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Teaching Vocational Gardening Skills To An Adolescent With Severe Autism

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TEACHING VOCATIONAL GARDENING SKILLS TO AN ADOLESCENT WITH SEVERE AUTISM

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Abstract

This research project examines the efficacy of teaching specific vocational gardening skills that are tied directly to real world job skills for an adolescent with severe autism. This study sought to determine if visual activity schedules paired with prompting increases independent achievement of gardening skills identified as essential to successful performance at a garden center job site for an adolescent with severe autism. Current research shows that the majority of adults with autism spectrum disorder are either unemployed or underemployed (Gerhardt & Lainer, 2011); however, when individuals with ASD participated in supported employment their quality of life improved, reduced their autistic symptoms, and increased cognitive functioning (Taylor et al. 2012). This quantitative research design looked closely at one student working on three specific vocational gardening activities that were directly related to employable skills at a garden center. The activities were broken down into multiple steps through a visual activity schedule paired with prompting hierarchies. The results exhibited an increase in independence of gardening activities of a simulated garden center on school grounds, for an adolescent with severe ASD, thus suggesting the use of visual supports paired with prompting was highly effective in independent performance for all three gardening skills.

Table of Contents

CHAPTER 1: PROBLEM STATEMENT

Introduction

The current crisis of increased population of adults with autism spectrum disorder, and the imbalance of available resources and placements (Gerhardt & Lainer, 2011), points to the eminent need to train and support our young adults with specific vocational skills that lead directly to employment opportunities. Studies show that individuals with ASD participating in supported employment improved their quality of life, reduced their ASD symptoms, and increased cognitive functioning (Taylor et al. 2012). However, research reveals that the majority of adults with autism spectrum disorder are either unemployed or underemployed (Gerhardt & Lainer, 2011). Therefore it is imperative to get them prepared for the job market and target their skills early in their educational career.

There are some inherent challenges and potential barriers for this population of young adults with severe autism to acquire vocational skills. We have to take into consideration the challenging behaviors of these young adults with ASD, which often include limited verbal communication, restricted range of interests, high anxiety in response to sensory stimuli and impulsive behavior (Migliore, Butterworth and Zalewska, 2013). Training and finding employment for this group of young adults poses greater challenges for matching their skills with specific employment. These factors pose challenges to implement the "employment first" policies of the Vocational Rehabilitation Program of the U.S. Department of Education (Migliore et al. 2013). Young adults with severe autism face great obstacles as opposed to individuals with less significant disabilities who have better opportunities for employment. There are numerous studies for individuals with mild or moderate disabilities that are the beneficiaries of supported employment (Smith, Belcher, & Juhrs, 1995) but we need to extend those services for the severe population as well.

Although there are a variety of approaches to work-based learning, for this research project we will focus on the classroom-training component, which is a prerequisite to job site training of cooperative education. Focusing on specific vocational skills based on interests and/or abilities of individual students and identifying jobs to correlate with those skills are essential aspects for a successful outcome. Once the job skills or interests are identified, a visual activity schedule for the specified job is an effective method for teaching each skill. The purpose of this research project is to observe and reflect on the pragmatics of providing vocational gardening skills to an individual with severe ASD. Through this experience we can examine the efficacy of teaching vocational skills and implement some of the practices gained onto other students in the classroom.

Problem Statement

Providing vocational skills for teens and young adults with severe autism spectrum disorder is necessary and should be part of their educational curriculum. However, how the practice is implemented and made meaningful and valuable to our students is what needs to be addressed. Often, these adults with severe autism are left to spend their days in adult day programs that may not be as fulfilling or enriching as having a meaningful and productive work. Giving our students specific, applicable job skills gives them a sense of purpose and direction, and allows them to become contributing members of society. Many studies have shown that early intervention programs through ABA (Applied Behavior Analysis) practices for children with autism are comprehensive with diligent accountability criteria and have resulted in improved functionality and increased quality of life for these children (McEachin, Smith, & Lovaas, 1993). These rigorous programs and expectations should also hold true for adolescents and young adults on the severe end of the autism spectrum.

Although educators may have the best of intentions, one must look at each task and task analyze the purpose of that activity. The skills the students learn tend to stagnate and the skill is not built upon or scaffold into a meaningful process or product for the student, nor do they have any meaningful relationship to their work environment. Instead, meaningfulness can be found in a specific vocational skill such as gardening that can impart on functionality as well as recreational and leisure skills.

Within my current classroom of teens and young adults with severe ASD and some with a comorbid diagnosis of ID have limited access to vocational skills and jobs. Due to behavioral challenges associated with ASD, the students' rate of skill acquisition is slow and there is fear of how the students would perform in the community or job site. This became apparent when an interview with a garden center manager revealed his concerns in employing a student with severe autism. His experiences with previous employees with autism were not successful even with a support provider at their side. As a result, the manager was reluctant to hire an individual with severe disabilities.

The approach for this research project was to create a simulation of three specific job skills to be practiced within the classroom and the school garden provided the foundation for the current research project. School-to-work methodology and supported employment strategies will be practiced at the school site to task analyze the approach to better understand task demands. Taylor, Smith and Mailick (2013), have found that supported employment promotes positive behavioral development for adults with autism. This type of specific vocational training program has been successful for a study implemented on an adolescent with autism learning to complete a newspaper route independently (Robinson and Smith 2010). Though Robinson's research is instructive, a lack of in depth analysis of task demands for specific employment opportunities for

students with autism remains. According to Taylor et al. (2012) addressing individual student needs as well as targeting vocational training to their areas of strength, it results in more productive and positive outcome (Taylor et al. 2012). Therefore, additional research regarding employment skills for specific jobs for students with autism continues to be a necessary so that students with ASD can be gainfully employed.

Statement of Purpose

The purpose of this research project is to examine the efficacy of functional and practical vocational gardening skills to an adolescent with severe ASD, who will soon exit his school experience, which will enable him to enter adulthood with potentially employable skills. The specific job skills will be determined through the interview with the manager of a local garden center as well as the interests and abilities of the student. Acquiring these skills will hopefully provide greater opportunities for supported employment and increase the quality of life for him. The research will observe the student's acquisition of three garden center job skills through a variety of teaching strategies that include best practices such as prompting hierarchies of applied behavior analysis, reinforcements and visual activity schedules. The effect of visual activity schedules and prompting hierarchies of ABA practices will be closely observed. Research studies reviewed by Demchak (as cited by McKay, Weiss, Dickson & Ahearn, 2014), have found that most-to-least (MTL) fading of prompts were most efficient in rate of acquisition and with fewer errors, therefore MTL prompting will be used in this research project.

Once the efficacy of the intervention is demonstrated, similar applications could be applied to the other students in the classroom. Vocational jobs and activities through vocational training can be taught as part of transition goals in the students' Individual Education Program (IEP). Once these students age out of the school system and become adults, if they exhibit

proficiency in specific skills it may lead them to jobs or open doors for greater opportunities to actively participate in their communities and be contributing members to society. Since research has shown that individuals with autism, who are able to be in a supported work environment, have an increased quality of life (Garcia-Villamisar, Wehman, & Diaz Navarro, 2002), and advancement in cognitive abilities, it is imperative we provide these individuals with vocational skills for such opportunities.

Research Question

Based on my interests for this master thesis project, the research question for this project is:

> Will the use of a visual activity schedule paired with prompting increase independent achievement of gardening skills identified as essential to successful performance at a garden center job site for an adolescent with severe autism?

Theoretical Model

Social learning theorists Bandura and Vygotsky focus on the necessity of social modeling; clear structure and socio-cultural approach utilizing scaffolding to aid students with significant disabilities reach their potential for learning. In addition to these theoretical models that are fundamental in the design of instruction in my research, is the ecological model for career development for individuals with disabilities. Szymanski, Hershenson, Enright, and Ettinger (as cited in Szymanski & Hanley-Maxwell, 1996), presents an ecological model for career development intervention through the integration of current career development theories and a practical application guide for people with and without disabilities.

Bandura's social learning theory simply states that people learn by watching others (Bandura, 1977). This form of observational learning is broken down into four components. In the first of the four, the learner attends to a skill being taught through attentional processes.

There are a variety of factors for the attention, such as motivation for attending through reinforcements and/or a short duration of the skill to be performed. The second component involves retentional processes, which essential means to what effect did the individual recall what was observed (Bandura, 1977). The third component is the motor reduction process, which involves the individual's observation to be enhanced by motor memory from task repetition, such as training exact sequences over multiple days. Bandura's last component of observational learning is reinforcement and motivational processes (1977). When there are reinforcements, it becomes an incentive for the individual to perform the observed behavior, and therefore the behavior is more likely to occur.

Given Bandura's observational learning theory, instructional strategies used for individuals with ASD include modeling for learning when introducing a new skill, paired with a motivator such as verbal praise or a tangible reinforcer for the individual to maintain his motivation for attending. Robinson and Smith (2010) provide an example of how Bandura's observational learning theory was applicable in their study with an adolescent with ASD and ID. The student was able to maintain attention to the task of inserting flyers into newspapers because he was given a tangible reinforcer and the duration of the task was brief. The student was then able to retain what he had observed with the visual cues of newspapers and flyers in a teaching session. For the motor reduction process, the student was able to physically perform the task he had observed. Finally the fourth component of motivational process which can include external incentives, sensory, tangible, social, control, vicarious incentives, self-incentives (Miller, 2002, p.186), the student in Robinson and Smith's study was given a food reinforcer, which he was then motivated to perform the task (2010).

In Vygotsky's sociocultural approach to development asserts that children learn within a social context that includes the child, a person aiding the child and the activity, all of which are interrelated (Miller, 2002). The children's development is affected by their experiences and participation; therefore knowing an activity requires doing the activity (Miller, 2002). Vygotsky conceived the terminology *zone of proximal development,* which refers to the range between the child's current skill level and the highest level of potential development, given support from tools and/or adult guidance (Miller, 2002). For the child to achieve their highest potential, the instructor collaborates with the child through joint participation in an activity, prompting, modeling, scaffolding and controlling the child's attention, to name a few strategies. In addition to this, the child must be physically engaged in the activity as a shared understanding of the common goal (Miller, 2002).

Vygotsky's sociocultural theory has the learning individual be an active participant and not just an observer. Joint participation with an adult is essential in achieving success as the adult provides scaffolding of an activity for increased level of skill development for the learning individual. There are multiple teaching strategies including prompting levels and reinforcement of skill acquisition for motivation, which can increase the student's independence. Once at student's current level of ability is assessed for an activity, the supporting adult can scaffold the activity into smaller chunks and build upon it as the student displays any progress. This can be demonstrated by presenting the student a visual schedule of the activity, broken down into task analyzed steps so that the student can concretely see what is expected of him within the activity and what the final end result will be.

The ecological model by Szymanski et. al. (as cited in Szymanski & Hanley-Maxwell, 1996), stems from the theory that career development is a developmental process of diverse

individuals with disabilities and the environment in which they are brought up in. Therefore their career development is not determined by their disability in and of itself or the interventions needed. Instead, the combination of understanding the individual needs and the nature of the career development support the direct applicability of various theories. Szymanski et.al. (as cited in Szymanski & Hanley-Maxwell, 1996) believe that individual career intervention requires the combination of understanding the individual and the nature of career development.

There are some general principles of career development that have potential consequences for people with developmental disabilities. Career development is a developmental process in which work personality starts in the pre-school years and influenced by school experiences, play and chores and therefore a lifelong process in which jobs can be changed throughout individual's lifetime. Interests are learned and therefore disability during developmental years can limit learning experiences that may impede interest development. Career development is influenced by the individual's environment, such as family, education, and socioeconomic status, but also the individual's belief (e.g., self-efficacy, self-concept and cultural beliefs) affects career development. Additionally, societal beliefs affect career development, such as prejudices and society's thoughts on the employability of individuals with disabilities. Career development can be also be influenced by the environment, such as employment practices and physical environmental space which may be barriers for employment.

Taking all these principles into account, Szymanski and Hanely-Maxwell (1996) provide an ecological model for intervention. With the lifelong developmental process, the cognitive process is a crucial element to career development. Therefore it is essential that the individual with disabilities is an active participant to promote independence. In addition to promoting independence, the intervention should also be least intrusive, under maximum amount of control

as possible for the individual with disability and the intervention takes place in the most natural setting as possible.

Combining and implementing Bandura's theory on observational learning with Vygotsky's theory on children learning from direct experiences through active participation can support instructors when educating their students with special needs. All the salient features of both theorists can be pragmatic and applicable for individual students with varying disabilities. In addition to Bandura and Vygotsky are Szymanski, Hershenson, Enright, and Ettinger's (as cited in Szymanski & Hanley-Maxwell, 1996) ecological model that emphasizes the dynamic interaction of individuals and their environments allow career development theories into practice.

Researcher Background

I have been teaching and working with students and adults with severe autism spectrum disorder for over 17 years and recently have been working directly with adolescents in transition to postsecondary schooling and adulthood. Although it has crossed my mind in my earlier years of teaching, it has become more evident of frustration as I observe students of adolescent age ill-prepared nor given opportunities to work on vocational skills for potential supported employment. Often, fine motor tasks get mistaken for vocational skills and there is no direct correlation with a target skill. I have noticed in IEP goals that some teachers have tied fine motor skills as vocational skills without a clear purpose.

I teach at a Non-Public School for students with severe autism and neurological disabilities. In my classroom there are 9 students ranging in ages from 14 to 21. Their primary diagnosis is severe autism with other varying and multiple disabilities. All of the students have limited or no verbal communication abilities. Their communication skills range from using some form of a picture exchange communication system (PECS), Augmentative and Alternative

Communication devices (AAC), and/or use of simple sign language of no more than 5 signs. All of the students present behavioral challenges that can impede their daily learning at school. The behaviors can range from mild to severe within a school day or even by the hour. Given these characteristics of my students to be studied, one can be apprehensive about teaching employable job skills to students with severe autism.

However, individuals with autism tend to be routine learners and can benefit greatly when strategies for teaching include a well structured environment, visual activity schedules, reinforcement, direct teaching, fading of prompts and other best practice strategies (Darrow, 2009). With these strategies paired with an assessment of student interests and abilities, I feel that our students are teachable and have the right to effective and meaningful vocational education that can lead to potential supported employment. Through my research, I hope to highlight this need with my school and administrators to encourage other teachers to expand their comfort zone and actively teach our age appropriate students functional and practical vocational skills that may positively affect their quality of life into their adulthood.

Definition of Terms

- **Autism Spectrum Disorder (ASD)**-A developmental disorder marked by impaired communication, socialization, limited interests and restricted patterns of behavior (NICHY).
- **Developmental Disabilities**- A wide range of conditions that refers to a severe, chronic physical or mental disability before the age of 22, that results in substantial functional limitations in three or more areas of major life activity (Szymanski & Hanley-Maxwell, 1996).

- **Job Carving-** Finding specific areas within a job for a student to perform. A specific analysis of the job within the environment must first be conducted. Then specific tasks are "carved" out within already existing jobs. For example, wrapping silverware and wiping down tables at a restaurant can be the specific jobs carved from typical duties of a wait staff (Sitlington et al., 2010).
- **Job Coach-** A professional that provides direct instruction and support to the low-incidence individual at the workplace (Sitlington et al., 2010).
- **Prompting Hierarchies-** A systematic method to assist students learn and use new skills and a framework for educators to communicate the learning and level of independence the students are performing at.
- **Most-To-Least Prompting (MTL)-** Teaching new skills to students by beginning with a high level of support (prompting) and then systematically fading to lower levels of support or prompts as the students' masters the skill.
- **Supported Employment-** A specially designed program that involves working with individuals with low-incidence disabilities. It is a specific job where an individual is working in a competitive and integrated work environment with a support provider giving training and support to ensure success on the job (Sitlington et al., 2010).
- **Task Analysis-** Task analysis is the process of breaking a skill into smaller, more manageable steps in order to teach the skill. Other practices, such as reinforcement, video modeling, or time delay, should be used to facilitate learning of the smaller steps. As the smaller steps are mastered, the learner becomes more and more independent in his/her ability to perform the larger skill. (NPDC on ASD)

- **Vocational skills-** Hands-on activities that are specific to a job or trade. Instruction is given through hands-on training of the specific vocational skill (Sitlington et al., 2010).
- **Vocational Skills Assessment-** Assessing skill levels to determine what job or career path is most appropriate. The primary areas the skills assessment addresses are strengths of an individual, their interests and areas of need for support (Sitlington et al., 2010).
- **Zone of Proximal Development- "**The distance between a child's actual developmental level as determined by independent problem solving and the higher level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Miller, 2002).

CHAPTER 2: LITERATURE REVIEW

Introduction

Autism Spectrum Disorder is a developmental disorder that is defined by significant impairments in social functioning, communication, and behavioral challenges (Centers For Disease Control and Prevention, 2014). ASD is a life-long disorder, and given the challenges associated with it, can limit the quality of life in adulthood. Research has shown that individuals with autism who are able to be in a supported work environment, their socially appropriate behavior (Tailor, Smith & Mailick, 2014), quality of life, and cognitive abilities increase (Taylor et al., 2012). However, current research has shown that over-all transition outcomes for individuals with autism spectrum disorder reflect uneven attainment of transitionary skills, which has resulted in poor secondary and post-secondary education outcomes with very few individuals participating in employment as adults (Friedman, Warfield, & Parish, 2013).

Therefore it is imperative to implement practical vocational training early on as adolescents for individuals with autism and/or comorbid diagnosis of intellectual disability (ID), as more and more individuals with ASD are leaving the school system and entering adulthood. Using sound evidence based strategies such as applied behavior analysis (ABA) principles, prompting levels and visual supports have been proven effective in early intervention programs, and can also be applied to adolescents and adults with ASD, which can improve the functioning and quality of life for these individuals (Garcia-Villamisar, Wehman, & Navarro, 2002; Robinson & Smith, 2010). Supporting adolescents with severe ASD find meaning and value in vocational training tasks that translate to concrete and practical work skills can better prepare them for the fast approaching adult world. Their marketable skills may also open doors for greater opportunities in their lives and they can be contributing members of society.

The balance between student interests, abilities and the type of employable job skills available can be complicated and difficult to accomplish. The disappointments or complications can lead educators from relinquishing their attempts for potential employment for individuals with severe autism. To offset this trend, educators at the secondary level can bridge the on-site supported job training with classroom vocational skill activities that are replicated as closely as possible to the specific job skills described by potential employers, through interviews and discussion. This master thesis investigates how teaching specific gardening skills taken from a garden center job site, increases independence in gardening skills for an adolescent with severe autism, for potential future employment at a garden center. Additionally, the efficacy of using a visual activity schedule paired with prompts in the gardening activities for the same individual is observed.

This literature review examines studies reporting a significant rise in youth with autism transitioning into adulthood and the impact it has in services, quality of life and current issues related to this increase. Studies also explore benefits and positive outcomes of various vocational programs implemented with individuals with autism and trends in vocational rehabilitation. Some of the research studies involving evidence-based strategies such as supported employment, that had a positive impact will be reviewed, in addition to the ecological model of career development, that incorporates frameworks of major career development theories for intervention planning (Szymanski & Hanley-Maxwell, 1996). Additionally, this literature review examines the efficacy of visual supports and prompting as positive strategies to support vocational training and supported employment.

Current trends for individuals with ASD transitioning to adulthood

According to the CDC, the prevalence of people diagnosed with autism continues to rise with its current ratio at 1 in 68 children identified with Autism Spectrum Disorder across multiple areas of the United States (2014). The number of children diagnosed with ASD, have rapidly increased in the last 20 years and now they are entering adulthood (Gurney et al. 2003) with limited placements and very little opportunity for employment (Howlin et al. 2005). Studies have shown that with supported employment for adults with ASD, the employment rates increase which has been associated with improved quality of life and cognitive performance (Garcia, Wehman, & Navarro, 2002).

Despite knowing the positive impacts of employment for adults with ASD, families are left with fragmented systems of care once their youth with ASD transition out of their entitled children's service system from IDEA and into adulthood (Friedman, Warfield & Parish, 2013). Friedman et al. suspect that current models of school-based transition planning are inadequate given the poor outcome in vocational training and employment for adults with ASD (2013). Additionally, there is a shortage of appropriate opportunities for independence, and concurrently a dire long wait list for adult services (Howlin et al. 2005, Gerhardt & Lainer, 2011).

Taylor and Seltzer (2010) examined the changes in autism behavioral phenotype in individuals with ASD, before and after they exit the school system and entered adulthood. Results showed that on average, autism symptomology that included repetitive behaviors, stereotyped interests, impairments in social reciprocity and impairments in verbal communication all improved prior to exiting high school, including a reduction in maladaptive behaviors (behaviors that include aggression, self injury and non-compliance). However, once these individuals exited high school, the improvements in the symptoms significantly slowed

down. According to the study, the "turning point" of transitioning out of high school has a disruptive effect in behavioral phenotype in individuals with ASD, with the significant slowing of improvements in most areas of symptomology and cognitive development.

Taylor and Seltzer (2010) believe the slowing down of improvements are reflective of less stimulating adult occupational and day activities as compared to what was experienced in high school. They found 74% of young adults with ASD and comorbid ID were receiving adult day services, and 25% of young adults with ASD and without ID did not have occupational, educational, or day activities. These findings have significant implications for the need of stimulating job opportunities and effective adult services for youth with ASD. Unfortunately, according to Gerhardt and Lainer (2011), the vast major of adults with ASD, 90% are either unemployed or underemployed, and many without appropriate services. This information can be further examined by the following study.

Billstedt, Gillberg, and Gillberg (2005), did a follow-up study of 120 individuals with autism from childhood to adulthood. They found that 57% of the individuals had *very poor outcome*, unable to have any kind of independent existence, and without any verbal or non-verbal communication, 21% had *poor outcome* that included no independent social progress with some verbal or non-verbal communication, 13% had *restricted but acceptable outcome*, meaning they had characteristics of poor outcome but were accepted by peers, 8% had *fair outcome* being employed or living independently with two or more friends, and none had *good outcome,* that indicated being employed and living independently.

Migliore et al. (2014) investigates the trend in youth with autism and the types of services associated with vocational rehabilitation (VR) and the employment outcome from the services accessed, compared with youth with other disabilities. In order to achieve economic self-

sufficiency, employment programs have been emphasized across many states, and many have adopted “employment first” policies that receive funding priorities. Combining the employment first policies with the population increase in youth with autism translates to a substantial increase of employment services needed by transitional youth with autism.

The results showed the number of youth with autism exiting the VR program doubled in recent years but remained relatively small compared with other disability groups. Only about half the youth who received VR services exited the VR program with integrated employment and the number who received VR services declined slightly over time. Consequently, receiving VR services is an indication of progress toward employment (Migliore et al., 2014). Understanding the current trends in the ASD population in regards to employment, it is essential to further investigate the benefits associated with vocational training and supported employment.

Benefits of Vocational Training and Supported Employment

The likelihood of youth with autism achieving employment increased when they received job-specific training, supports and preparation (Lugas, Timmons, & Smith, 2010). This demonstrates the imperativeness to examine the benefits of vocational training and supported employment to better prepare these adolescents for adulthood. Studies have reported that vocational training and supported employment are associated with positive behavior improvement, reduction of anxiety and feelings of depression, cognitive functioning and improvements in quality of life (Talyor et al., 2012).

The improved behavior characteristics in individuals with ASD, such as autism symptoms and maladaptive behaviors are the consequences of the achievement in vocational activities during their school years (Taylor, Smith, & Mailick, 2013). However, the improvement slowed down after high school when youth with ASD were not engaged in vocational or

educational activities. Shattuck et al. (2012), found that in the first 2 years of exiting high school, youth with ASD did not participate in any educational or paid employment activities. Taylor et al. (2013) found clear evidence that adults with ASD reduced their autism symptoms and maladaptive behaviors when their placement engaged in more independent vocational activities.

Another benefit of vocational activities and skills training for individuals with ASD is the significant reduction of anxiety and feelings of depression as examined by Hillier, Fish, Siegel, and Beversdorf (2011). Individuals with ASD often experience high levels of anxiety and stress so Hillier et al. addressed this with an intervention program (2011). The intervention consisted of 49 young adults with ASD participating in a vocational skills program. The intervention resulted with effect sizes indicating small changes however it still demonstrated the positive effects of vocational activities reducing anxiety and feelings of depression.

Through supported employment, individuals are more likely to get a job, attain higher salaries, have access to diverse jobs and job retention and stability are generally increased (Nicholas et al., 2015). When these individuals held their jobs for a sustained amount of time, they increased their self-esteem and had better symptomatic control (Bond et al., 2001). Nicholas, Attridge, Zwaigenbaum and Clarke (2015) define supported employment as some degree of formal training for employment preparedness, job matching according to individual's abilities, and ongoing support in the workplace. Supported employment essentially facilitates employment success for individuals with disabilities through structured and supported work placements in community settings.

The benefits of supported employment can be seen in a study that included 55 young adults with ASD. The study concluded a higher quality of life for those were in a supported employment environment compared to those who were in sheltered workshops (Garcia-

Villamisar, Wehman, & Diaz Navarro, 2002). The quality of life scores improved for those in supported employment environment as they worked between 15 and 30 hours a week and were paid competitive wages. Supported employment not only increased quality of life, but also cognitive performance in adults with autism (Garcia-Villamisar & Hughes, 2007). Garcia-Villamisar and Hughes (2007), compared adults with autism in supported employment versus unemployed. The two groups did not differ on the cognitive measures. The results showed higher scores for executive functions for the group with supported employment, where as the unemployed group maintained the same cognitive performance. Therefore the study suggests that vocational rehabilitation programs have a valuable impact on the cognitive functioning of individuals with ASD (Garcia-Villamisar & Hughes, 2007).

Positive Strategies

After reviewing all the benefits of vocational training and supported employment for individuals with autism spectrum disorder, the next area is to examine the positive strategies and interventions to support a positive outcome. One positive strategy is a relatively new derivative of supported employment, called customized employment (Gerhardt & Lainer, 2011). The main idea of customized employment is highly specialized and focused on person-centered planning, or job carving that emphasizes the needs, interests, and abilities of both the employer and the employee with ASD. Customized employment results in meeting the needs of both parties involved (Gerhardt & Lainer, 2011). Some of the elements to consider in a supported environment are job training, continual job coaching, job modifications, and employee supervision by employers (Hagner & Cooney, 2005).

For individuals with severe ASD and/or significant ID, utilizing visual supports and prompting hierarchies are effective strategies when teaching vocational skills (McKay, Weiss,

Dickson, & Ahearn, 2014). There are several studies that report the effectiveness of prompting strategies that increase the efficiency of skill acquisition, reduce the number of errors and avoid prompt dependency (Sabielny & Cannella-Malone, 2014). In particular, using most-to-least prompting hierarchy tends to be more efficient and with fewer errors than least-to-most (McKay et al., 2014).

Using visual supports, as instructional tools can be very effective for an individual with ASD, when they cannot interpret the naturally occurring visual cues (Hayes et al., 2010). The visuals can be used to augment communication and have shown to reduce ASD symptoms (Hayes et al., 2010). According to Quill (1995), the use of a visual system may provide a student with autism concrete choices, without a reliance on linguistic recall. Therefore, qualities of a visual system for communication appear to match the cognitive strengths of students with autism. Wilson, Schepis and Mason Main (1987), have found that when instruction was facilitated with a visual stimuli, individuals with autism acquired skills in a variety of areas such as vocational tasks. To further validate the importance of visual supports, Mesibov, Schopler and Hearsey (1994), identified three ways visual structure can be used with students who have autism to promote organization and independence: visual clarity, visual organization, and visual instruction. Given the auditory deficits exhibited in individuals with autism, this structured teaching program minimizes problems associated with verbal input through the use of visual supports.

Gerhardt and Lainer (2011), address the challenges of being potentially employed by the limitations and failures of systems to support the individuals within the work environment. They found that the principles of applied behavior analysis (ABA) intervention in supported employment exhibited positive results. Some of the strategies included task analysis, activity

schedules, visual supports, differential reinforcement of alternative behaviors, prompting, shaping, and positive reinforcement, (Gerhardt & Lainer, 2011). Garcia-Villamisar et al. (2002), also found that the same principles used in early intervention programs with ABA concepts, can also improve functioning and quality of life of adolescents and adults with autism.

A longitudinal study completed by McClannahan, MacDuff and Krantz (2002), implemented an intervention program that followed individuals with ASD, from childhood to adulthood for 15-25 years. They were trained for vocational placements, practicing strategies such as behavior analysis that included reinforcement procedures, prompting and fading, and skill generalization. In adolescent years, the programming focused on vocational skills and as young adults they became part of a supported employment program. This study illuminated the benefits of long-term, tailored supported employment programs, which included stable employment, wages, individual satisfaction with work and the commitment of an employer to employing persons with disabilities (Nicolas et al., 2015).

Furthermore, Friedman et al. (2013), believe schools need to allow ample time for preparation and implementation of vocational skills before transitioning to post secondary schools for students with ASD. By working collaboratively with vocational and employment service organizations, Friedman et al., suspect this process may improve the dismal outcomes of post-secondary education and vocational training and employment amongst the young adults with ASD (2013). The idea of early intervention conforms to the ecological model of career development theories of Szymanski and Hanley-Maxwell, (1996).

Ecological Model of Career Development

When considering positive strategies for intervention in teaching vocational skills to individuals with ASD, it would suffice to explore Szymanski and Hanley-Maxwell's ecological

model of career development (1996). They believe that career development is a lifelong process that is determined by the uniqueness of an individual and the dynamic interaction of their environment. The work personality is formed in the early years of an individual and is influenced by school experiences and home environment. The contextual factors that influence career development include family, education and socioeconomic status (Szymanski & Hanley-Maxwell, 1996). Szymanski and Hanley-Maxwell have devised a framework for intervention that can be considered when thinking of positive strategies to support vocational skills that may lead to supported employment (1996).

The framework or ecological model for career development essentially depends on the individual characteristics, the context in which they live, belief structures, potential environments, and evidenced work outcome behaviors. Career development is an active process for the individual with disabilities and thus they need to be directly involved by learning and controlling a planning process. The general interventions should promote independence, be maximally in control of the individual as possible, least intrusive, and most natural for the setting (Szymanski & Hanley-Maxwell, 1996).

Summary

With the significant rise of adolescents with autism spectrum disorder entering adulthood, studies have shown that there is a huge disparity between services needed and services provided. Often these adults with ASD end up in adult day centers or sheltered workshops (Garcia-Villamisar et al., 2002). However studies show that economic self-sufficiency, behavior and cognitive functioning increases with employment (Taylor et al., 2012). Several studies point to positive outcomes of employment for individuals with ASD when given the supports needed such as supported employment through job carving (Gerhardt & Lainer, 2011). Szymanski and

Hanley-Maxwell's ecological model for career development should be considered as implementation of intervention planning for the bigger picture starts early childhood and is a lifelong process. Therefore we need to educate and provide functional and practical vocational skills to better prepare our adolescents with ASD who will soon exit their school experience, and to enable them to enter adulthood with marketable skills.

CHAPTER 3: RESEARCH METHODS

Introduction

The purpose of this research project is look at the efficacy of teaching specific vocational gardening skills that are taken directly from community garden center and taught to adolescents with severe autism. Not only could the students learn gardening vocational skills for potential employment in a garden center, but it can also impart on the recreational and leisure skills for these adolescents to achieve a better quality of life as adults. In this section, I will describe the methods I have used to gather and analyze data to answer the research questions I have proposed:

1. Will the use of a visual activity schedule paired with prompting increase independent achievement of gardening skills identified as essential to successful performance at a garden center job site for an adolescent with severe autism?

Research Design

I conducted a multiple baseline across skills single case design (Kennedy, 2005). This research project was loosely based on a study done by Kerry-Anne Robinson (2010) that focused on a specific vocational training program for an adolescent with autism. This action research used quantitative data, focusing on one student working on three specific vocational activities that are directly related to real world job skills at a garden center. A multiple baseline design across activities within the single subject design was conducted.

Each gardening skill was introduced at the same time and baseline data was taken on student performance for each skill. Once the baseline levels for the first skill was consistent in performance, then intervention was initiated for this skill only. The effectiveness of the intervention was reflected in the data and graphing of the data. Data reflected the change in percentage of independence in activities that were given direct instruction for intervention. This was in comparison to the other two skills with consistent response patterns during the baseline

phase until receiving intervention for each skill through a staggered implementation system. As the independent variable was introduced for each skill, its effectiveness was reflected on the dependent variable, which illustrated the student's independence level given intervention to each gardening skill and that seeks to establish a functional relationship between the independent and dependent variables.

Setting.

The setting of my study took place at a non-public school for students with severe autism and neurological disorders. The following information was taken from the school website and San Jose City website.

Community.

San Jose is a large sprawling city in California, with a population of over 1 million people, making it the third largest city in California. It combines both urban and suburban neighborhoods within the city. According to the U.S. Census (2010), the median age is 35. Within race 43% are white, 33% Hispanic or Latino, 31% Asian, 3.2% black and 15% other race. Owner-occupied housing units count for 58% of the population and 41% are renter-occupied housing. The citywide median household income is over $76,000.

School.

The school is a non-profit, non-public school that serves students with severe autism and neurological disorders. It is a stand-alone school site with approximately 65 school-aged students from the ages of 6 to 22. There are 7 classrooms with one teacher and between 8-10 instructional aides in each classroom. The classrooms serve up to 10 students. The school also has an adult program serving the special needs population sharing the site. The school shares the site with an after school program for special needs students. The physical structure of the site includes two

long buildings, with a large garden area in-between the two buildings. The garden itself has several fruit trees including persimmons, pomegranate, figs, and apples. Additionally there are garden boxes for several of the classrooms as well as floral bushes and trees.

Classroom.

This research project focused on a student from a classroom with high school and post secondary aged students. There are 9 students with 1 teacher and 7 instructional aides. All the students have a primary diagnosis of severe autism with concomitant intellectual disabilities. There are 7 boys and 2 girls in the classroom. The physical layout of the classroom includes five cubicles for one to one sessions between staff and students, in addition to an open area for group lessons, snack, and lunch.

Garden Area.

The garden area is right outside the classroom door separated by a large walkway, approximately 12' in width. The walkway edged up to the garden is where the sweeping vocational skill will take place. The entire garden area stretches between two school buildings approximately 20' wide and 300' in length. It is an expansive garden with large fruit trees such as persimmons, pomegranate, orange, lemon, and fig tree. It also has other various trees that stand 10-18' high. There are several benches and swings in the garden area for students to access. Each classroom is assigned a garden bed box and there is ample room to walk around the garden.

Participants

One student who exemplifies the core deficits associated with autism, social deficits and repetitive behavior, participated in the study. This student was chosen due to his transitional IEP goals that reflect vocational gardening activities, as his parents have expressed strong interest for

the student to gain gardening skills as a recreational skill in addition to potential work site skill. This student has also showed interest in working in a garden and is able to tolerate gardening activities for extended amount of time. To ensure that the research was implemented with fidelity my instructional aide and I collected data in a logical ordered method to reduce research bias.

Student.

"Jeff" is a 16 year-old student with severe autism and intellectual disability. He has limited verbal communication skills and very little spontaneous functional speech. He generally needs prompting to verbally indicate his wants or needs, as he can be prompt dependent. Jeff will often make vocal sounds and talk to himself by repeating short phrases or words related to Disney movies. He is sensitive to loud sounds or other students' screaming, consequently he will self-monitor his sensitivity and help himself to noise blocking headphones. Jeff seems to enjoy doing vocational activities, but requires extensive support to remain on task otherwise he will drift off into his own world and verbalize unrecognizable words or phrases, while flapping and slapping his hands. Jeff has had some exposure to gardening activities and appears to enjoy the activities as he does not object to them and is very compliant to follow gardening instructions. Jeff's parents have asked to implement gardening skills into his daily school activities.

Teacher.

I am a female Korean American with over 13 years of teaching students with autism spectrum disorder or severe neurological disorder. I have taught in all grade levels. My area of focus and experience is in applied behavior analysis. I have had training in multiple ABA techniques, which will support my data taking procedures as well as looking at the function of behaviors.

Instructional aide.

Instructional aide "Sally" supported "Jeff" with some of the vocational activities we had planned for him. Sally is of European American background, and has been an instructional aide at this school for more than 15 years. She has a lot of experience with students on the autism spectrum. She required training from me on how to take the data to fidelity.

Procedures in Detail

Preparation for Intervention: First I found a garden center that was willing to be interviewed for an inventory checklist of specific job skills needed at the site. Through the interview, I examined what specific job activities would support the garden center, as well as be appropriate for my student. Second, I trained one instructional aide to take data during this research project in additional to myself. Once the activities within the garden center were determined, I task analyzed and created visual multi-steps for each activity so Jeff could follow the visual steps that will be paired with prompts. The garden activities were performed on school grounds through a simulation of the actual garden center, as closely as possible through the use of similar materials such as seed packets, plastic trays of plant cells, 6 inch plastic pots used at a garden center, watering wand, garden hose, etc.

Baseline

During baseline, data was collected on three job skills including sweeping around the plants, watering plant cells, and stocking seed packets. For each job skill, Jeff was given a corresponding verbal direction at the start of each task, to "sweep between the rows", "water the plant cells", and "sort the seed packets". Data was taken on how independently he performed each vocational skill with just the initial verbal direction.

The first vocational skill was for Jeff to sweep an area with nine, 6" black plant containers in a row and the baseline data reflected how independently he could complete the skill with no intervention to get the broom and sweep in between the walkway and the row of plant containers. Jeff was given the verbal prompt to "sweep between the rows" and Sally or myself observed Jeff's immediate response and collected data on the percentage of independence demonstrated of the 10-step process. Sally or I then walked Jeff to the garden hose and gave him initial verbal direction to "water the plant cells". Again, Sally or I waited and observed Jeff's response and collected data reflecting the percentage of independence to complete the seven-step activity. Lastly, we walked back to the classroom and directed Jeff to the seed sorting display. Jeff was given the initial verbal instruction to "sort the seed packets". Without any other intervention, other than the initial verbal direction, data was collected on the percentage of independence of the six-steps carried out by Jeff.

Intervention

The intervention consisted of a visual support of each job skills broken down into basic steps, which was reviewed with Jeff. Then direct instruction paired with a visual schedule of each activity and prompting levels were given to implement the specific vocational gardening activity. Intervention was given to one vocational activity at a time. When Jeff demonstrated consistent performance for the first vocational activity after intervention, then the second vocational activity intervention took place. While maintaining the first intervention and Jeff displayed steady performance in the second intervention, the third and final activity was given direct instruction paired with visual supports. Each visual instruction was paired with varying prompting hierarchies and data was taken on the level of prompting received. Trainings took place between 15-30 minutes of his school day.

After baseline data was taken for the first gardening activity of sweeping in between potted plants for about 6 sessions and consistent performance was demonstrated; then specific steps to sweeping was taught with a visual support for each basic step paired with prompting hierarchies. Data was taken to reflect the skill performance for about 13 sessions, until we saw a significant increase in the percentile for independence be consistent, before we provided specific instruction for the second gardening activity.

Watering the plant cells and stocking seed packets was introduced simultaneously with the sweeping activity during baseline data collection. Initial baseline data was taken concurrently for all three gardening activities. Intervention for the watering occurred as soon as the student demonstrated some improvement and stable performance in sweeping between the plant rows. Intervention for "stocking" or sorting the seed packets occurred as soon as the student demonstrated improvement within the watering skill and data reflected consistent performance.

The first gardening activity was sweeping between the rows of 6" potted plants. For baseline, Jeff was given an initial verbal direction, "Sweep between the rows," without any other directives, prompts or visual supports. The data checklist had 10 specific steps to collect prompting levels and a percentile of completing each step independently for each session.

The second gardening activity was watering the plant cells. There were several trays of plant cells that contained multiple individual cells. For baseline, Jeff was given an initial verbal direction, "Water the plant cells," without any prompts or visual supports. The data checklist contained 7 specific steps to collect prompting levels and a culmination of percentage of independent performance for each step. Data was taken when the visual support was referenced and how often, while comparing it to the increase in percentile of independence.

The third gardening activity was sorting or "stocking" seed packets with 6 specific steps. Data was collected on prompting levels for each step, while paired with a visual schedule for the activity. The prompting levels for all three gardening activities were: full physical prompt, partial physical prompt, gestural prompt, verbal prompt and independent. Additionally, when and how frequently the visual schedule was referenced was reflected in the data collection for each session.

Data Collection and Sources

Data was collected through direct observation and an observational checklist that indicated the level of prompting needed for each step of the multi-stepped procedures for three vocational skills. This measured the percentage of independence performed by Jeff. See appendices A, B, and C.

The baseline data was the primary source of quantitative data to measure the dependent variable of the student's achievement, which was the student's percentage steps completed independently, taken from data collection of each step for all three vocational skills. The student was observed over several sessions, until he demonstrated consistent performance, when given general directions for each specific job skill. All vocational skills were broken down into basic steps and each task was recorded through hierarchal prompting levels ending with percentage of steps completed independently for each session.

Once intervention was introduced through a visual schedule paired with prompting levels for all the vocational skills, data was taken in the same format as baseline data. Each step of an activity was recorded through hierarchal prompting levels ending with percentage of steps completed independently, reflecting student performance.

Data Analysis

This action research used both quantitative and qualitative data that were analyzed and compared between baseline and intervention phases within the multiple-baselines-across-skills design of the three gardening activities. The dependent variable was the percentage of components completed independently for each of the three gardening activities. The independent variable was the visual schedule supports for each gardening skill that was broken down into multi-steps, along with prompting, and reinforcement. Through the use of a multiple baseline design, all three gardening activities were simultaneously evaluated.

The percentile of independence for each gardening activity, during intervention was observed. The data indicated the number of trials on average it took to reach independence or stable performance with limited support, for each of the gardening activities. To address the efficacy of visual supports to increase independence, data was collected on the number of times the visual support was referenced during the intervention with (if any) correlation to the reduction of prompts and the increase in independence. Credit for independence was given if the visual support was the only support referenced.

Limitations/Threats to Internal Validity

As each task analysis was taught to the student, there was a possibility that the prompting levels being used could have been misinterpreted by the instructional aide who was taking the data in addition to myself. I trained the instructional aide to implement the intervention to fidelity, through direct instruction and some video modeling of myself performing the tasks with Jeff.

There may have been some bias as I am both experimenter and data collector. I tried to minimize the bias and maintain specific prompting protocols and did not let unintended

prompting take place. Also absences due to illness, holidays, and vacations interrupted the continuous data collection days and intervention, which may have potentially reflected lower than expected data and were taken into consideration. The inconsistency of intervention could have resulted in lower dependent variable levels.

Distractible and negative behaviors demonstrated by the student may have affected the data and caused the research project to reflect inconsistent or irregular data. Jeff can be highly distractible and sometimes had a difficult time attending to the activity if there were environmental distractors. There were a few days data could not be collected due to his demonstration of high anxiety and distractibility. Additionally, the time of day may have impacted Jeff's response to intervention.

Inter-observer Agreement (IOA)

Inter-observer agreement was collected 25% of the sessions, over 31 occasions of data collection. The second data collector (IOA) simultaneously and independently collected data for reliability purposes. At the end of the study, the data sheets were compared to calculate the number of agreements versus disagreements to get the percentage of agreement per day. To count as an agreement between the primary and secondary data collected, the data has to have the same percentage of independent performance for each activity and each session. A disagreement is when there is a discrepancy in data collection between the two data collectors. Dividing the number of agreements, by the number of agreements plus disagreements, and then multiplying the quotient by 100 will yield the percent of agreement or reliability. For each gardening skill, secondary data was taken for 25% of the sessions for IOA. Percentage of agreement or reliability of independent performance for each sweeping skill was 75% agreement, watering skill was 100% agreement, and seed sorting was 100% agreement. The average mean

for independent performance in sweeping steps was 80% agreement with a range of 60-90%. The average mean for independent performance in watering plant cells was 67.5% agreement, with a range of 30-85%. The average mean for independent performance in seed packet sorting was 65% agreement, with a range of 0-100%. Low agreement scores reflected in ranges are attributable to initial training during the first intervention that required full prompting in most steps across all three gardening skills.

CHAPTER 4: FINDINGS

Introduction

The purpose of this chapter is to present the results and data obtained from this action research thesis that focused on the research question: Will the use of a visual activity schedule paired with prompting increase independent achievement of gardening skills identified as essential to successful performance at a garden center job site for an adolescent with severe autism?

A multiple baseline design across activities within the single subject design was conducted while collecting quantitative and qualitative data through two forms of observational data. The first was collecting data for each multi-step of all three gardening activities on the prompts used, whether or not a visual activity schedule was referenced and total percentage performed independently during each session as seen in Appendices A, B and C. The forms allowed for documentation of each multi-step of an activity, the session number, percentage of independent performance for each session, and the prompting levels: FP=full physical prompting, PP=partial physical prompting, G=gestural prompting, VP=verbal prompting, I=independent, and R=referencing the visual support. The forms were completed by placing the appropriate prompting level or "I" for independent performance on each sequential step, followed by the total percentage of independent achievement.

The second form of observational data included a brief narrative during sessions that entailed any behavior or environmental variables that may have affected the student's performance level (Appendix D). The form documented the session, time, which gardening activity, and any specific observations such as environmental variables, student behaviors, and any other narrative observation to be noted.

Analysis of data collection has found the impact of providing a visual activity schedule paired with prompting when training vocational gardening skills to an adolescent with severe autism, increased his level of independent performance. Data analysis exhibited the alteration of the dependent variable after the independent variables were implemented. Teaching specific vocational gardening skills to Jeff demonstrated successful skill acquisition, which can be seen in Figure 1. The efficacy of visual activity schedule paired with prompting hierarchies corresponded to independent task completion as examined in the three gardening skills trained: sweeping, watering, and sorting seed packets.

Impact of Intervention

Data reflected the change in percentage of independence in activities that were given direct instruction for intervention. Comparison of all three skills demonstrated consistent response patterns during the baseline phase, until receiving intervention for each skill through a staggered implementation system. As intervention was introduced for each skill, its effectiveness reflected on the dependent variable, which illustrated the increase in the student independence level for each gardening skill. A functional relationship was established between the independent variable and the dependent variable across all three skills.

This research and data collection occurred over six weeks and 31 sessions, and data was simultaneously evaluated for the three skills: sweeping, watering and seed sorting. Intervention was sequentially and systematically administered across the different tiers of gardening skills. After the baseline data for the first skill of sweeping was consistent in response, then intervention was introduced. Once the student's performance in sweeping maintained a consistent response pattern with intervention, then intervention occurred for the second skill of watering. This

process was repeated for the third skill of sorting seed packets. Table 1 shows the number of sessions Jeff spent for each gardening activity during baseline and intervention.

Table 1
Number of Sessions Jeff Spent in Baseline and Intervention for Each Gardening Activity

Gardening Activity	Baseline	Intervention
Sweeping	5	26
Watering	18	13
Sorting Seed Packets	25	6

Figure 1 depicts the consistent and stable response in baseline for all three activities, which remained at 0% in completing steps independently until intervention was implemented. Each data point represents every session Jeff completed and the percentage of independent task completion for each gardening activity. Task steps were considered independent if he initiated and completed the step.

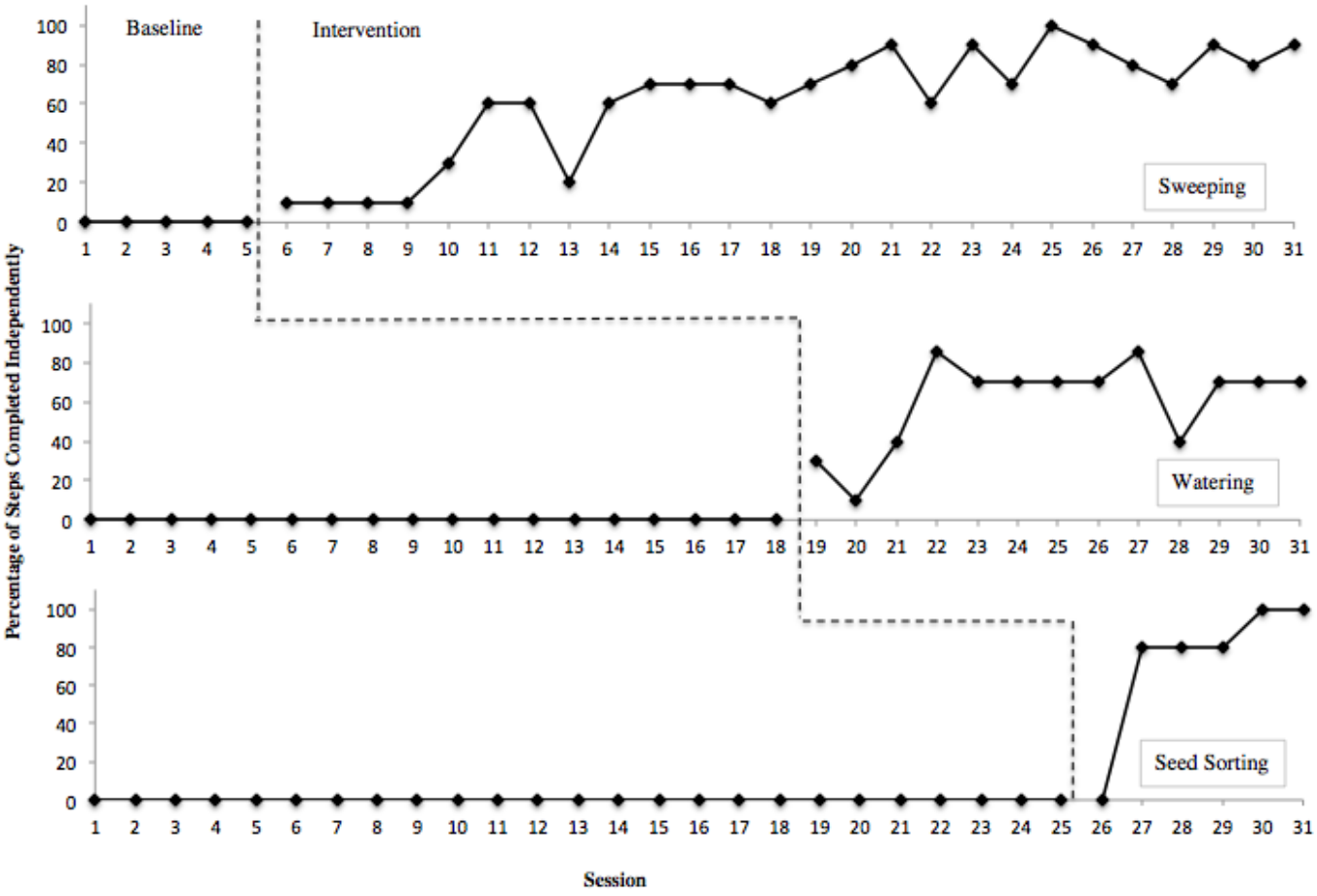

Figure 1. Percent of Steps in a Gardening Routine Completed Independently for Three Gardening Skills.

Sweeping Intervention

Initial baseline level was established for sweeping across six sessions as an objective basis for detecting change during the absence of an independent variable. During baseline, I asked Jeff to "sweep between the rows," while standing near the broom closet. He would wait and appeared confused as he looked around for a prompt or indication that I would help him understand the direction I gave him. After waiting approximately 45 seconds for Jeff to respond, data was taken on all 10 steps of the vocational task to sweep between the rows. (See appendix A for sweeping data form.)

The strategies used during intervention included a visual activity schedule of all 10 steps that was initially reviewed, followed by an initial verbal instruction and then hierarchal prompts as needed to support Jeff complete each step for sweeping between the rows. Reinforcement strategy through praise was given when he completed each step independently and after he completed all three gardening activities, Jeff was given a few minutes of back massage using a three pronged back massager. Visual analysis of the data as seen on Figure 1, indicates a slow start in task independence ranging between 10 to 30% in the first 5 sessions with intervention, followed by an overall increasing trend with an average range of 60 to 90% with one dip down to 20%.

Each session began with a visual review of the 10 steps followed by the verbal direction "sweep between the rows". After Jeff was initially shown where the broom, dustpan and garbage can were kept, he was able to go directly to the broom closet but required gestural and visual prompting to collect the items until the 19th session when he completed it independently and continued to do so for the rest of the research period, resulting in 42% of the time as seen in Table 2. However, it was around the 11th session when Jeff began showing an increase in independent performance for multiple steps including carrying tools to the area to be swept, moving potted plants over 3 feet to be swept, holding the broom in both hands, pouring materials from the dustpan to the garbage can, moving potted plants back to original place and returning his tools back into appropriate places. He was performing independently in 7 out of 10 steps at 50% or more and some as high as 96% after intervention was implemented, as shown in Table 2.

Table 2
Percent of each task performed independently after intervention was implemented

Steps to Sweeping Skill:	Percent Performed Independently After Intervention
1. Get broom, dustpan and garbage can.	42%
2. Carry tools to area to be swept.	77%
3. Move potted plants over 3 feet, to provide an area to be swept.	50%
4. Hold broom in 2 hands.	65%
5. Sweep dirt and materials into a pile.	27%
6. Sweep materials into the dustpan.	62%
7. Pour materials from the dustpan into the garbage can.	96%
8. Continue until no more dirt or materials are visible in the designated area.	27%
9. Move potted plants back to its original place.	65%
10. Put all tools away.	73%

It must be noted that there was a change in the environment during the research. When the research first started, the vocational training took place during scheduled vocational training for all students in the classroom at 1:45p.m. However, due to notable distractions from classmates, we changed the time for Jeff's gardening training to 9:30am, which had less noticeable distractions. This change occurred on the 11th session, which correlated with the significant increase in independent skill acquisition for each step and the overall increasing trend.

Prompting hierarchies that began with most-to-least prompts were actively faded. Although an initial verbal direction was always given to start the sweeping activity, any other verbal prompts throughout the training were consciously kept to a minimum or used as a last resort. Full physical was initiated to introduce each step paired with a visual reference. At about the 10th session, full physical prompting was significantly reduced and often a gestural prompt or visual reference were the only prompts being used if not independent. On average, 0-20% of full

physical prompting was applied for each session after the 10th session. On the 8th session of intervention with sweeping, Jeff completed step 9, "Move potted plants back to its original place" of all 10 potted plants independently for the first time and immediately afterwards, he spontaneously exclaimed "Ta-da!" Jeff's behavior indicated that he was very proud of his achievement and wanted acknowledgment from me as he looked directly at me waiting for a response after his declaration of "ta-da!" It is very rare for Jeff to verbally express himself spontaneously as well as being appropriate to the context of a situation.

Watering Intervention

As with the sweeping activity, Jeff was given a visual reference for all 7 steps to watering the plant cells and data recorded the prompting level and percentage of independent task completion (Appendix B). Providing a visual schedule of watering plant cells paired with prompting, Jeff achieved an average of 60% independent performance per session. Watering intervention began at the 19th session, as Jeff's sweeping skill acquisition was maintaining a stable percentage between 60% -70% of independent performance in 7 previous opportunities, which can be seen in Figure 1. Timing of intervention is contingent on stable data being exhibited, therefore it can be noted in Table 1, that it took 13 intervention sessions of sweeping before Jeff demonstrated stable level of independence in task completion to start intervention for the watering activity. However, it took only 7 intervention sessions for Jeff to demonstrate stable performance in watering so that seed packet sorting intervention can take place. The amount of intervention sessions decreased by almost half in comparison.

Visual analysis of the data in Figure 1 indicates an initial increase in percentage of independent activity completion, after intervention followed by a decline and then a steep increase on the fourth session after intervention going from 20% to 10% to 40% to 80%

respectively. Overall steady trend range between 70% and 90% independent skill acquisition can be seen in Figure 1, with one session decrease to 40% during the later part of the intervention. When Jeff got "stuck" he was gestured to reference the visual activity schedule, and he began to show that he was using the visual support to give him information on the next steps that he needed to complete. Jeff was observed to be looking and pointing and verbalizing the visual support steps, and completing subsequent steps.

Table 3
Percent of each task performed independently after intervention was implemented

Steps To Watering Skill:	Percent Performed Independently After Intervention
1. Walk to the garden hose and turn on the water spigot.	100%
2. Get garden hose and pull toward garden area.	85%
3. Turn on watering wand.	77%
4. Water the plant trays until wet.	38%
5. Make sure all plant cells are watered, by looking at all plant cells and checking for any missed spots by touching soil (Does not miss any)	0%
6. Return garden hose back to original place.	77%
7. Turn off water.	69%

Table 3 shows the percent of each step that was performed independently after intervention was implemented for watering the plant cells. It can be seen that Jeff was performing five out of seven steps independently at 69% or above, averaging at 64% independent task step performance in watering the plant cells. Jeff initially needed gestural prompts and reference to the visual activity schedule, but quickly discontinued the need for the supports for most of the task steps. He maintained a general need of verbal and full physical prompts to make sure all plant cells were well watered by looking and touching the soil for any

missed spots. When Jeff was physically guided to touch and check the soil for the first couple of plant cells, he would respond by verbally repeating "Is it all wet?" and would then check the remaining plant cells independently.

Sorting Seed Packets Intervention

Sorting seed packets was in baseline longer than the first two gardening activities at 25 sessions and maintained 0% independent performance throughout baseline. During baseline, Jeff was brought back into the classroom immediately after watering the garden was complete, and was told to "sort the seed packets" while standing in the vicinity of the materials and exposure to seed sorting display. I would wait him out for about 45 seconds to 1 minute to respond, but he would generally find himself a chair in the area and have a seat. Jeff was reinforced for attending to all three activities (although he did not complete the seed packet sorting) with a visual reminder that he received a back massage with a three pronged back massager. Jeff would remove the gardening picture icon into an "all done" pocket, followed by a verbalized request and pointing to the massage picture icon on the activity schedule strip.

Since the timing of intervention is contingent on the stableness of the previous activity, the seed packet sorting intervention was implemented after 7 sessions of watering the plant cells intervention, as noted before. Data shows that Jeff performed at 0% on his initial intervention session, but quickly rose to 80% independent performance on his second intervention session, followed by a stable trend of 80% to 100% consistency for the remaining research period. This exemplifies the decrease in the number of intervention sessions Jeff needed to reflect stable performance of skill acquisition.

The seed packet sorting data indicated a greater level of task independence was achieved after systematic instruction through visual activity schedule and prompting were given. It can be

seen in Table 4 the percent performed independently after intervention for each step of sorting seed packets. All six steps were performed at 50% or above, and most steps performed at 83% independently, with an overall independent performance of 73% across 6 intervention sessions.

Table 4
Percent of each task performed independently after intervention was implemented.

Steps To Sorting Seed Packets:	Percent Performed Independently After Intervention
1. Get box containing seed packets.	50%
2. Take box to seed packet display area.	83%
3. Open box and remove seed packets.	83%
4. Match seed packets to identical seed packets in the display and place them accordingly.	83%
5. Complete stocking all 24 seed packets.	83%
6. Put the empty box back in the closet.	67%

When looking back at Figure 1, visual data analysis indicate that seed packet sorting had the most significant affect in independent performance in comparison to sweeping and watering. Jeff was able to complete this activity within a relatively short period of time as compared to sweeping and watering. Seed packet sorting was the last of the three activities and afterwards, Jeff was given his back massage reinforcer. After some changes to the schedule, some of the sessions took place after lunch and before outdoor break time. Therefore, Jeff had a natural reinforcer, which entailed time on the swings during outdoor break time.

Summary

Synthesizing the outcome of this single subject research while collecting quantitative and qualitative data indicated that when systematically instructing a student with severe ASD through visual supports and prompts, he was able to successfully demonstrate independent performance in majority of the task steps of all three gardening activities. This demonstrated significant

potential to further my research with additional students participating in these gardening job skills or other vocational skills of interest. The following chapter will discuss the overall study and the results as well as impart on the limitations that may have impacted this research. Implications for further study or an action plan to implement this study within a school site will be discussed.

CHAPTER 5: DISCUSSION

Introduction

This chapter of the master thesis provides a discussion of the overall study focused on the research question: Will the use of a visual activity schedule paired with prompting increase independent achievement of gardening skills identified as essential to successful performance at a garden center job site for an adolescent with severe autism? This study involved instructing one student with severe autism, three vocational gardening skills over 6.5 week time period. The purpose of the study will be summarized with overall findings, along with main ideas from the literature review that was relative to this study. Additionally, limitations and variables to the study will be discussed followed by implications for further research and implications for practitioners on how they might implement this research.

Summary

The purpose of this study was to examine the use of visual schedules and prompting to increase independent achievement in gardening skills that were identified as specific job skills performed at a garden center, for a student with severe autism. The impact of acquiring these employable skills may provide the student with a potential job, which may affect the quality of life for him in the future. The results in the vocational training program was successful in teaching Jeff to complete three different vocational gardening skills with very little support, using positive strategies such as visual schedules and prompting hierarchies. It is reported in the literature review that the likelihood of youth with autism achieving employment increased when they received job-specific training, supports and preparation (Lugas, Timmons, & Smith, 2010).

Given the challenges associated with ASD, students with severe autism are often left to adult day programs and time spent unfulfilled (Taylor & Seltzer, 2010). However, they can be taught specific vocational skills given appropriate support and strategically task analyzed job skills that are tied to a specific job in the community at large. As it has been examined in the literature review of Chapter 2, ASD is a life-long disorder and can limit the quality of life in adulthood but research has shown that individuals with autism who are able to be in a supported work environment, their socially appropriate behavior (Tailor, Smith & Mailick, 2014), quality of life, and cognitive abilities increase (Taylor et al., 2012). Current research has shown that over-all transition outcomes for individuals with autism spectrum disorder reflect uneven attainment of transitionary skills, which has resulted in poor secondary and post-secondary education outcomes with very few individuals participating in employment as adults (Friedman, Warfield, & Parish, 2013). However, the likelihood of youth with autism achieving employment increased when they received job-specific training, supports and preparation (Lugas, Timmons, & Smith, 2010). The achievement in vocational activities during their school years (Taylor, Smith, & Mailick, 2013) improved behavior characteristics in individuals with ASD, such as autism symptoms and maladaptive behaviors. Another benefit of vocational activities and skills training for individuals with ASD is the significant reduction of anxiety and feelings of depression as examined by Hillier, Fish, Siegel, and Beversdorf (2011).

As discussed in the literature review, the various strategies that would support students with severe autism and cognitive deficits included the use of visual supports, prompting hierarchies and the idea of customized employment (Gerhardt & Lainer, 2011) to achieve skill acquisition of vocational skills. The main idea of customized employment is highly specialized and focused on person-centered planning, or job carving that emphasizes the needs, interests, and

abilities of both the employer and the employee with ASD. Customized employment results in meeting the needs of both parties involved (Gerhardt & Lainer, 2011). This concept was taken into practice for this research project, as the manager for a garden center was interviewed and in collaboration, we targeted three specific and appropriate gardening activities that demonstrated physical tasks that Jeff would potentially be capable of completing, and concurrently meet the needs of the garden center. The gardening activities were replicated at the school site for Jeff to practice. As the findings in Chapter 4 demonstrate, given some support Jeff was able to successfully complete sweeping in between rows of planted pots, water the plant cells until completely wet, and sort the seed packets; all of which are typical job skills at a garden center.

The visual supports and prompting hierarchies are two other strategies used in this research project that suggest to be effective. In the literature review McKay et al. (2014), discussed how utilizing visual supports and prompting hierarchies are effective strategies when teaching vocational skills. The efficacy of the visual supports was demonstrated during intervention, when Jeff would pause and wait for a verbal prompt he is generally accustomed to in other areas of learning, but rather than verbalize the next step, I gestured to the next skill step on the visual support and quietly waited. Jeff attended to the picture of the task step and moved all 10 potted plants to the appropriate place.

Although Table 2 only reflects a 50% independent performance for skill step number three, it must be noted that Jeff tends to be verbally prompt dependent but he was able to complete the skill step given only a visual prompt. At the start of the intervention, Jeff would wait for verbal prompts and took longer than expected to increase percentage of independent performance in the first gardening skill (Figure 1). I was focused on using the visual supports and most-to least prompting and limited the use of verbal prompts. Several studies have reported

the effectiveness of visual supports as prompting strategies that increase the efficiency of skill acquisition, reduce the number of errors and avoid prompt dependency (Sabielny & Cannella-Malone, 2014). Focusing on reducing verbal prompts were more challenging than expected, as it was easier to give Jeff verbal directions and he would attempt or complete the tasks within a short response time, but I was cognizant of verbal prompts being more difficult to fade in comparison to physical prompts.

During the sweeping intervention, Jeff demonstrated contentment for the first time, by vocalizing "Tada!" with a smile and looking at me for a response. This occurred in the 6th session of intervention and prior to that, he had not made significant improvement in the interventions, maintaining 10-30% rate of independent performance as seen in Figure 1. As discussed in Chapter 4, Jeff rarely expresses spontaneous verbal expressions that are appropriate to the context of a situation; therefore this was a significant milestone in the research project. Although there are no current research for the effects of employment or non-employment for individuals with ASD and their psychological well being, there is significant research for typically developing adults that indicate that their competency in work activities is the strongest predictors of psychological well-being (Taylor et al., 2014). However, Taylor et al. reported that vocational training and supported employment are associated with positive behavior improvement, reduction of anxiety and feelings of depression, cognitive functioning and improvements in quality of life. This qualitative data gave me a deeper insight on how Jeff's performance may have affected him.

Limitations

As with other single case research studies, inferring these outcomes for other students may not be warranted until sufficient research can replicate these findings across more students

with severe ASD and low cognitive functioning. The intervention, teaching strategies and supports were developed for Jeff's developmental and cognitive level, which may be different if this research were to be replicated for another individual. Although we replicated the activities from a specific garden center, there are variables such as the physical space, the specific tools, and the order of activities that may differ if this research was to be generalized.

Another limitation was the potential confounds given that the time of day seemed to affect Jeff's performance. The time of intervention was initially in the afternoon, but he appeared to be highly distracted as other classmates were working on their vocational activities at the same time, therefore I had changed his intervention time to earlier in the day. This change corresponded with improved performance of each step within the activities. Providing a quiet time of day may have impacted the results, however it was not significant enough to say that the instructional strategies were not effective. Figure 1 demonstrates data reflecting no change during baseline for watering the plant cells and sorting seed packets, although these gardening activities followed suit to the time change.

Lastly, serving the role as instructor and data keeper posed some challenges and may have slightly modified the results. In the beginning, when attempting to use full physical prompts to fade appropriately, rather than verbal prompts, I had to put my data book down for certain steps to the gardening activities. I was not able to record in the moment, and sometimes had to support Jeff in multiple steps before I was able to pick up the data book and chart my observations.

Implications for Research

This single case study produced findings that demonstrated the successfulness of targeting specific vocational skills that are taken from a real world job site and breaking those

skills down into multiple steps through the use of visual sequences and prompting levels for an individual with severe autism. The results of this study demonstrate Jeff's marketable skills to potentially work at a garden center, but it cannot be assumed that Jeff would be able to generalize his acquired skills at the garden center job site. This elicits the implication for a follow up research that observes his ability to generalize and implement his newfound skills at a garden center job site.

Additionally, it would be of interest to observe and study how his overall behavioral development and quality of life are affected by possibly being employed. As it was noted in the literature review, studies conducted by Taylor and Setzler (2010) suggest that the variability in behavioral development in adults with ASD are affected by having stimulating vocational activities or a lack thereof. As Garcia-Villamisar and Hughes (2007), have found supported employment not only increased quality of life, but also cognitive performance in adults with autism, this can be further observed with a follow up research at a job site. Future research could also focus on longitudinal studies on the impact of instructing multiple individuals with severe autism specific employable vocational skills using visual supports and fading prompts and how it gets translated at a job site.

An additional area as a follow up to this study could focus on the long-term impact of less verbal and more visual referencing that would promote independence. Although it was easier to give verbal prompts and Jeff would respond more quickly, it left the observer with fewer options to fade the prompting systematically. There are several studies that report the effectiveness of prompting strategies that increase the efficiency of skill acquisition, reduce the number of errors and avoid prompt dependency (Sabielny & Cannella-Malone, 2014). In particular, using most-to-least prompting hierarchy tends to be more efficient and with fewer

errors than least-to-most (McKay et al., 2014). Comparison of verbal prompting versus limited to no verbal prompting on teaching vocational skills and the rate of skill acquisition is an area for further research.

Implications for Practitioners

The results of this study were found to be successful for one individual and therefore an extension of this study for multiple individuals in my classroom will be applied. As gardening vocational skills were found to be of specific interest to Jeff, it would be imperative to find individual interests of each of the other students with severe autism. Through informal and formal assessments and collaborations with families, identifying and matching their interests with abilities could be achieved. Simultaneously, I would seek out potential job sites out in the community that would be interested in collaborating supported employment for our students. Once a potential job site is achieved, intervention using principles of applied behavior analysis through strategies of visual supports and prompting hierarchies would be utilized as it was done successfully in this research.

Additionally, implications for other teachers in the special education field working with students with severe autism could consider an expansion of this research study in their classrooms. More specifically, I have plans with my administration to provide professional development and collaboration with other classes on campus to implement various vocational activities applying the strategies used in this research project. The instructional tools that included visual supports and prompting hierarchies with limited use of verbal prompts are key elements to this study that would be imparted onto the teachers. Involving all classrooms, not just the middle and high school classroom, but including the younger elementary classrooms would align with Szymanski and Hanley-Maxwell's ecological model of career development

(1996). They believe that career development is a lifelong process that is determined by the uniqueness of an individual and the dynamic interaction of their environment and the work personality is formed in the early years of an individual and is influenced by school experiences and home environment.

In the younger classrooms, the special educators could collaborate with the families and identify what their hopes and goals are for their children with severe autism and their future. The collaboration could be further extended to the community at large and establish vocational skills based on what is potentially available in relation to student abilities. Once that is determined, the process of developing the instructional tools for each individual student can be generated. The practice of limiting verbal prompts and focusing on visual supports and fading physical prompts will be essential to a positive long-term outcome.

Conclusion

The positive effects of this single case study were evident as demonstrated by the results in Jeff's high level of independent performance in all three skills levels. He continues to thrive in these gardening skills after the study ended, with further increase in independent performance. The results of this study suggest that individuals with severe autism can successfully complete specific employable vocational skills with a high rate of independence, given task sequenced visual supports and prompting hierarchies that are faded.

Often individuals with severe autism are not given enough opportunities to practice vocational skills that are functional and applicable to real world job skills. I have seen classrooms with young adults and individuals with severe autism who will soon exist the school system and enter the adult world with limited skill sets that may provide them opportunities for supported employment. Sometimes it is not that they are not provided vocational tasks, but the

tasks themselves seem to have no means to an end or a functional significance. It became evident to me how important functional significance is to vocational skills, when Jeff demonstrated his "ta-da!" moment during sweeping skills. He saw that there was a purpose to the sweeping and completing the task.

Additionally, the visual supports and prompting hierarchy strategies used were found to be effective instructional tools to support Jeff in the gardening activities. It is my hope to transfer this research study onto other individuals in my classroom along with the rest of the classrooms at our school campus. The clear and concrete strategies are guidelines that the other special educators can implement for their individual students. It is my hope to impart on other teachers to collaborate with their students' families and the community to provide enriching vocational skills that are functional and practical and possibly lends itself to future employment for students with severe autism and their quality of life.

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Appendix A

Data Keeping for Sweeping

KEY: **Verbal direction: "*Sweep between the rows.*"** **R= Referencing visual support**

FP= Full Physical Prompt **PP= Partial Physical Prompt** **G= Gestural Prompt** **VP= Verbal Prompt** **I= Independent**

Sweeping:

SESSION												
1. Get broom, dustpan and garbage can.												
2. Carry tools to area to be swept.												
3. Move potted plants over 3 feet, to provide an area to be swept.												
4. Hold broom in 2 hands.												
5. Sweep dirt and materials into a pile.												
6. Sweep materials into the dustpan.												
7. Pour materials from the dustpan into the garbage can.												
8. Continue until no more dirt or materials are visible in the designated area.												
9. Move potted plants back to its original place.												
10. Put all tools away.												
Daily Percent Independent												

Appendix B

Data Keeping for Watering the Plant Cells

KEY: **Verbal directions: "*Water the plant cells.*"** **R=Referencing visual support**

FP= Full Physical Prompt **PP= Partial Physical Prompt** **G= Gestural Prompt** **VP= Verbal Prompt** **I= Independent**

Watering Plant Cells:

SESSION												
1. Walk to the garden hose and turn on the water spigot.												
2. Get garden hose and pull toward garden area.												
3. Turn on watering wand.												
4. Water the plant trays until wet.												
5. Make sure all plant cells are watered, by looking at all plant cells and checking for any missed spots by touching soil (Does not miss any)												
6. Return garden hose back to original place.												
7. Turn off water.												
Daily Percent Independent												

Appendix C

Data Keeping for Sorting Seed Packets

KEY: **Verbal direction: *"Sort the seed packets."*** **R= Referencing visual support**

FP= Full Physical Prompt **PP= Partial Physical Prompt** **G= Gestural Prompt** **VP= Verbal Prompt** **I= Independent**

Stocking Seed Packets:

SESSION												
1. Get box containing seed packets.												
2. Take box to seed packet display area.												
3. Open box and remove seed packets.												
4. Match seed packets to identical seed packets in the display and place them accordingly.												
5. Complete stocking all 24 seed packets.												
6. Put the empty box back in the closet.												
Daily Percent Independent												

Appendix D
Observation of Variables Data Form

Session number	Time	Gardening Activity	Observations: (i.e. environmental variables, behavior, etc.)