however, these behaviors were not maintained throughout the maintenance phase. Further research is definitely warranted.

Conclusions and Implications

Conclusions

In the following sections the researcher presents the conclusions of this study in relation to how the research answered the research questions. Each research question is addressed individually. The researcher also includes an addendum to the study as a opportunity afforded the researcher to follow 3 sections of a Science Methods class offered in an area institution of Higher Education.

Research question 1: How does the use of horticultural activities in an inclusive preschool setting influence students' active engagement, passive engagement, and off-task behavior?

Students in Class 1 and Class 2 presented an increase in active engagement during the post-horticultural activity observation of the intervention phase. However, the increase was

inconsistent and with few exceptions was not maintained throughout the maintenance phase. The levels of active engagement during the maintenance phase were, however, higher than passive engagement or off-task behavior.

The findings in regard to passive engagement for Class 1 and Class 2 were very inconsistent across all phases. Incidents of passive engagement were lower during periods of higher active engagement.

Off-task behavior was consistently higher than active or passive engagement during the baseline and pre-horticultural activity phases; however, the percentage of time off-task behavior decreased during the post-horticultural activities and maintenance phases. While the incidents were not consistent, the percentage of time off-task remained lower during the maintenance phase than any other time across phases.

Research question 2: How does the use of horticultural activities in the preschool setting influence students' physical and verbal peer interaction?

Class 1 and Class 2 presented inconsistent positive physical peer interactions across the phases. During the post-horticulture activity observations there was an increase; however, the increase was inconsistent and was not maintained throughout the maintenance phase. The researcher attributed this to the fact that the students were so involved in the post-horticultural activity that they did not have time to interact physically.

Verbal peer interactions were also inconsistent across the phases. There were a higher number of incidents of negative verbal peer interaction during the baseline phase and inconsistency during the intervention phase; however, there was a decrease in the number of negative verbal interactions in Class 1 and Class 2 during the maintenance phase. Positive verbal interaction increased and in general remained higher than negative interaction during the post-

horticultural activity and maintenance phases. The researcher attributed the increase of positive interactions to the discussions the students had while they were writing in their journals.

There appeared to be a relationship between active and passive engagement, and positive physical and verbal peer interaction for Class 1 and Class 2. This is evidenced by the data collection during the post-horticultural activity intervention and maintenance phases of the study. The data demonstrates that during times of high active engagement, incidence of positive physical and verbal peer interactions increased, likewise, when there was a high percentage of off-task behavior presented, there was an increase in negative physical and verbal peer interactions.

Research question 3: What are teachers' perceptions of the use of horticultural activities with preschool students in an inclusive setting?

Each pre- and post-horticultural activity interview question was analyzed independently. A summary of the results follows the post-horticultural activities interview analysis.

The use of plants and plant materials in rehabilitative settings slowly evolved from a less structured set of activities to a more structured form of therapy. Although horticulture therapy has been in existence for centuries and is currently used in hospitals, correctional facilities, youth detention centers, and schools, there has been little research demonstrating the success of such activities in preschool settings.

The researcher sought to determine whether using horticultural activities in an inclusive preschool setting would positively influence student behavior. To do this, the researcher examined the influences of horticultural activities with regard to active and passive engagement, off-task behavior and positive and negative physical and verbal peer interactions.

Research by Fox and Little (2001) and Benedict, Horner, and Squires (2007) shows that early childhood educators are now presented with students who demonstrate challenging behaviors and are at risk for severe behavior and emotional issues. These behaviors and issues not only affect the students' long-term academic outcomes and emotional well-being, but they can affect the immediate and long-range classroom and school environments. Positive Guidance and Positive Behavior Support are current proactive approaches to working with students, faculty, staff, and parents to create and maintain positive environments across settings and to encourage positive and productive students (Fox & Hemmeter, 2009). The presentation of horticultural activities was used to determine what influences they might have on active engagement, passive engagement and off-task behaviors, as well as positive and negative physical and verbal peer interaction .

Based on the history of horticulture therapy and the fact that these activities are often used with individuals who present challenging behaviors (Flagler, 1995; Jiler, 2007; Palumbo-McGuinn, 1999), it appears these types of activities could be beneficial for all students when presented in a non therapeutic manner. Research has shown that, when significant behavior issues are not addressed and treated, the resulting problems tend to be long lasting and perhaps life changing (Koertering & Braziel, 1999; U.S. Department of Health & Human Services, U.S. Department of Education, 2015).

Based on the success of early intervention programs in reducing challenging behaviors in young students, the researcher sought to use horticultural activities in conjunction with Pyramid Method/Positive Guidance/Positive Behavior Supports as a preventive strategy for two classrooms of preschool students.

The objectives of this study were to discover how the use of horticultural activities in an inclusive preschool setting might influence students' peer interactions and task engagement. Four teachers and twenty preschool students ages 3 to 5 participated in the study. The preschool facility was located on a suburban Philadelphia corporate campus. This preschool facility is one of a nationwide franchise that provides services for children of individuals working for large corporations. They provide extensive training for all faculty and staff.

There were three phases to this study: baseline, intervention, and maintenance. Students were observed throughout each of the three phases in regard to task engagement and peer interactions. Teacher-student interactions also were observed by the researcher.

Baseline.

The primary finding during the baseline phase was that there was a lot of inconsistency in student behavior regarding active and passive engagement, off-task behavior, and positive and negative physical and verbal interactions across classrooms. Baseline data was collected two times each week for three weeks in Class 1 and four weeks in Class 2. The baseline data demonstrated that there were inconsistencies in task engagement and peer interactions across classrooms. Some of this inconsistency might be attributed to the fact that baseline data was collected prior to the winter holiday break and there were atypical activities occurring throughout the school day.

Intervention.

The intervention phase of the study began with the implementation of horticultural activities in each of the classrooms. The three parts to the twice-weekly horticultural activities sessions included pre-horticultural activity observations, the actual horticulture activity and the post-horticultural observation.

During the pre-horticultural activity observation the percentage of time off-task was high; however, active and passive engagement increased in both Class 1 and Class 2 throughout this phase. There was a substitute teacher present during several sessions during this phase, and it appears that during those sessions there was inconsistency in behavior. This was a variable that was unanticipated by the researcher.

The positive and negative physical interactions were relatively consistent in both classes, however, by the end of the intervention phase there were fewer negative physical or verbal interactions observed. The increase in positive physical and verbal interaction and decrease of negative physical and verbal interaction appears to relate to an increase in active and passive engagement.

During the post-horticulture data collection, the percentage of time off-task was greatly reduced while active and passive engagement increased in both Class 1 and Class 2.

By the end of the intervention phase, there were very few incidences of negative physical or verbal interactions. This may be attributed to the high percentage of passive and active engagement. It appears that when there was a higher percentage of engagement there was an increase of positive physical and verbal interactions.

Maintenance.

During the maintenance phase, data collected during the morning meeting showed off-task behavior was almost totally extinguished. active engagement increased while passive engagement remained relatively consistent. There appeared to be a spike in verbal interaction during the maintenance phase. It could be suggested that the spike in positive verbal interactions during the last part of the intervention phase was due to common interest in the shared activity.

For Class 2 positive physical interaction was inconsistent, with higher numbers of incidents at the beginning and ending of the sessions.

There was a great decrease in the incidents of negative physical or verbal interactions among the students.

During this phase the teachers were very involved in continuing the study of horticulture. Literature materials were provided by the researcher. These materials provided the teachers with the information necessary to continue and maintain the classroom projects.

It appears there was a relationship in Class 1 and Class 2 between active and passive engagement and positive physical and verbal peer interaction. This is evidenced through the data collected during the maintenance phase of the study.

Overall, the implementation of horticultural activities in the inclusive preschool setting appeared to positively influence task engagement and peer interactions. This subject requires further study over a longer period of time for a clearer understanding of the influence horticultural activities have on young children.

Limitations

This study served to demonstrate that the use of horticultural activities with preschool students positively influenced their task engagement and peer interaction. The results of this study should be interpreted with caution due to a number of limitations.

The first limitation is the sample size for the current study, which is representative of only two classes in one geographic location. Therefore, it is not known whether these results are representative of other classes in other locales. There were no students with the official diagnosis of Emotional/Behavioral Disorders, nor were there a significant number of students diagnosed with Special Education needs.

The second limitation is the length of the study and the time of year in which it was conducted; a 16 week time frame beginning in December 2011 and ending in March 2012. Therefore, due to weather conditions many activities that are appropriate for outdoors could be not conducted. Indoor space for the planting projects which needed to be in sunny areas was limited. The researcher, participating faculty and administrative staff agreed that if the study was started at the beginning of the school year and continued through the year and if data was extrapolated for that period, the results would have been even more significant.

The third limitation to this study is that the horticultural activities, which were used as a strategy to encourage positive peer interaction and increase task engagement, were presented by the researcher. The students responded differently to the researcher than they did to their teacher. While no data was collected during the presentation, data was collected immediately prior to and immediately following each activity. Follow-up activities were conducted by the classroom teachers, however, no data was collected in regard to task engagement or peer interactions during those times. It is the ultimate goal to have the classroom teachers implement the strategy which needs to be effective and easily implemented. The strategy needs to have specific purpose and meaning in the classroom as well.

Implications of Study

Based on the information collected during teacher interviews at the completion of the intervention phase, the researcher discerned that the teachers enjoyed the activities as much as the children and that their expectations were met.

While these activities produced variable results, the overall outcome demonstrated success in increasing the percentage of time actively engaged in activities and positive peer interactions across classes. The first step to increasing the effectiveness of these activities is to

make it more a part of the daily classroom routine. Asking students and teachers about preferred activities could reinforce the importance and value of each activity.

Horticulture in many forms has been presented to individuals of all ages and socio-economic groups with great success. Studies have shown that horticulture can be used to teach math, art, history, literature, language arts and science (Predny, 1999). In addition, students develop a sense of responsibility, patience, confidence and empathy.

Since individuals do not simply absorb behaviors, these activities provide teachers with the opportunity to model desired behaviors for their students in a variety of situations (Grusec, 1992). The students in this preschool setting were introduced to activities that were adapted from Biddy Moore's book *Growing With Gardening: A Twelve Month Guide for Therapy, Recreation and Education* (1989) which has been used by healthcare professionals, activity directors, teachers, rehabilitative specialist and community volunteers. These techniques were easily adapted to meet the ability level and the needs of the preschool students which make the utilization of these activities available to anyone who wishes to participate across environments, socio-economic groups, disability, age and gender. These activities have been shown to calm the body and mind of individuals and create positive learning environments for those involved (Hewson, 1994). That being said, Positive Guidance and Positive Behavior Supports also provide the opportunity for all students to engage in desired behaviors and to create a positive learning environment. By modeling and reinforcing the desired behaviors in the classroom and by providing consistent expectations and consequences, students are developing the necessary tools for academic and social/emotional success.

Horticultural activities, Positive Guidance and Positive Behavior Supports appear to provide the prospect of creating non-invasive, positive learning opportunities for all involved.

Teachers are given the chance to model desired behaviors and present expectations in a calm and engaging manner that specifically meets the needs of the class and the individuals. Students are afforded opportunities to participate in activities that provide skills that will be used throughout their lives. Finally, classes and educational facilities can create aesthetically appealing environments, as well as behaviorally and academically successful students.

Surprising Outcomes

One of the outcomes that surprised the researcher was the increased parental engagement. The researcher often was at the facility when parents were dropping their children off for the day. Parents were comfortable approaching the researcher to ask what type of activity the children were going to do that day or to comment on the previous activity. Several parents requested the title and author of books that were used by the researcher as well as instructions for the follow-up activities. These items were provided through the teachers. A list suggested literature was placed in the student's cubby.

The students were also more involved in the Kid Writing process. In the past, students would rush to complete the Kid Writing assignment. As the study evolved, some students were able to write more than one word, more than one sentence and some of the more advanced students began to add detail to the writing.

Implications for Future Research and Practice

This dissertation supports the need for further research in the area of complementary therapies, specifically horticultural activities as a strategy to encourage positive peer interactions and increase task engagement. These activities used in conjunction with Positive Guidance and Positive Behavior Support principles have the potential to yield extraordinary results.

The first area for future researchers to critically examine is the use of horticultural activities throughout the school year as part of the classroom routine in the preschool setting, and how these activities influence student behavior, specifically regarding peer interaction. Teachers and/or administrators would monitor behaviors, particularly for those students who have a specific special education or medical diagnosis or present consistent challenging behavior as defined by the facility in their code of conduct. Data could be collected using a tool provided by the researcher and specifically designed to address the behavioral interests and needs of the educators and families. For the purposes of this dissertation, the researcher, who has a specific interest in horticultural activities and therapies, presented the activities to the students and teachers; however, future activities could be presented by the classroom teachers at the facility. While these are not critical research questions, they need to be thoroughly discussed with the researcher and the upper and middle management as well as the teachers at the childcare facility. Librarians, teachers, parents and community members could all make contributions to the success of a horticultural program in the inclusive pre-school setting. Librarians could provide the children's literature to parents, and teachers to introduce and follow-up these activities. Art and music teachers could support these activities through their own lessons and activities. Perhaps Master Gardeners could participate in activities at the pre-school facilities in support of the teachers. Questions that should be considered for future activities would be: Who would be the individual presenting the activities? Would this individual need to be an employee of the childcare facility? Would or could the teachers be willing to consistently present the horticultural activities? More importantly, would they be willing to participate in the necessary training? One possible solution to this question would be to join forces with a college or university's Extension Program and work with their Master Gardening candidates and certificate

holders. This could turn into a symbiotic relationship as Master Gardeners are required to participate in community service hours annually to maintain the Master Gardener status. By working with children in schools in community gardens, they could fulfill their required community service hours. Additionally, the Master Gardeners could train preschool staff in basic horticultural activities, and the staff could replicate those horticultural activities in future classes.

Additional research is needed to investigate the actual effectiveness of using horticultural activities and Positive Guidance principles as a strategy to influence positive peer interaction and task engagement and to develop effective models that can be implemented by teachers and classroom staff in the inclusive classroom setting. Prior knowledge and experiences will dictate how, when, and to whom these activities are presented and possibly who presents the activity. It would be important to study facilities that currently employ the Positive Guidance/ Positive Behavior Supports as well as those that do not have these frameworks in place. There could be significant differences in site that do not have the Pyramid Model (formerly Positive Guidance)/Positive Behavior Support training.

As a final reflection, it is interesting to note that most of the studies previously conducted in the area of Horticulture Therapy have been of a more qualitative nature. This might be explained by the incredible “human/emotional” element that is difficult to measure empirically. These types of activities provide individuals with a “feel good” opportunity that cannot be measured on a scale; however, I believe that working in conjunction with horticulture therapists, researchers can develop a more effective data collection tool. Future researchers will be able to more accurately evaluate the benefits and influences of horticulture for all individuals.

References

- Ackley, D., & Cole, L. (1987). The effects of a horticulture therapy program on children with cerebral palsy. *Journal of Rehabilitation, 53*(4), 70-73.
- Adil, J. R. (1994). *Accessible gardening for people with physical disabilities*. Bethesda, MD: Woodbine House.
- AHTA. (1999). Definitions and Positions. Retrieved from <http://www.ahta.org>.
- Alexander, J., North, M., & Hendren, H. K. (1995). Master gardeners classroom garden project: An evaluation of the benefits to children. *Children's Environment, 12*(2), 256-263.
- Bandura, A. (1973). Social learning theory of aggression. In J. F. Knutson (Ed.), *The control of aggression*. (pp. 201-252). New Brunswick, NJ: Aldine Transaction.
- Bandura, A. (1974, December). Behavior theory and the models of man. *American Psychologist, 856-869*.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology, 52*, 1-26.
- Bandura, A., Ross, D., & Ross, S. A. (1961). Transmission of aggression through imitation of aggressive models. *Journal of Abnormal and Social Psychology, 63*, 575-582.
- Barakat, I. S., & Clark, J. A. (2007) Positive discipline and child guidance. Retrieved from <http://extension.missouri.edu/publications.GH6119>.
- Barnett, D. W., Elliott, N., Wolsing, L., Bunger, C. E., Haski, H., McKissick, C., & Vander Meer, C. D., (2006). Response to intervention for young children with extremely challenging behaviors: What it might look like. *School Psychology Review, 35*(4), 568-582.
- Barnett, W. S., & Hustedt, J. T. (2005). Head Start's lasting benefits. *Infants and Young Children, 18*(1), 16-24.
- Barnicle, T., & Stoelzle Midden, K. (2003). The effects of a horticulture activity program on the psychological well-being of older people in a long-term care facility. *HortTechnology, 13*(1), 81-85.

- Benedict, E. A., Horner, R. H., & Squires, J. K. (2007). Assessment and implementation of positive behavior supports in preschools. *Topics in Early Childhood Special Education*, 27(3), 174-192.
- Block, A. W., & Block, S. R. (2002). Strengthening social work approaches through advancing knowledge of early childhood intervention. *Child and Adolescent Social Work Journal*, 19(3), 191-208.
- Boso, M., Emanuele, E., Minazzi, V., Abbomonte, M., & Politi, P. (2007). Effect of long-term interactive music therapy on behavior profile and music skills in young adults with severe autism. *Journal of Alternative and Complementary Medicine*, 13, 709-712.
- Burke, R. V., Kuhn, B. R., Peterson, J. L., Peterson, R. W., & Bandura-Brack, A. S. (2010). "Don't kick me out!: Day treatment for two preschool children with severe behavior problems. *Clinical Case Studies*, 9(1), 28-40.
- Campbell, H., Knox, T. W., & Byrnes, T. (1896). *Darkness and the daylight, or lights and shadows of New York life*. New York: Hartford Publishing.
- Caprara, G. V., Barbaranelli, C., Pastorelli, C., Bandura, A., & Zimbardo, P. G., (2000). Pro-social foundations of children's academic achievement. *Psychological Science: American Psychological Society*, 11(4), 302-306.
- Commission on Mental Health. (2003). <http://www.nami.org>
- Conroy, M. A., Dunlap, G., Clarke, S., & Alter, P. J., (2005). A descriptive analysis of positive behavioral intervention research with young children with challenging behavior. *Topics in Early Childhood Special Education*, 25(3), 157-166.
- Creswell, J. W., & Plano Clark, V. L. (2008). *Designing and conducting mixed methods research*. Thousand Oaks: Sage Publishing.
- Davis, S. (1994, April). Ninth annual congressional initiatives awards ceremonies. In Senate Russell Office Building. Symposium conducted at the Congressional initiatives awards, Washington D.C.
- Davis, S. (1998). Development of the profession of horticulture therapy. In S. P. Simson, Ph.D. & M. C. Straus, HTM (Eds.), *Horticulture as Therapy: Principles and Practice* (pp. 3-20). New York: Hawthorne Press.
- DeMarco, L. (1997). The factors affecting elementary school teachers' integration of school gardening into the curriculum (Doctoral dissertation, Virginia Polytechnic Institute and State University, 1997).
- DeMarco, L., Relf, D., & McDaniel, A. (1999). Integrating gardening into the elementary school curriculum. *HortTechnology*, 9(2), 276-281.

- DeMarco, L., Relf, D., & McDaniel, A. (n.d.). Master gardener valued by teachers in school gardening programs. *Journal of Extension* 36(5). Retrieved from <http://www.joe-ed@joe.org>
- Dillon, S. (2010). Top test scores from Shanghai stun educators. Retrieved from [http://www.nytimes.com/2010/12/07/education/07.html?sq=2009international study reading math and science scores&sl=nyt&scp=1&pagewanted=print](http://www.nytimes.com/2010/12/07/education/07.html?sq=2009international%20study%20reading%20math%20and%20science%20scores&sl=nyt&scp=1&pagewanted=print)
- Dufrene, B. A., Doggett, R. A., Henington, C., & Watson, T. S. (2007). Functional assessment and intervention for disruptive classroom behaviors in preschool and head start classrooms. *Journal of Behavior Education* 16, 368-388.
- Dunlap, G., Strain, P. S., Fox, L., Carta, J. J., Convoy, C., Smith, B. J., & Kern, L. (2006). Prevention and intervention with young children's challenging behavior: Perspectives regarding current knowledge. *Behavioral Disorders*, 32(1), 29-45.
- Eames-Sheavly, M. (1998, Winter). Education in blossom: The social garden community partnership. *Taproot*, 3-8.
- Ebel, S. (1991). Designing stage-specific horticulture therapy interventions for patients with Alzheimer's disease. *Journal of Therapeutic Horticulture*, 5, 1-4.
- Education.com. (2012, June). Reggio Emilia Philosophy. Retrieved from http://www.education.com/reference/article/Ref_Reggio_Emilial/.
- Fabor-Taylor, A., Wiley, A., Kuo, F., & Sullivan, W. C. (1998). Growing up in the inner city: Green spaces to grow. *Environment and Behavior*, 30(1), 3-273-27.
- Fabor-Taylor, A., Wiley, A., Kuo, F., & Sullivan, W. C. (2001). Coping with ADD: The surprising connection to green play settings. *Environment and Behavior*, 30(1), 54-77.
- Finch, C. R. (1995). Green Brigade: Horticulture learn and earn program for juvenile offenders. *HortTechnology*, 5(2), 118-120.
- Flagler, J. (1993). *Rutgers cooperative research and extension fact sheet horticulture therapy*. [Brochure]. Rutgers' Cook College: Rutgers-Cook College Resource Center.
- Flagler, J. (1995). The role of horticulture in training correctional youth. *HortTechnology*, 5(2), 185-187.
- Flahive-Dinardo, M. (n.d.). Horticulture therapy: Bringing new growth to people with disabilities. *Journal of Extension*. Retrieved from <http://www.joe.org/2007april/iw6p.shtml>

- Fox, L., Dunlap, G., & Powell, D. (2002). Young children with challenging behavior: Issues and considerations for behavior support. *Journal of Positive Behavior Interventions* 4(4), 208-217.
- Fox, L. & Hemmeter, M. L. (2009). A program-wide model for supporting emotional development and addressing challenging behavior in early childhood settings. In Sailor, W., Dunlap, G., Sugai, G., & Horner, R. (Eds.), *Handbook for positive behavior support* (pp. 177-202). New York: Springer.
- Fox, L. & Little, N. (2001). Starting early: Developing school-wide behavior support in a community preschool. *Journal of Positive Behavior Interventions*, 3, 251-254.
- Fried, G. G., & Wichrowski, M. J. (2008). Horticulture therapy: A psychosocial treatment option at the Stephen D. Hassenfid Children's Center for Cancer and Blood Disorders. *Primary Psychiatry*, 15(7), 73-77.
- Galen, B. R., & Underwood, M. K. (1997). A developmental investigation of social aggression among children. *Developmental Psychology*, 33(4), 589-600.
- Gilliam, W.S. (2005). *Pre-kindergarteners left behind: Expulsion rates in state pre-kindergarten systems*. New Haven, CT: Yale University Child Study Center.
- Gottlieb, R. (2001). *Environmentalism unbound: Exploring the new pathways for change*. Cambridge, MA: M.I.T. Press.
- Griffiths, A. E., & Griffiths, L. W. (1976). Healing through horticulture. *Leisurability*, 3(1), 29-35.
- Grusec, J. E. (1992). Social learning theory and developmental psychology: The legacies of Robert Sears and Albert Bandura. *Developmental Psychology*, 28(5), 776-786.
- Guardino, C. A. & Fullerton, E. (2010). Changing behaviors by changing the classroom environment. *Teaching Exceptional Children*, 42(6), 8-13.
- Hall, R. V., Cristler, C., Cranston, S. S., & Tucker, B. (1970). Teachers and parents as researchers using multiple baseline designs. *Journal of Applied Behavior Analysis*, 3, 247-255.
- Hebert, B. (2003). *Design guidelines of a therapeutic garden for autistic children*. (Unpublished doctoral dissertation). Loyola University, Baltimore, MD.
- Heffernan, M. (1997). *Horticulture rediscovered: The flowering of American schoolyards. Learning through landscapes*. [Brochure]. Cleveland, OH: Cleveland Botanical Gardens.
- Hefley, P. D. (1973). Horticulture: A therapeutic tool. *Journal of Rehabilitation*, 39 (1), 27-29.

- Hemmeter, M. L., Fox, L., & Broyles, L. (2007). A program-wide model of positive behavior support in early childhood settings. *Journal of Early Intervention, 29*(4), 337-355.
- Hemmeter, M. L., Ostrosky, M. M., & Corso, R. M. (2012). Preventing and addressing challenging behavior: Common questions and practical strategies. *Young Exceptional Children, 15*(2), 32-46.
- Hester, P. P., Baltodano, H. M., Gable, R. A., Tonelson, M. A., & Hendrickson, J. M. (2003). Early intervention with children at risk of emotional/behavioral disorders: A critical examination of research methodology and practices. *Education and Treatment of Children, 26*(4), 362-381.
- Hester, P. P., Baltodano, H. M., Hendrickson, J. M., Tonelson, S. W., Conroy, M. A., & Gable, R. A. (2004). Lessons learned from research on early intervention: What teachers can do to prevent children's behavior problems. *Preventing School Failure, 49*(1), 5-10.
- Hewson, M. L. (1994). *Horticulture as therapy: A practical guide to using horticulture as a therapeutic tool*. Ontario, CN: Mediaworks Design and Communications.
- Higlers, K. R., Haynes, C., & Olson, J. (2008). Assessing a garden based curriculum for elementary youth in Iowa: Parental perceptions of change. *HortTechnology, 18*(1), 18-23.
- Horner, R., & Sugai, G. (2006). A promising approach for expanding and sustaining school-wide positive behavior supports. *School Psychology Review, 35*(2), 245-259.
- Isom, M. D., (1998, November 30). The social learning theory. Retrieved from <http://www.criminology.fsu.edu/crimtheory/bandura.htm>
- Jarrot, S. E., Kwack, H. R., & Relf, D. (2002). An observational assessment of a dementia-specific horticulture therapy program. *HortTechnology, 12*(3), 403-410.
- Jiler, J. (2007). *Doing time in the garden: Life lessons through prison horticulture*. Oakland: New Village Press.
- Jolivet, K. & Nelson, C. M. (2010). Adapting positive behavioral interventions and for secure juvenile justice settings: Improving facility-wide behavior. *Behavior Disorders, 36*(1), 28-42.
- Kuo, F. E. (2001). Coping with poverty: Impacts of environment and attention in the inner city. *Environment and Behavior, 33*(1), 5-34.
- Kuo, F. E., & Sullivan, W. C. (2001). Aggression and violence in the inner city: Effects of environment via mental fatigue. *Environment and Behavior, 33*(4), 5.

- Leedy, A., Bates, P., & Safran, S. P. (2004). Bridging the research-to-practice gap: Improving hallway behavior using positive behavior supports. *Behavioral Disorders, 29*(2), 130-139.
- Levin, A. (n.d.). Psychiatrists sow seed of good mental health. *Psychiatric News*. Retrieved from <http://pnpsychiatry.org/cgi/full/42/16/14>
- Lewis, C., (1996). *Green Nature Human Nature*. Urbana and Chicago: University of Illinois Press.
- Lewis, C., (1976). Fourth Annual meeting of the national council for therapy and rehabilitation through horticulture. September 6, Philadelphia, PA.
- Lewis, T. J., Jones, S. E., Horner, R. H., & Sugai, G., (2010). School-wide positive behavior support and students with emotional/behavioral disorders: Implications for prevention, identification and intervention. *Exceptionality 18*(2), 82-93.
- Leyden, L. (2009, November 30). For forest kindergarteners, class is back to nature rain or shine. *New York Times*, A24.
- Lorenzo-Lasa, R., Ideishi, R. I., & Ideishi, S. K. (2007). Facilitating preschool learning through movement and dance. *Early Childhood Education Journal, 35*, 25-31.
- Mann, E. A., & Reynolds, A. J. (2006). Early intervention and juvenile delinquency prevention: Evidence from the Chicago longitudinal study. *Social Work Research, 30*(3), 153-167.
- Marion, M. (n.d.). Positive guidance and discipline strategies: Description and explanation. 1-7. Retrieved from <http://www.education.com/reference/article/positive-guidance-discipline>
- McClellan, S. (2010). Snow or shine, the forest in the classroom: A new kindergarten aims to counter nature deficit disorder. *Hill Country Observer, 3* and 26.
- McDonald, J. (1995). *A comparative study of the horticulture therapy professions in the United Kingdom and the United States of America* (unpublished doctoral dissertation), University of Reading, England.
- McFarland, L., Saunders, R., & Allen, S. (2009). Reflective practice and self-evaluation in learning positive guidance: Experiences of early childhood practicum students. *Early Childhood Education Journal 36*(6), 505-511.
- McGuinn, C., & Relf, P. (2001). A profile of juvenile offenders in vocational horticulture curriculum. *HortTechnology, 11*(3), 427-433.
- Merrell, K. W., & Walker, H. M. (2004). Deconstructing a definition: social maladjustment versus emotional disturbance and moving the EBD field forward. *Psychology in the Schools 41* (8), 899-910.

- Mertens, D. M. (1998). *Research methods in education and psychology: Integrating diversity with quantitative and qualitative approaches*. Thousand Oaks, CA: Sage Publications.
- Miller, D. L. (2007). The seeds of learning: Young children develop important skills through their gardening activities at a Midwestern early education program. *Applied Environmental Education & Communication*, 6(1), 49-66.
- Moore, B. (1989). *Growing with gardening: A twelve month guide for therapy, recreation, and education*. Chapel Hill: University of North Carolina Press.
- Morgan, B. (1989). *Growing together: Activities to use in your horticulture and horticulture therapy programs for children*. Pittsburgh, PA: Pittsburgh Child Guidance Foundation.
- Murphy, K. A., Theodore, L. A., Aloiso, D., Alric-Edwards, J. M., & Hughes, T. L. (2007). Interdependent group contingency and mystery motivators to reduce preschool disruptive behavior. *Psychology in Schools*, 44(1), 53-63.
- National Education Association Memorandum. (2016). NEA policy statement on discipline and the school to prison pipeline. From U.S. Department of Health & Human Services, U.S. Department of Education. (2015). Policy statement on expulsion and suspension policies in early childhood settings.
- National Council for Complementary and Alternative Medicine (NCCAM). (n.d.). What is CAM? Retrieved from [http://nccam.nih.gov/health/what is cam/D347.pfd](http://nccam.nih.gov/health/what%20is%20cam/D347.pfd)
- Odom, S. L., Hoyson, M., Jamieson, B., & Strain, P. S. (1985). Increasing handicapped preschoolers' peer social interactions: Cross-setting and component analysis. *Journal of Applied Behavioral Analysis*, 18, 3-16.
- Olszowsky, D. R. (1978). *Horticulture for the disabled and disadvantaged*. Springfield, IL: Charles C. Thomas.
- Oppenheimer, T. (1999). Schooling the imagination. *The Atlantic Monthly*, 284(3), 71-83.
- OSEP Center on Positive Behavioral Interventions and Supports. (2012). Positive behavioral interventions & supports-effective school-wide interventions. Retrieved from <http://www.pbis.org>.
- Ostrov, J. M., Massetti, G. M., Stauffacher, K., Godleski, S. A., Hart, K. C., Karch, K. M., Mullins, A. D., & Ries, E. E. (2009). An intervention for relational and physical aggression in early childhood: A preliminary study. *Early Childhood Quarterly Research*, 24(1), 15-28.
- Palumbo-McGuinn, C. (1999). *An assessment of a horticulture training curriculum at a school for juvenile offenders* (unpublished doctoral dissertation), Virginia Polytechnic Institute and State University. Blacksburg, VA.

- Parsons, R. (1991). The potential influences of environmental perception on human health. *Journal of Environmental Psychology, 11*, 1-23.
- Pennsylvania Department of Education. (2012). Pennsylvania Training and Technical Assistance Network. Retrieved from <http://www.pattan.net/>.
- Plankinton, H. S. (1973). *Horticulture as a work program for therapy* (unpublished Master's thesis), University of Delaware, Newark, DE.
- Pratt, R. R. (2007). Art, dance and music therapy. *Physical Medicine and Rehabilitation Clinics of North America, 15*, 827-841.
- Predny, M. L. (1999). Assessing an intergenerational horticulture therapy program for elderly adults and preschool students. (Unpublished master's thesis), Virginia Polytechnic Institute and State University, Blacksburg, Virginia.
- Relf, D. (1992). Human issues in horticulture. *HortTechnology, 5*(2), 9-171.
- Relf, D., & Dorn, S. (1995). Horticulture: Meeting the needs of special populations. *HortTechnology, 5*(2), 94-103.
- Robinson, C. W., & Zajicek, J. M. (2005). Growing minds: The effects of a one year school gardens program on six constructs of life skills of elementary school children. *HortTechnology, 15*(3), 453-457.
- Sandrock, M., & Andrews, C. (2016). Pyramid model: Implementation Glows & Grows from Georgia's Childcare Centers. Georgia's Association for Positive Behavior Support Conference 7.
- Scheuermann, B. K., & Hall, J. A. (2008). *Positive Behavior Supports for the Classroom*. Upper Saddle River, NJ: Pearson.
- Schroeder-Yu, G. (2008). Ideas and applications from the Reggio Emilia approach. *Teaching Artists Journal, 6*(2), 126-134.
- Sempik, J., Aldridge, J., & Beckers, S. (2003). *Horticulture as therapy: From Benjamin Rush to the present day*. United Kingdom: Centre for Child and Family Research, Department of Social Science, Loughborough University.
- Simson, S., & Straus, M. C. (Eds.). (1998). *Horticulture as therapy: Principles and practice*. New York: Hawthorne Press.
- Simonsen, B., Sugai, G., & Negron, M. (2008). School-wide positive behavior supports primary systems and practices. *TEACHING Exceptional Children 40*(6), 32-40.

- Smith, L. L., & C. E. Motsenbocker. (2005). Impact of hands-on science through school gardening in Louisiana public elementary schools. *HortTechnology* 15(3):439-443.
- Soderback, I., Soderstrom, M., & Schalander, E. (2004). Horticulture therapy: The healing garden' and gardening in rehabilitation measures at Danderyd Hospital Rehabilitation Clinic, Sweden. *Pediatric Rehabilitation*, 7, 245-260.
- Stegelin, D. A. (2003). Applications of the Reggio Emilia Approach to early childhood science curriculum. *Early Childhood Education Journal*, 30(3), 163-169.
- Stigsdotter, A. U., & Grahn, P. (2002). What makes a garden a healing garden? *Journal of Therapeutic Horticulture*, 13, 60-69.
- Strain, P. S., & Timm, M. A. (2001). Remediation and prevention of aggression: An evaluation of the regional intervention program over a quarter century. *Behavioral Disorders*, 26(4), 297-313.
- Straus, M. (1987). *Horticulture as therapy at Friends Hospital*. [Brochure]. Philadelphia, PA: Friends Hospital.
- Sugai, G. (n.d.). School-wide positive behavior support and response to intervention. Retrieved from: <http://www.rtinetwork.org/learn/behavior/schoolwidebehavior>
- Tawney, J. W. & Gast, D. L. (1984). *Single Subject Research in Special Education*. Columbus, OH: Merrill.
- Tereshkovich, G. (1975). *Horticulture therapy: A review*, National Council for Therapy and Rehabilitation through Horticulture lecture and publication series. February 1 (1): 1-4.
- Trout, A. L., Epstein, M. H., Nelson, R., Synhorst, L., & Hurley, K. D. (2006). Profiles of children served in early intervention programs for behavioral disorders: Early literacy and behavioral characteristics. *Topics in early childhood special education*, 26(4), 206-218.
- Tyson, M. M. (1998). *The healing landscape: Therapeutic outdoor environments*. New York: McGraw-Hill.
- United States Department of Health and Human Services/United States Department of Education. (2015). Policy Statement on Expulsion and Suspension policies in Early Childhood Settings. <https://www2.ed.gov/policy/gen/guid/school-discipline/policy-statement-ece-expulsions-suspensions.pdf>
- University of New Hampshire (n.d.). *Sustainable horticulture*. Retrieved from <http://horticulture.unh.edu/sustainability.html>

- Waliczek, T. M., Bradley, J. C., & Zajicek, J. M. (2001). The effects of school gardens on children's interpersonal relationships and attitudes toward school. *HortTechnology*, 11(3), 466-468.
- Walker Brooks, K. (1997, October). Too much fun for therapy: Therapeutic recreation as an intervention tool with at risk youth. *National Prevention Dropout Center, A series of solutions and strategies*, 11, 1-8.
- Watson, D. P., & Burlingame, A. W. (1960). *Therapy through horticulture*. New York: Macmillan.
- Webster-Stratton, C. (1996). Early onset conduct problems: Does gender make a difference? *Journal of Consulting and Clinical Psychology*, 64 (3), 540-551.
- Wedel, A., & Murrey, G. J. (2006). Horticulture therapy in the treatment of brain injury. In Murrey, G. (Ed.), *Alternative therapies in the treatment of brain injury and neurobehavioral disorders: A practical guide* (pp. 7-28). New York: Hawthorne Press.
- Witt, S.D., & Kimple, K.P. (2008). How does your garden grow? Teaching preschool children about the environment. *Early Childhood Development and Care*, 178 (1), 41-48.

Appendix A

Student Behavior and Task Engagement Data Collection Form

Table A1: *Student Data Collection Form*

Observer: _____ Date/Time: _____

AE: Active Engagement P+ Positive Physical Interaction
 PE: Passive Engagement P-Negative Physical Interactions
 OT: Off-task V+ Positive Verbal Interaction
 ST: Student V-Negative Verbal Interaction
 Momentary time sampling/ 15 second intervals

ST	15 sec	30 sec	45 sec	1 min	ST	15 sec	30 sec	45 sec	2 min
Minute # 1					Minute #2				
1	AE P+ PE P- OT V+ V-	1	AE P+ PE P- OT V+ V-						
2	AE P+ PE P- OT V+ V-	2	AE P+ PE P- OT V+ V-						
3	AE P+ PE P- OT V+ V-	3	AE P+ PE P- OT V+ V-						
4	AE P+ PE P- OT V+ V-	4	AE P+ PE P- OT V+ V-						
5	AE P+ PE P- OT V+ V-	5	AE P+ PE P- OT V+ V-						
6	AE P+ PE P- OT V+ V-	6	AE P+ PE P- OT V+ V-						

Appendix B

Satisfaction Survey – Teacher Version

Table E1.

Teacher Satisfaction Survey

Teacher survey questions: I will be looking for the teachers' perspectives of the social value of horticultural activities in the preschool classroom.

Survey Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Horticultural activities were helpful to you as the teacher.					
2. The activities were helpful for students who were previously displaying at risk behaviors.					
3. The students benefited from these activities.					
4. The horticultural activities added to the curriculum in a meaning-ful way.					
5. The horticultural activities were easy to implement and maintain in the class.					
6. I would recommend horticultural activities to other teachers.					

Appendix C

Satisfaction Survey-Student version

Table F1.

Student Satisfaction Survey

	YES	NO	I DON'T KNOW
I liked the plant activities.			
I think that the plant activities helped me behave.			
I would like to do more plant activities.			
I would like to do plant activities at home with my family.			

Appendix E
Children's Literature

Julian's Gift by Dr. Teri Rouse

The Mountain that loved a Bird by Alice McLerran
Ill by Eric Carle
The Tiny Seed by Eric Carle
The Grouchy Ladybug by Eric Carle
How Flowers Grow by Emma Helbrough
How a Seed Grows by Helene Jordon
Max and Maggie in Spring by Janet Craig
Are You a Ladybug? by Judy Allen
Are You a Butterfly? by Judy Allen
The Trellis and the Seed by Jan Karon
Miss Lady Bird's Wildflowers by Kathi Appelt
From Caterpillar to Butterfly by Deborah Heiligman
It Started as a Seed by Dr. Alden Kelley
A Seed is a Promise by Claire Merrill
A Field of Sunflowers by Neil Johnson
The Empty Pot by Demi
Flower Garden by Eve Bunting
Ladybug at Orchard Avenue by Kathleen Weidner Zoefeld
Titch by Pat Hutchins
Will Spring Be Early? Or Will Spring be Late by Crocket Johnson
Anna in the Garden by Diane Hearn
The Pea Patch Jig by Thatcher Hurd
Sunflower House by Eve Bunting
A Weed is a Seed by Feida Wolff
From Seed to Plant by Gail Gibbons

Flowers, Fruits, Seeds by Jerome Wexler
Planting a Rainbow by Lois Ehlert
Waiting for Wings by Lois Ehlert
Feathers for Lunch by Lois Ehlert
A Seed is Sleepy by Diana Hutts Aston
The Giving Tree by Shel Silverstein
The Carrot Seed by Ruth Kraus
The Flower Alphabet Book by Jerry Pallota
The Victory Garden Vegetable Alphabet Book by Jerry Pallota
The Icky Bug Book Alphabet Book by Jerry Pallota
The Butterfly Counting Book by Jerry Pallota
The Popcorn Book by Tomie dePoala
Sunflower by Miela Ford
Jeepers the Little Frog by Marjorie Cooper
The Umbrella by Jan Brett
The Great Kapok Tree by Lynne Cherry
How Groundhog's Garden Grew by Lynne Cherry
Rabbits and Raindrops by Jim Arnosky
One Bean by Anne Rockwell
Jack's Garden by Henry Cole
Charlie the Caterpillar by Dom De Luis
The Beeman by Laurie Krebs