University of Nevada, Reno

The Use of Visual Supports to Increase Task Independence in Students with Severe Disabilities in the Inclusive Educational Setting

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Special Education

by

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Abstract

The present study sought to determine if systematically teaching the use of visual supports to students identified as having severe disabilities resulted in improved task completion and independence in general education classrooms and inclusive school environments. Four students attending an inclusive elementary school in a public school district in a western state participated in this research study. The four participants, in grades two through five, participated in activities in general education classrooms and school environments with same-aged peers a minimum of 10% of each school day. Symbol assessments (Beukelman & Mirenda, 2005) were conducted to determine the type of symbols understood by each participant, with the results used to inform the design of individualized visual supports. For each participant, a visual support system delineated a multi-step task, which prior to the implementation of the intervention, required extensive prompting. The visual support was designed to increase independent task completion for each student's selected activity. A non-concurrent multiple baseline design across participants was used to demonstrate experimental control within this study. The independent variable was the use of the visual support, with and without systematic teaching, during a specific task within the school environment. The dependent variable was the participant's degree of independent task completion.

Results, analyzed through visual analysis and percentage of all non-overlapping data (PAND), showed intervention of visual supports paired with systematic teaching of the supports was highly effective for three of four participants, with the fourth participant not completing intervention due to the end of the school year. Participants' increased independent completion of targeted activities demonstrated the effectiveness of a visual

support paired with systematically teaching how to use the support. Social validity data gathered a few months after the completion of the study revealed that teachers and support staff viewed the visual support intervention as an effective strategy in aiding the participants' independent completion of their specific tasks.

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Introduction

Beginning with the Education for All Handicapped Children Act of 1975 (PL 94-142) now known as the Individuals with Disabilities Education Improvement Act-2004 (IDEA'04), mainstreaming and inclusion of students with disabilities into general education classrooms has been a public education trend. The opportunities for students with severe disabilities to be educated in the general education setting is viewed as more educationally appropriate than education in more restrictive settings by many parents and teachers. However, many students with disabilities exhibit communication, behavior, and academic challenges that make participating in general education classrooms difficult.

School systems have an obligation to offer special education services that provide learning and engagement opportunities for all children regardless of severity of disability. Schools are also required to provide scientifically-based (US Department of Education, 2002) interventions to enhance the opportunities for each child's success. Such interventions were mandated, in part, so that an appropriate education in the least restrictive environment (NICHCY, 2004) would ensure an inclusive education and improved outcomes for all children with disabilities.

Educational personnel are responsible for identifying poor academic, behavioral, and social progress; as well as for preventing, treating, and accommodating children with all types of disabilities. School personnel must recognize when various methods and intensities of interventions have or have not been successful for a child with disabilities (Holdnack & Weiss, 2006). This implies that an educational team consisting of general education teachers, special education teachers, school psychologists, and school

administrators need to be aware of what is necessary to meet the needs of all children in public education settings and be prepared to address those needs, regardless of the severity of a child's disability. Special education teachers' skills in assessment and intervention must be sufficient to provide effective strategies when working with children who have deficits in academic, communication, social, and motor skill domains that may increase the likelihood of problem behaviors in the classroom setting (Hastings, 2005).

Practices that focus on teaching children routines and expectations, giving clear directions and feedback, and arranging the social and physical environment lead to higher levels of engagement within the inclusive school environments. Identifying behaviors that are expected and reinforced within the natural school environments in which students socialize can be contextual. Therefore, children need an intervention strategy with a contextual approach that is likely to provide a meaningful understanding of what is expected in the environment in which they are participating (Warnes, Sheridan, Geske, & Warnes, 2005).

Problem behaviors are often seen in children diagnosed with moderate to severe disabilities. These disabilities can interfere with children's functioning within the same developmental range as typically developing peers. Delays in various domains (cognitive, academic, fine/gross motor, social, and communication) can lead to problem behaviors and skill deficits that serve as impeding factors for children and, without the appropriate educational supports, can interfere when considering educational service options. Behaviors, which develop due to lack of appropriate educational supports, have the potential to limit children's opportunities, contribute to the challenges of academic success as well as interfere with social opportunities and inclusion within natural

environments. Children diagnosed with various disabilities, including autism, developmental disabilities, and severe disabilities, often exhibit behaviors requiring supports that focus on organization, academic and life skills, communication, social interaction, and behavior management (Breitfelder, 2008). These children often display behaviors consistent with the inability to understand and process verbal language (Breitfelder).

Children with severe disabilities who are educated in inclusive settings receive the benefit of engaging with same-age peers without disabilities, thereby increasing their communication and social skills (Demchak, 1997). As including students with severe disabilities becomes more of a typical practice, it becomes necessary to ensure each student's educational needs are being met in this inclusive setting (Demchak). Task completion is an essential skill for successful inclusion. When a student with disabilities cannot complete the required tasks independently, in spite of having targeted academic modifications and accommodations, an intervention to address this type of behavior is needed to aid in successful inclusion. "General education teachers are often more receptive to having students with severe disabilities in the classroom when the teachers are aware of the supports and adaptations available to facilitate success" (Demchak, p.45).

Purpose of the Present Study

The purpose of this study was to investigate the use of visual support systems (picture schedules, task organizers, environmental cues/labels) in the form of picture prompts as a tool for independent task completion in general education settings. This study evaluated visual supports as an intervention method for students identified with

severe disabilities who are included in general education classrooms and other school environments. Students participating in this study were taught to use visual support systems to increase independent task completion thereby increasing the students' overall independence across specific inclusive educational settings. The visual supports served as an intervention to increase opportunities for participation within general education settings. The objective was to determine if visual supports increased students' independence while decreasing the amount of regular education, special education, and paraprofessional support.

Additionally, this study contributes to the research base outside of special education settings, demonstrating the value of using visual supports as an educational tool to support the behavior, academic, and communication needs of students with severe disabilities in general education environments. This study also investigated the need for systematically teaching use of a visual support to facilitate greater access to peers without disabilities, general education classrooms and curriculum in inclusive school environments (Carr & Durand, 1985; Hodgdon, 1999; Griffin, Griffin, Fitch, Albera, & Gingras, 2006). Whether a student's least restrictive environment is a general classroom, a resource classroom, or a self-contained classroom, there is an additional need for research to be conducted evaluating the effects of visual supports, prompting systems, and cues on student task completion and independence (Bryan & Gast, 2000).

Research Question

This research examined changes in children's level of independence in general education setting tasks and activities after they were exposed to a visual support system. This research examined changes in children's task completion behavior after they were

exposed to a visual support that highlighted a 10-step task using individualized pictures and/or representational icons for each step. Three different tasks and four different visual supports were used to answer the question: Do visual supports increase independent task completion skills during inclusive school routines? Specific research questions were:

1. To what extent does the use of a visual support system increase independent task completion by students with severe disabilities in activities in the general education setting?
    a. What effect do visual supports have on task behavior without systematic teaching?
    b. What effect do visual supports have on task behavior with systematic teaching through least-to-most prompting?

Review of Literature

Educational Needs in Inclusive Environments

When focusing on the inclusion of students with severe disabilities in general education settings, it is important to consider their individual needs. Students with severe disabilities have a wide range of skills and abilities as well as needs that are specific to their individual disabilities. These skills and abilities can facilitate or inhibit success in the general classroom and overall school environments. One of the most important skill areas to consider is communication. Decreased communication skills often impede children's participation in a general education environment. Deficits in communication skills can lead to behaviors that additionally hinder children's functional social and academic participation in inclusive environments (Harrower & Dunlap, 2001; Hodgdon, 1999)

Many children with severe disabilities have receptive language delays and have difficulty following conversational exchanges or understanding directions or questions (Glennen & DeCoste, 1997). In the general classroom environment, it is important to consider children's comprehension of the activities in that setting. Understanding the expectations, requests, directions, peers, and language of the classroom environment are all key factors that contribute to the success of students with severe disabilities in an inclusive setting (Pistono in Hodgdon, 1999). Augmenting spoken language in the classroom with visual supports can increase children's comprehension of everyday communication (Glennen & DeCoste). When teachers pair speech with a visual support, "it provides comprehension support, slows down the delivery of the message; and often

results in favorable completion of the communication exchange" (Glennen & DeCoste, p.399).

In addition to communication within the general education classroom, it is important to consider how students with severe disabilities access the core curriculum within that setting. Research supports the proposition that students with severe disabilities do access the core curriculum; however, collaboration between the general education teacher and the special education teacher is necessary in order for appropriate accommodations and modifications to meet the individual needs of the students (Fisher & Frey, 2001; Demchak, 1997). Fisher and Frey (2001) found that when general education and special education teachers met frequently to discuss lessons, develop, and implement processes for modifying curriculum; there was a greater level of generalized use across environments and higher levels of success for both the student and the teacher in gaining access to the general education curriculum.

Increasing children's access to the general education curriculum involves implementing interventions that target children's communicating in appropriate ways, regulating their emotions, solving common problems, building positive relationships with peers and adults in their environments, as well as engaging in and persisting in challenging tasks (Hemmeter, Ostrosky, & Fox, 2006). With the appropriate support, children with severe disabilities can learn skills necessary to foster friendships, engage in appropriate tasks, and become participating members of the general education classroom. Interactions with friends allow children with severe disabilities to learn more sophisticated social skills, enabling them to continue to develop relationships. These children may then have a more rewarding school experience and, over time, a higher

quality of life (Hodgdon, 1999). Students with severe disabilities benefit greatly from participation in cooperative learning, partner activities, learning centers, and individual instruction. When students are expected to complete their assignments, engage in problem solving activities, and participate in groups that engage in supportive learning activities, there is evidence of learning for all participants (Fisher & Frey, 2001).

Practices that focus on teaching children routines and expectations, giving clear directions and feedback, and arranging the social and physical environments lead to higher levels of engagement, task completion, and social interaction (Carson, Gast, & Ayres, 2008; Bryan & Gast, 2000; Ganz et al., 2008; MacDuff, Krantz, & McClannahan, 1993). These practices must meet students' needs by comprehensively addressing communication, social, behavioral, and academic needs in the general education classroom. There is not a single best program that can be used to provide the appropriate accommodations and modifications to support all of the needs of an individual child in an inclusive environment. However, research suggests there are many strategies available that will increase the likelihood of success across a variety of environments, including the general education classroom (Hodgdon, 1999; Rao & Gagie, 2006; Fossett, 2004; Bryan & Gast, 2000; Carr & Durand, 1985; Conroy, Asmus, Sellers, & Ladwig, 2005).

Visual Supports

One strategy that is diverse in its presentation, but upheld by empirical research, is the use of visual supports, not only as a communication aid, but also as a teaching aid that can provide students with a greater amount of information, thus allowing students to process a whole message, task, or expectation (Rao & Gagie, 2006). Visual supports can be used as a systematic intervention, providing students with the necessary visual stimuli

to keep them focused on the task and allowing them to complete required tasks, decreasing the need for assistance from the classroom teacher, instructional support staff, or their peers (Conroy et al., 2005; Bryan & Gast, 2000; MacDuff et al., 1993). Additionally, visual supports can be used to enhance social skill development and to address behavior that impedes students' learning and the learning of others (Harrower & Dunlap, 2008; Ganz et al., 2008).

Visual supports are what we see that enhance the communication and language process (Hodgdon, 1999) and can be used to increase students' receptive and expressive understanding of their environments. Visual supports can be varied and there are many options for their presentation. They can be categorized as tools to give information, aids to give effective directions, visual strategies to organize the environment, and tools to mediate the communication between environments (Hodgdon, 1999). Icons, photographs, environmental cues, picture schedules, Social Stories™ , countoons, drawings, and graphic organizers are all visual supports used to support the success of students who exhibit skill deficits, problem behaviors, and communication delays in classroom and school environments (Rao & Gagie, 2006). These various visual supports strengthen the relationship between behavior and the environment; assisting children in understanding communication occurring within and between environments (Hodgdon, 1999).

When visual supports are used to mediate communication between environments there are three main goals:

1. Mediate communication between home and school or other significant environments.

2. Stimulate and expand functional language, communication, reading, and writing and academic development.
3. Provide more opportunities for the student to engage in communication and conversation about experiences through practicing giving information, building vocabulary, and sharing details about their experiences (Hodgdon, 1999).

Visual supports for communication between environments. Countoons are visual supports that help a student to identify desired behaviors that should occur, as opposed to other, less desirable behaviors. They have been successful as an intervention used to increase students' abilities to engage in self-management, self-reinforcement, and self-monitoring strategies (McDougall, 1998). The benefits of teaching students to self-monitor in general and special education settings include increasing their abilities for self-reliance, thereby decreasing reliance on parents, teachers, and other external controls (McDougall). Alberto and Troutman (2006) amassed significant research supporting conclusions that students with relatively severe disabilities including mental retardation and autism could be taught to use self-management procedures (Alberto & Troutman). Countoons are an excellent visual support tool that can be used for this purpose.

Similar to the self-management and self-reinforcement strategies of Countoons, Social Stories™ are another visual support strategy that aid communication between environments, have gained popularity as an intervention to provide students with additional information about their environments. They have been used as an environmental support since their development in the early 1990s and can be characterized as short, personalized stories containing text and/or pictures, designed to

teach children how to manage their behavior during social situations they find challenging or confusing (Ali & Frederickson, 2006). They were initially developed by Carol Gray to address the specific needs of individuals diagnosed with autism so that they could understand and interact appropriately in social situations (Ali & Frederickson, 2006). Gray (2000) defines Social Stories™ as a product in the form of a short story that "describes a situation, concept, or social skill using a format that is meaningful (p.13-1)." There is an extensive amount of literature addressing the use of Social Stories™ as an intervention for children with autism spectrum disorders (Goldstein, 2002; Hess, Morrier, Heflin, & Ivey, 2007; Ivey, Heflin & Alberto, 2004; Norris & Dattilo, 1999; Reynhout & Carter, 2007). Social Stories™ were developed to address the needs of students with autism who typically exhibited both social skill and communication delays and tended to be strong visual learners (Crozier & Tincani, 2005).

Another visual support for assisting with communication between environments is contingency mapping, a relatively new type of visual support system that is similar to a graphic organizer. In a pioneering study of the effectiveness of contingency mapping in the general education classroom, Brown and Mirenda (2006) demonstrated the effectiveness of the procedure as a visual support strategy. A contingency map is a pictorial representation of the environment that involves functional equivalence training. The objective of a contingency map is to help the student better understand a behavior support plan by providing graphic representations of expected behavior. Contingency maps are a new alternative to previously used visual supports that can teach individuals why and under what conditions they should engage in alternative replacement behavior (Brown & Mirenda).

Visual supports to organize the environment. Environmental labeling and picture cues in the form of signs, labels, and color codes provide students with visual information that is stationary long enough for the student to see it, take in the information, and respond to it. Students can go back and review the visual cues if they need to understand and remember to aid in organization and navigation around the classroom. Environmental cues and labels allow a student to focus on the completion of tasks independently without relying on another person (Griffin, Griffin, Fitch, Albera, & Gingras, 2006). A variety of studies support the use of environmental labels and picture cues as an effective support in increasing student participation as well as decreasing problem behaviors observed in inclusive environments.

Conroy, Asmus, Sellers, and Ladwig (2005) were successful in decreasing the incidence of stereotypic behavior (hand flapping) in the general education setting through the use of visual cue cards. The visual cues, in the form of line drawings, were presented when the incidence of stereotypy was unacceptable. Upon presentation of the cue, the behavior occurred at a lower rate. When the rates of behavior had reached an acceptable level, a different cue card was presented. The rate of stereotypy decreased during classroom academic activities and the visual cues were easily introduced and implemented (Conroy et al.). Additionally, the intervention was successfully transferred across a variety of people and naturally occurring academic activities; decreasing behavior that was interfering with the learning of the student and peers (Conroy et al.).

Johnson, McDonnell, Holzwarth, and Hunter (2004) demonstrated that the use of picture cues in the form of icons and printed words embedded into the general classroom teacher's instruction were extremely beneficial in increasing the acquisition and

maintenance of academic and developmental skills by students with severe disabilities. Observations during the implementation of the intervention using the picture and written cues also showed an overall increase in class participation and social interaction with non-disabled peers (Johnson et al.). Although the study focused on the benefits of embedded instruction, the use of visual support strategies to engage the students, increase their attention, participation, and overall communication, was an undeniable positive outcome of the study.

An expanded study on the effects of embedded instruction compared two environments, the special education classroom and the general education classroom, and found that when picture cues were appropriate, and combined with embedded instruction, student participation in the general education setting increased. The effectiveness of embedded instruction in the general education classroom proved to be a valuable instructional strategy for students with developmental disabilities (Jameson, McDonnell, Johnson, Riesen, & Polychronis, 2007). Combining the use of visual supports and embedded instruction lends itself to further increasing student success in the general education setting, and allows the students to become integrated members of the general education classroom, with the general education teacher leading the instruction for all of the students.

Ganz, Kaylor, Bourgeois, and Hadden (2008) used a picture cue composed of a line drawing of a face with the index finger in front of the mouth indicating “shhh” in combination with a social script to address problem behavior of repetitive verbal interaction with peers in the general education setting. The results indicated the combined use of the picture cue and the written social script increased the participants’ engagement

in the classroom. The cueing system was less intrusive and socially stigmatizing than the previous verbal prompts and reminders (Ganz et al.).

Johnston, Nelson, Evans, and Palazolo (2003) were successful in demonstrating that the use of a single picture cue depicting “can I play?” could lead to greater levels of engagement in an inclusive environment. The single picture icon was beneficial for two students in decreasing disruptive behavior, increasing paired verbal initiations in play situations, and creating an environment in which the general education teacher and peers were more receptive to having the students in the classroom setting. The researchers were successful in implementing a least-to-most prompting hierarchy combined with time-delay to teach the context of the visual cue and felt that the methodology was most successful in meeting the needs of the children. Additionally the researchers felt that the presentation of the picture cue was a socially valid intervention in that both the general education classroom teachers and the students’ peers found the support highly acceptable (Johnston et al.).

Visual supports for information and directions. Different types of visual supports are used to enhance the success of individual students, small groups, or entire classes. Step-by-step directions, choice boards, and classroom rules provide structure in classrooms. Visual supports can give students what they need to self-monitor, stay organized, and communicate. They also provide predictability and routine for students, acting as a reminder of behavior expectations (Hodgdon, 1999). Visual supports can “attract and hold attention, thus enabling the student to focus on the message, reduce anxiety, make abstract concepts more concrete, help prompt the student, and help the student to express his or her thoughts” (Rao & Gagie, p.26). The student must be able to

derive meaning from the visual cues and therefore those cues must be easily recognized and understood (Hodgdon).

Schedules and calendars comprised of easily understood cues, the most common visual tools used to give students information (Hodgdon, 1999), can be stationary or portable and help students by creating an environment that is more predictable and understandable. Problem behaviors often are exhibited by children as a result of stress or anxiety, and visual supports can provide structure and information to assist in decreasing this level of stress or anxiety by breaking down the expectations through the presentation of sequential visual cues. Visual support calendars and schedules provide a structure that allows a student to anticipate what will happen next, reduce anxiety by providing the student with a vision of his/her day, and promote calmness between transitions. They are especially important for students with profiles that include difficulties with the understanding of oral language and directions (Hodgdon).

Visual support calendars and schedules can save teachers time when used in the classrooms. They can be easily posted for class-wide access, leading to easier transitions (Jaime & Knowlton, 2007). Line drawings or photographs of the correct procedures for accomplishing tasks or delineating classroom rules can alleviate the need for teachers to use verbal prompts repetitively (Alberto & Troutman, 2006). Students with severe disabilities often have difficulty retaining or retrieving information, and visual supports can assist these students by providing a permanent reminder of task expectations and rules.

Students with developmental disabilities can experience difficulty with learning activities presented in general education classrooms for numerous reasons. Many students

with severe disabilities have difficulty in processing verbal instruction and thus have difficulties in accessing general classroom instruction. Additionally, students with severe disabilities may have difficulty paying attention to the teacher during instruction or following whole-class or small-group discussions. These students may be easily distracted by extraneous sensory input and find it difficult to keep their attention focused on the instructional activities (Fossett, 2004).

The use of visual support strategies is thought to enhance information processing for people with developmental disabilities who may have difficulty with speech-only instruction. While speech is processed in an auditory-temporal fashion, visual information is non-transient, allowing more time for information processing (Fossett, 2004). In the general education classroom, visual support strategies can allow for a greater receptive and expressive understanding of the information being taught to those students experiencing difficulty with auditory processing or verbal expression (Beukelman & Mirenda, 2005). Visual support strategies provide improved access to curriculum using adapted texts and materials that allow individuals an alternate means for demonstrating their knowledge, skills, and abilities (Fossett).

Visual supports can potentially increase students' motivation to work through a less-favored activity knowing a favored activity is to follow. When visual supports in the form of picture schedules were used with people with severe disabilities with limited communication skills, the picture schedules provided "salient discriminative stimuli". Additionally they provided more choices; thus enhancing the individual's choice making and control over their environment, proving to be a very successful intervention, increasing

participation and independence in specific tasks (Anderson, Sherman, Sheldon, & McAdam, 1997).

Visual supports can increase the level of on-task and on-schedule behaviors in classroom settings while increasing student independence (Bryan & Gast, 2000). When picture schedules were used with young elementary-age students, in a resource room setting, as an intervention strategy to increase overall engagement in literacy activities, there was a marked increase in all activity sequences represented by a picture activity schedule. Additionally, all students engaged in appropriate task-related behaviors with minimal adult prompting (Bryan & Gast).

Fossett (2004) used visual supports with students with developmental disabilities to increase their engagement in literacy activities. The result was an increase in the inclusive participation of literacy learning activities and further aid in the development of word recognition, comprehension, and writing skills. Additionally, Fossett found that the students had a greater level of response participation with the text in small group, and in large group discussions. This study demonstrated that visual supports have the potential to provide an alternate means for the demonstration of skills, abilities, and knowledge, providing the students with a more meaningful and motivating literacy experience (Fossett).

Since there are a wide variety of materials that are considered to be a visual support, it is necessary to consider each child individually and establish a method for determining what type of visual support system will be the most appropriate intervention to address a student's skill development across behavior, communication, academic, and social skill domain areas. Once it has been determined that a visual support strategy is the

best approach for addressing a student's educational needs, it is necessary to complete a symbol assessment to determine which symbols will be appropriate to use for the visual support and to meet the communication needs of the student. The visual support strategies put in place are not meant to replace communication mediated by spoken language (Jaime & Knowlton, 2007), but to augment spoken language so it can be better understood by the student. Visual supports can be used to enhance auditory skills in addition to enhancing instruction. For students who are non-readers or non-verbal, pictorial icons are universally understood and easily generalized to general classroom and inclusive educational settings (Jaime & Knowlton).

In deciding upon the level of representation that will be used with the support system through the symbol assessment process (Beukelman & Miranda, 2005), the level of visual representation (object, photo, line drawing, word) should be determined by that which is best understood by the student accessing the visual support (Carson et al., 2008). The visual depiction of the activity must be clear to the student (Jaime & Knowlton, 2007; Hodgdon, 1999; Carson et al., 2008). Often it is necessary to consider behavior exhibited by the student throughout various activities, or various parts of an activity, and use a combination of symbol representations within a visual support to meet the varying comprehension levels. In Jaime and Knowlton's study of a third grade student with cognitive disabilities, problem behaviors, and limited functional language, the implementation of a combination of visual strategies that included the use of Social Stories™ and visual schedules proved to be very effective in reducing the student's frustration and increasing participation in the general education classroom.

Visual aids such as schedules, calendars, choice boards, and menus serve the primary functions of giving information “in a logical, structured, sequential form” (Hodgdon, 1999, p.29; Carson et al., 2008). Aids for providing effective directions can include any classroom management tool that allows the teacher to communicate more effectively with the students and can include visual supports that give directions, depict rules, and provide students with task organization (Hodgdon). Cookbooks are considered an aid, in that they provide systematic prompts to help students’ complete tasks more independently. Visual supports that assist in organizing the environment can include environmental labeling with words, photographs, icons, or line drawings. These labels are used to give specific names to areas of the classroom and assist in assigning designated locations for items within the classroom. Signs, lists, and charts aid in teaching students to effectively use visual cues in their environment and allow them to recognize and act on the labels, creating an environment in which students can be more independent.

Schedules. Visual supports in the form of objects, pictures, line drawings, or words can be used to build schedules and organize tasks, bringing structure to a child’s day. They can be tools to put events and activities in order. They can be used in a variety of ways across many different settings. Schedules can be used for an entire class of students or they can be set up to meet the individual needs of a single child. Schedules can be displayed vertically, illustrating the passage of time, or they can be arranged horizontally from left to right, reinforcing the direction of text. Visual schedules can be presented in a book format, large or small, organized to represent an activity, part of a day, or an entire day. Whatever the format, visual schedules are used to provide structure and promote independence for students (Jaime & Knowlton, 2007).

Visual schedules can be used to support and organize specific activities and tasks by portraying the activities that are going to occur and detailing the small steps involved in a single activity such as the steps necessary to complete a cut and paste activity. Mini-schedules focusing on key components of routine activities (e.g., what needs to be done upon entering a classroom or how to participate in circle time group activities) help create a sense of organization and expectations for children with disabilities. Mini-schedules give students a sense of time and predictability, progressing students toward a goal of independence (Breitfelder, 2008). When a routine is learned by doing tasks in a specific order, children can learn the routine and participate in an environment where the children can maximize their levels of independence.

Research suggests that picture schedules that offer support both between and within an activity can benefit students with severe disabilities (Clarke, Dunlap, & Vaughn, 1999; Dettmer, Simpson, Myles, & Ganz, 2000). Picture schedules are often used as a strategy for increasing predictability of classroom routines and are used as an alternative to verbal and written instruction (Harrower & Dunlap, 2001). Since transitioning between activities can be problematic for students with disabilities, picture schedules can serve as effective cues to upcoming changes in activities as well as within activities (Harrower & Dunlap).

Schedules should be designed so they can be easily manipulated, allowing the child to know what has been completed and what has taken place. The children can be taught to cross off or remove the tasks or parts of a task that have already occurred. Visual icons used on schedules can be written words, black and white or colored line

drawings, black and white or colored photographs, objects, or a combination of options (e.g., written words paired with black and white line drawing) (Swanson, 2005).

Activity Schedules and Cookbooks. Bryan and Gast (2000) used graduated guidance combined with a picture activity schedule to increase independent on-task and on-schedule behaviors of students with autism. Their picture activity schedules were designed using line-drawings of academic activities and were used to replace verbal prompts while still maintaining attention and engagement in academic tasks. The picture activity schedules were reported as a useful management tool, feasible to implement in the general education classroom, and beneficial to all children in the classroom setting (Bryan & Gast, 2000).

Anderson et al. (1997) used activity schedules comprised of line drawings and/or photographs of adults performing various activities, including personal care, housekeeping, and recreational activities, to increase participation and independence in adults with severe developmental disabilities. The schedules provided a visual reminder, acted as an easy reference to assist the participants in determining the sequence of activities, and aided in transition between activities. The results of the study indicated that the participants showed an increased interest in the pictures, particularly the photographs, and that there was a direct increase in the engagement in the activities. The research shows that there was a direct correlation to the increased participation that could not be attributed to any other factors such as extensive training of teaching counselors, token reinforcement, or other prompts (Anderson et al., 1997).

Photographs can be combined to create schedule activity books, sometimes called “cookbooks” (Hodgdon, 1999). These books are a combination of photos that depict

individual activities in a sequence and placed in the order they are to occur (Carson et al., 2008). Although this study was conducted outside of the general education classroom, it demonstrated the benefit of activity schedule books on increasing students' independence in work environments thereby decreasing their prompt dependency and the need for teacher support. The success of the activity schedule books is suggestive of their ability as a non-invasive support strategy that can increase student independence across multiple environments, including the classroom (Carson et al.). The researchers of this study displayed color photographs in a photo album that depicted the individual tasks to be completed and depicted the finish location. The results of the study indicated a significant increase in task independence as a result of the implementation of the activity schedules. The researchers suggested that the procedures in this study could be easily replicated by classroom teachers in a variety of settings and the schedules can be integrated into daily classroom routines (Carson et al.).

Dettmer, Simpson, Smith-Myles and Ganz (2000) demonstrated the benefit of combining visual supports as an intervention strategy to decrease problem behaviors that occurred around transitions. The visual supports were presented in the form of two activity schedules, one placed in a student's automobile, and the other used portably. A daily schedule and a mini-schedule were created to support the transitions of a second participant in the study. For both participants the schedules were made of individual icons in the form of line drawings. The presentation of the schedules proved to decrease significantly aggressive behavior and increase each participant's smooth transition between activities and environments (Dettmer et al.).

Activity schedules were demonstrated to be very effective in teaching participants with autism and other developmental disabilities to complete a variety of recreational and home-living tasks. The activity schedules comprised of photographs and line drawings were successful in decreasing the participants' dependency on verbal prompts to remain engaged in appropriate activities. The photographic activity schedules, taught with graduated guidance, promoted sustained engagement and lead the participant to respond to new activity sequences and novel leisure activities with a greater level of independence (MacDuff et al., 1993).

Breitfelder (2008) suggests that work systems combined with schedules can give a student the information they need to know about where to go and what to do. The work system can provide a student with autism, developmental disability, or learning disability the information they need to work productively and independently without adult prompting. The student becomes more reliant on the visual support rather than the verbal directives that are often given by teachers and paraprofessionals. Work systems assist in organizing a student by proving a systematic work routine, working from left-to-right and top-to-bottom, and they can be used with any type of task or activity such as academic, self-help, or leisure (Breitfelder).

Conclusion

Visual supports are an excellent environmental intervention used to assist children in acquiring and supporting the skills necessary for maximum participation in the least-restrictive environment. Visual supports can ease transitions, provide students with feelings of empowerment through choice making activities, increase attention spans, and lead to reduced anxiety because expectations are clearly defined and concepts are more

concrete (Breitfelder, 2008). Visual supports are “one of the most effective ways to get students to process language,” acting to increase individual comprehension of information or demands (Breitfelder, p.3). A large amount of the research using visual supports with students with disabilities has been completed in small group, self-contained classrooms, and other alternative special education settings including group homes and vocational education sites (Carson et al., 2008; MacDuff, Krantz, & McClannahan, 1993).

Despite the numerous research studies conducted on the use of visual supports, only a small number address the needs of students with severe disabilities in the general education classroom and inclusive environments of the school setting. Further research in this area can add to the empirical evidence that visual support strategies can be a useful tool in supporting students with multiple disabilities in inclusive school settings. The use of visual supports to increase student independence, task initiation, and task completion continues to warrant research as a successful intervention and support tool for students with severe disabilities in inclusive environments.

Using visual supports for students with severe disabilities will be worth the invested time in supporting the benefits of self-initiation, autonomy, and generalization (Mesibov, Browder, & Kirkland, 2002), as well as allowing the students a greater level of access to the general education classroom, curriculum, and their same age peers. The supports can act as predictors for routine, provide increased information about task expectation, and bridge the communication gap between receptive and expressive understanding of the verbal instructions that are occurring in the classroom. Additionally,

there is the potential to provide students with a greater level of choice and independence across general education settings.

Adapting a curriculum and teaching methods in the general education setting using visual supports can enhance the opportunities for students to participate in reading, writing, and literacy activities and to develop their knowledge and language skills. The visual supports can compensate for verbal short-term memory difficulties and also engage students in socially, and behaviorally appropriate same-age peer activities that can boost self-esteem, confidence, and social acceptance (Buckley, Bird, & Sacks, 2006). The use of visual supports is well documented as an evidence-based instructional and intervention strategy; however, further evidence is needed to demonstrate the benefits of this strategy as optimal for students with severe disabilities in inclusive environments (Buckley et al.).

Best practices in special education recommend the utility of visual schedules and other types of visual prompts (Waters, Lerman, & Havanetz, 2009); however there are few studies that explore the specific use of visual schedules to increase task independence in students with multiple severe disabilities in inclusive environments (Hall, McClannahan & Krantz, 1995; Waters, Lerman, Havanetz, 2009). Visual schedules can be designed for single routines to show the order of events within an activity as well as can be used for a variety of activities to show the order of events for several activities (Jaime & Knowlton, 2007).

The benefits of visual supports have been demonstrated to lead to increased skills in students with disabilities. Visual schedules, in particular have a research base that supports their use as an intervention. This purpose of the present study was to expand this

research base and demonstrate that visual schedules can be used across activities, participants and inclusive settings to improve student outcomes.

Methodology

Information regarding this study was provided to potential families through their special education teacher and a mailing from the director of special education of a public school district in a western state. A single subject, non-current, multiple baseline design across participants involving the use of visual supports to increase task independence and task completion was the focus of the study. Changes in students' independent completion of steps and their use of a visual support within each task were documented throughout the intervention phases.

Research Participants

There were four participants in this study; three boys, two who were Caucasian and one who was Hispanic, and one girl who was Caucasian. The first criterion for student participation included those who received service and funding as student with moderate/severe disabilities under one of the following categories: mental retardation, multiple disability, autism, deaf-blindness, or serious emotional disturbance. Each participant in this study had an educational diagnosis of mental retardation or multiple disabilities. All students had an active IEP (Individualized Educational Plan) in place with specific goals and objectives as well as minimum time spent included/excluded in general education settings. The second criterion for inclusion in this study was a minimum of 10% of the school day in general education classrooms or school environments designated on the student's IEP. Each student's primary educational placement was considered a self-contained Special Day Class. All students enrolled in the class who met the above criteria were given the opportunity to participate in the study.

The participants ultimately included were those students whose parents returned permission forms.

The researcher gained permission from parents to review cumulative records to confirm educational diagnosis and services. The school district diagnosed all of the students through a multi-disciplinary psycho-educational evaluation, which is required to be completed every 3 years. Demographics and educational background in Table 1 provides information on each student regarding present levels of performance, services and intellectual functioning.

Table 1 *Participant educational information*

Participant	Ethnicity	Age (in years)	Grade	Disability	Services	% Included in General Education Settings	Present levels of performance		
							Measure	Purpose	Score[a]
Will	Caucasian	10	3	Mental Retardation	• Speech and language • Adapted physical education • Occupational therapy	20	KABC[b]	Assessment of intellectual functioning	68
							SIB-R[c]	Assessment of adaptive skill functioning	43
Seth	Caucasian	8	2	Multiple Disabilities	• Speech and language	45	DAS [d]	Assessment of intellectual functioning	70
							SIB-R	Assessment of adaptive skill functioning	49
Jose	Hispanic	11	5	Mental Retardation	• Speech and language • Adapted physical education	10	KABC	Assessment of intellectual functioning	40
							SIB-R		2

Molly	Caucasian	12	5	Mental Retardation	• Speech and language • Adapted physical education • Occupational therapy	10	None SIB-R	Assessment of adaptive skill functioning Assessment of intellectual functioning Assessment of adaptive skill functioning	n/a 3

[a]Present levels of performance- standard scores are reported; [b]KABC-Kauffman Assessment Battery for Children. Scores are General Intellectual Ability; [c]SIB-R-Scales of Independent Behavior-Revised. Scores are reported as Broad Independence; [d] DAS- Differential Abilities Scale

Participant 1: Will. Will lived with his mother, father, and brother (age 17 years).Will, identified as having Down syndrome, received his last multi-disciplinary educational evaluation in May, 2008. The results of the assessment indicate that Will's cognitive functioning falls within the mentally deficient range and his adaptive skills are within the low range (see Table 1). IEP Team recommendations indicate a need for intervention due to severe language deficits and articulation errors with resulting low intelligibility. Additional recommendations included providing reinforcement to Will for beginning tasks, staying on task, task completion, as well as providing frequent repetition of directions and information and checking frequently for comprehension.

Will was observed in his general education classroom, lunch room, playground, and computer lab. Within the general education classroom, Will followed the routine within "Center" time in the mornings. There were times when he wandered around the room rather than staying in designated areas, but returned upon verbal request. Although he sometimes he needed more than one reminder/request to stay on task, Will was observed completing seatwork independently for 25 minutes. During computer class, Will entered the computer lab and followed his classmates to the floor area to get teacher instructions, where he sat quietly and looked at the teacher. Once directions for the class were reviewed, Will went to his designated computer and chose Kids Pix while his classmates had a different assignment. Sometimes the teacher brought Will specific skills CDs such as Type- to-Learn; however, Will seemed to prefer Kids Pix. Once the teacher left, Will returned to his chosen program rather than continuing with the teacher chosen activity. On some occasions, Will completed, with verbal one-on-one assistance, activities presented by the computer teacher. The computer teacher and the special

education teacher communicated regarding ways to increase Will's level of computer interaction beyond Kid Pix, although no alternative activities or supports were observed to be in place.

Participant 2: Seth. Seth, an 8-year-old Caucasian male who lives with his mother and father, has an educational diagnosis of multiple disabilities according to his IEP. He exhibits overall low adaptive skills and borderline cognitive abilities resulting from an unknown etiology. He is currently in second grade and receives the majority of his educational services through a Special Day Class for students with moderate to severe disabilities since September of 2004. Seth's last psycho-educational evaluation included cognitive and adaptive skills assessments (see Table 1).

Seth attends recess with his second grade classmates and returns to the Special Day Class for academic instruction. Following some academic instruction, he returns to second grade for lunch and recess. Once recess is over, he returns to the second grade class for silent reading and various special activities such as music, P.E. and computers. Seth then attends the last recess of the day independently and once again returns to the Special Day Class. During the last block of time, Seth works on refining his fine motor skills, which include keyboarding activities, various hand-strengthening activities, and handwriting practice. Seth's second grade teacher reports she consistently must remind Seth to remain seated, stay on-task, and must set up alternative work for him to do because he misses instruction when he is out of the second grade classroom.

The multi-disciplinary team determined Seth's overall social and communication abilities are observed to be significantly depressed due to Seth's difficulty with reading and understanding written materials, printing and writing personal information, and

following parts of multi-step verbal directions. Seth's functional communication is in the low range. Recommendations for educational and academic modifications included pairing auditory and visual cues whenever possible to assist Seth in understanding expectations within his environment.

Participant 3: Jose. Jose, an 11-year-old Hispanic boy, lives with his mother, sister, brother, grandmother, aunt, and two cousins under the age of 5 years. Jose initially received special education services from 3 through 5 years of age, after which he and his mother moved to Mexico where he reportedly received little schooling. (i.e., 2 days per week for about 4 hours). They returned from Mexico in September 2008. Jose, who qualifies for Special Education Services under the educational category of mental retardation, has been identified as having Kabuki syndrome (see Table 1).

Jose is in the general education setting for lunch, recess and music with support from Special Day Class staff. Jose was observed in his classroom environment, on the playground, in the lunchroom and outside at the bus pick/up and drop off area to determine which environment should be targeted for increasing task independence with a visual support. Jose, whose overall communication is indicated to be at the 2-year, 6-month level in Spanish, was observed in the classroom to use a visual schedule, comprised of colored photos of the actual objects used and icons, in a "first/then" format. The schedule shows first "job" (represented by a photograph), then reinforcement (represented by a line drawing symbol).

At the initial observation, Jose did not have the picture icons easily accessible for him to use. He was observed to use no English words, and very few Spanish words for communication purposes. He was also observed to use intelligible verbal communication

including ‘no’, ‘coco’ (his mother), ‘pee pee’, ‘nina’ and ‘bye bye’, as well as signing to request food. He made many unintelligible verbalizations towards adults and children. Jose’s IEP reflected his need to progress in the areas of task completion, speech and language, and independent living skills.

Participant 4: Molly. Molly, a 12-year-old Caucasian female who qualifies for special education services under the mental retardation category, was previously diagnosed with 9P minus syndrome. This syndrome is associated with developmental delays, low tone, and heart issues. Molly lives with her mother, father, and older sister (age 14). Molly began receiving special education services in preschool and has received services in a Special Day Class since that time. Molly’s last educational evaluation was completed in May 2009; special education staff providing services completed a triennial evaluation. At that time, due to behavior challenges, delayed communication, vision impairments and well below average skill levels, her cognitive functioning was not formally assessed (see Table 1).

Molly spends the majority of her school day in the Special Day class; she is integrated with her fifth grade peers for physical education, music, library, art and some computer classes. Molly eats lunch in the cafeteria and participates in all recesses. While in music, library, physical education and computer classes, she is paired with one or two peers. Observations of Molly across her environments are consistent with assessments that have been completed.

Molly is observed to have both receptive and expressive communication deficits. At home, Molly’s parents observe her following simple directions such as, “Put your coat in the closet’, and following 2 part spoken directions, “Put your coat away, then get a

book". Molly's special education teacher reports that in that classroom and other locations at school, Molly follows verbal directions that include multiple prompts, including verbal, gestural, and sometimes physical prompts. She was observed in activities such as getting a new "job", setting up her job, and performing her job. Jobs included tasks such as sorting silverware, sorting pens and pencils, and sorting a box of three tactilely different objects. Molly is able to clear her snack items by being asked, "If you're finished, what do you need to do?"

Molly's parents and teacher report that she asks simple questions, and speaks in three to four word sentences. Her childcare provider and teacher indicate that Molly states her last name when asked. At school, Molly's expressive skills vary depending on her motivation to obtain an item or meet a need. Spontaneous expressive communication within the Special Day Class or other school environments is seen primarily when she wants a toy, something to eat or when she wants to either go outside or inside. Molly requests more food during snack time saying, "more". She indicates that she is eating ("Snacky"), and drinking ("milky"). When Molly needs help with her zipper or opening various snack containers, she rarely spontaneously requests "Help". During most observations she was verbally prompted to say "Help" or "Open", usually followed by "Pleasey", or a teacher or assistant would complete the process for her.

Molly was observed to label photographs of people and objects familiar to her by being presented with the photo and asked "Who" or "What". She labeled various photos of household items such as a hair dryer, stove, laundry basket, hammer, shoes. She labeled classroom materials, supplies, and furniture upon request. Molly's IEP recommendations included expanding the use of alternative communication opportunities

supplemental to a modified picture exchange system that was reportedly being used; suggestions included the use of icon strips, scripts, and augmentative devices.

Setting

The present study was conducted at a rural elementary school located in a western state. The school is a traditional kindergarten through fifth grade inclusive school that serves all local community children. This school was chosen because it is the only elementary school in the district that serves children ages 3 years through 12 years who have moderate to severe disabilities. This elementary school has the only Special Day Class in the district, exclusively for students with more severe educational needs. The population for this study included students with disabilities whose primary education service setting is a Special Day Class (self-contained special education). Special Day Class placements are designed to support students who need greater than 50% of their educational time supported by Special Education Staff; this is considered an alternative education environment. Total student enrollment of the special education classroom (Special Day Class) was seven. Individual settings of the study participants included a second grade classroom, a resource classroom, a third grade classroom, and the school cafeteria.

The second and third grade classrooms had class sizes between 20 and 22 students. Both classes were diverse in make-up; with students receiving varying degrees of support. These students spent between 15 % and 25 % of their academic instructional time outside of the classroom. The students with moderate to severe disabilities spent greater than 50 % of their academic instruction time outside of the general education setting and were supported for up to 100 % of their day.

The second grade classroom was set up traditionally, with all students in the class having their own desks. Desks were grouped into learning “pods” of five desks each. In addition to the individual desks there were large group tables. The classroom had designated areas for a library, an open space in the front of the classroom for group/circle times, and a teacher work area. During academic instruction times students sat at their individual desks or in a group on the floor in the front of the classroom. During non-instruction times, the students were allowed to self-select different locations in the classroom to complete work, engage in silent reading or partner reading activities, or complete free time activities. The self-selected seating was contingent on the students’ remaining on-task.

The resource classroom was set up to provide instruction to several small groups of students receiving English Language Development (ELD) instruction, and reading, writing, and math instruction. The resource classroom served between eight and 12 students, receiving instruction for 45 to 60 minutes. The resource classroom was comprised of three large group tables and contained several computers available for working on reading, writing, and math skills that were not otherwise available in the general education classrooms.

The school cafeteria was set up to support feeding lunch to all 660 students attending the school. Lunch times were set up in 10-minute intervals by grade-level. Students were given 20 to 30 minutes to eat lunch in the cafeteria and then they were sent outside for recess. The cafeteria was open for a total of 1 hour; from noon to 1:00 p.m. Upon entering the cafeteria, the students walked along a perimeter line to the director of the cafeteria who checked students by name on a computer. Each student was required to

wait on the “white line,” give his or her name and then walk through the door to the buffet-style serving corridor where each picked up milk, continued down the line, and selected lunch. Each day lunch choices consisted of a hot lunch or a cold lunch, which was either yogurt or a sandwich. Students selected their lunch and continued out the door where another buffet-style cart contained spork packages (a spoon/fork, napkin, straw combination), fruits and vegetables, and condiments (e.g., ketchup). After getting the necessary utensils, students self-selected a seat at one of 16 cafeteria tables. Upon finishing eating, students raised their hands to be excused by one of the cafeteria supervisors.

Research Design

A variation of a multiple baseline across participants design was used to examine the effectiveness of the visual supports on increasing task independence and reducing the need for staff prompting for task engagement and completion. The use of a multiple baseline design prevented the need for a withdrawal, reversal, or repeat alternating conditions design and thus was a more ethically accepted research design. The multiple baseline design variation used in the present study was a non-concurrent, multiple baseline across participants design (Carr, 2004; Harvey, May, & Kennedy, 2004; Stokes et al., 2004; Watson & Workman, 1981). “Non-concurrent multiple baseline designs stagger the baseline-to-intervention timing across various entities, but the baselines and interventions are not contemporaneous across each of the tiers” (Harvey et al., p. 270). The non-concurrent design is similar to the concurrent design in that behaviors are evaluated and compared across multiple baselines, in this case settings and people (Harvey et al.). The non-concurrent multiple baseline is a series of A-B replications

across baselines differing in their length of time (Carr, 2004). The data are then vertically aligned and visually inspected as they would be in a concurrent multiple baseline design (Carr). The difference as it applies to this research is as Carr implies, the A-B replications were not collected simultaneously throughout all participants across all phases. As Harvey et al. suggests, as long as unequal baselines occur, and the intervention is planned out, the requirements of the experimental design have been met. Non-concurrent multiple baseline design provides flexibility when withdrawal and reversal of the intervention effects and establishing cotemporaneous baselines are not possible (Harvey et al.).

During the study, three phases were implemented: Phase 1: Baseline; followed by Phase 2: Intervention in the form of a visual support introduced without systematically teaching its use; and Phase 3: Intervention consisting of the visual support remaining in place and paired with systematic teaching using least-to-most prompts. The objective was to implement the visual supports, without subjecting the participants to withdrawal of treatment. In this study, the A-B tiers partially overlapped, but not all tiers were conducted simultaneously across participants. As Kennedy (2005) suggests, this design controls for a number of possible threats to the external validity by staggering the introduction of the intervention or independent variable to allow for assessing effects.

"Multiple baseline designs are the experimental tactic of choice in situations where behavior cannot be reversed, logistical constraints do not allow the removal of the intervention, or ethical concerns make removal of the intervention unacceptable" (Kennedy, p. 162). In this study, taught behavior could not be un-taught, nor was it ethical to remove the intervention once it was in place. The non-concurrent multiple baseline design was chosen because it allowed the students to receive intervention that

might aid in successful acquisition of steps within each designated task, while at the same time allowing for comparisons among participants.

Following development of task-analyses, baseline data were collected for varying lengths of time for each participant to demonstrate stability in data before moving on to intervention Phase 2. Intervention Phase 3 and follow-up were completed for the three routines through successive, non-concurrent sessions. Each data point represents a completed day of the designated activity.

Table 2 *Participant task analyses*

Will	Seth	Jose	Molly
1. Press power button on screen to turn on computer	1. Get from shelf his book box that contained an assortment of books on CD.	1. Stand in line; wait for turn to greet cafeteria director	1. Greet Dani by saying “Hi” or “Hi Dani”, or waving.
2. Open Write:Outloud; use mouse to click on “SOLO” icon on the desktop	2. Sit.	2. Greet Dani by saying “Hi” or “Hi Dani”.	2. Get milk from the refrigerated milk crates. (First step after entering the serving line.)
3. Type his name	3. Choose a book.	3. Get milk from refrigerated milk crates. (First step after entering the serving line.)	3. Get lunch.
4. Type his password	4. Open the CD player.	4. Get lunch.	4. Get a spork package. (First step after exiting the serving room. Packages on a buffet outside the door.)
5. Click on the Write:Outloud pencil icon located on the top toolbar	5. Put the CD from the chosen book in the CD player.	5. Get a spork package. (First step after exiting the serving room.)	5. Sit at a table.
6. Click on wake-up Co:Writer icon located on the top toolbar	6. Put on headphones attached to the CD player	6. Sit at a table.	6. Open spork package.
7. Type sentences.	7. Push play on the CD player	7. Open spork package.	7. Open milk.
8. Click on Save icon located on top toolbar	8. Read.	8. Open milk.	8. Open lunch packages.
9. Type the date.	9. Put CD in book, and materials in book box.	9. Eat.	9. Eat.
10. Click on red close box along top toolbar to close program	10. Put book box back on the shelf in its designated location.	10. Clean-up, gathering all trash from food wrappers and milk carton; walk to a central trashcan.	10. Clean-up, gathering all trash from food wrappers and milk carton; walk to a central trashcan.

Procedure. A letter (see Appendix A) describing the study and containing information about the researcher was sent to potential families with children who met the previously described criteria. Following the letter, interested parents made contact with the researcher and a meeting was held to discuss the study and distribute informed consent forms (see Appendix B). Once all consent forms were signed by the participants' parents or guardians, the researcher began the research.

Confidentiality. An informed consent form (see Appendix B) described reasons for the study, confidentiality, and the right to withdraw at any time without penalty. To ensure confidentiality no real names were used within data collection and identifying information was removed from all written data. The name of the school was also changed. Only the researchers had access to data collected and it was stored in a locked file cabinet in the student researcher's classroom.

Interviews and records review data. After consent forms were signed, each child's cumulative school records were reviewed to ascertain the child's qualifying disability category and educational diagnosis. Multi-disciplinary, psycho-educational evaluation reports were examined to gather information on present levels of cognitive, adaptive skill, and communication functioning. Additionally, observations prior to beginning any research were conducted across multiple general education school environments for each child. Interviews with the Special Day Class teacher regarding activities to promote independence were also conducted. Additional information regarding the amount of time students were to spend outside of the special education setting with non-disabled peers was gathered from the most recently completed IEP.

Selection of the general education activity. Before the intervention began, the investigator met with the teacher and conducted preliminary videotaping to identify school environments and routines in which students did not already have interventions in place or where tasks were being completed one-on-one with a great deal of prompting. Working with the classroom teacher and the researcher's advisor, the routines selected were academic (i.e., sentence writing on a computer) for Will, silent reading for Seth, and lunch routines for Molly and Jose.

None of the participants had visual supports in place for the selected tasks prior to beginning the research project. Writing, using the computer software Write:Outloud with Co-Writer, a talking word processor and writing software program and a word-prediction program designed to expand vocabulary and improve written expression, was selected for Will because of his lack of functional computer use as well as the importance of classroom-based writing for academic gains. All activities using the computer that did not involve a preferred activity selected by Will required one-on-one support with consistent verbal prompting. Silent reading was selected for Seth after discussing Seth's reading abilities with both the Special Day Class teacher and the second grade teacher. Silent reading, occurring daily in the second grade classroom, tended to be 20 to 30 minute sessions where students interacted with books independently while the classroom teacher worked one-on-one with students. Because Seth's reading skill level is kindergarten level, excessive prompting or one-on-one assistance was needed for Seth to complete this activity successfully. Lunch time routines were selected for Molly and Jose as this was the time they were involved for the duration of an activity with same-age peers in the general education environment on a consistent, daily basis. This routine was selected

because it required one-on-one or one-on-two support from either a teacher or a paraprofessional with extensive prompting for the duration of the activity.

Selection of the general education activities were based upon individual student needs. Task analyses (Table 2) were completed for three separate school routines. Task analyses were used because of their effectiveness in assisting in the planning of implementing a multiple-step instructional procedure. Each task and environment was determined by individual student needs through a pre-baseline observation. In this case, the researcher systematically studied the behavioral sequences necessary for carrying out the expected activities (Stokes et al., 2004). The designated tasks for individual participants in this study included accessing and completing a writing routine using computer software, silent reading routine using books on CD and a CD player, and completing lunch routines from beginning to end. Each activity involved multiple steps and the duration of each activity varied from 15 to 30 minutes. Upon identification through task-analysis of each of the critical steps necessary to complete the designated activities, the critical steps were then paired with a visual representation of the step and organized into a complete 10-step visual support. The support outlined each necessary step to complete the activity sequence. The independent variable was the use of the visual support during a 10-step activity. The dependent variable was the change in task independence of the student participants.

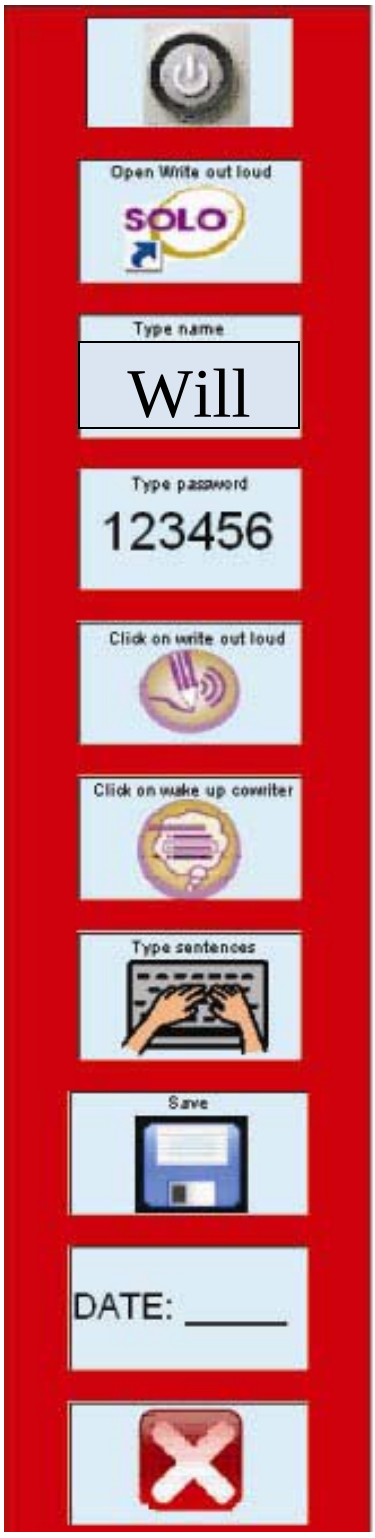
Materials

Creating visual supports. The materials used in this study were developed following observations in several inclusive school environments and after symbol assessments (Beukelman & Mirenda, 2005) were completed with each student. The

visual supports were individualized and included a combination of digital photos, line drawing symbols, and objects dependent upon individual student needs. The number of symbols in each visual support was standardized across participants and based upon the 10-step task analysis that was completed for each participant's activity (Table 2). During the initial task-analysis process, each step of the activity was recorded and assigned vocabulary. The vocabulary was then assigned a symbol referent based upon the communication level of each student as determined by the symbol assessment. Once symbol referents were assigned to the vocabulary, each visual support was designed to provide systematic visual steps for each student to complete the designated activity. Each visual support contained 10 symbol referents organized to meet the individual needs of students and the activity which they were to complete.

Participant 1: Will. Will's visual support (Figure 1) contained symbols that were a combination of photos, icons matching the computer, and words/numbers. Each referent corresponded with the systematic prompts of the computer program. The visual support was organized vertically and attached to the left edge of the computer screen. The vertical organization of the visual support allowed Will to read it like a list. The pictures were ½ inch by 1 inch (1.27 cm by 2.54 cm) in size. Will was required to complete 10 steps from the beginning to the end of his activity; as determined by the task analysis that was completed (Appendix C). Will typed between three and five sentences per session. The sentences were aligned with the reading program in which Will was working. Each sentence contained controlled vocabulary and contained a picture. The picture cued Will to type a word from his spelling words and was intended to promote the use of word prediction; the reason Will was using Co:Writer with Write:Outloud.

Figure 1 *Will's Visual Support*



Participant 2: Seth. Seth's visual support (Figure 2) was organized using a combination of photos and Picture Communication Symbols (The visual support was organized as a "script", allowing Seth to "read" his visual support from left to right, similar to reading a book or page of text. Additionally, silent reading involved the use of a portable CD player to listen to books on tape, headphones, and a task box to hold the book choices. Seth had to be introduced to the CD player and prompted through its use; all part of what would become his visual support. Seth's symbols measured 1 inch by 1 inch (2.54 cm by 2.54 cm). Seth's engagement in Silent Reading in the second grade classroom included ten steps from beginning to end. Pre-baseline observations demonstrated that Seth had the motor skills to use the CD player and possessed the necessary skills for correct book orientation and turning pages along with the CD. Thus, visual supports were not needed for the reading steps.

Seth was required to sit in a location in the room where he could see his books. He had previously arranged with his second grade teacher to sit close to a window in the library area of the classroom. The second grade teacher felt he should sit in this location consistently. Seth, prior to the start of the research project, reportedly needed consistent verbal reminders to find a place to sit; return to his seat; and engage with a book. The task analysis (Appendix C) identified the 10 steps necessary for Seth to begin, remain engaged, and complete the reading activity. The researcher varied the selection of books every 2 weeks to provide choice and opportunities to engage in reading materials that were potentially high interest. There were always between four and six books from which he could choose to read.

Figure 2. *Seth's visual support*

Participant 3: Jose. Jose's visual support (Figure 3) was made solely of photographs that included all of the meaningful steps involved in participating actively in the lunch routine. Students are required to give their name and teacher so the cafeteria director can mark them as having received lunch. The modification for Jose was an alternative to giving his name and teacher's name; a skill not in his repertoire, but the requirement of saying "hi" was.

Figure 3 *Jose's Visual Support*

Each step of the lunch routine was depicted by a color photograph; organized from left-to-right, with the first five steps backed in red and the last five steps backed in blue. This visual support was organized to decrease visual clutter and provide Jose with the task broken down into two distinct parts of the activity; the process of moving through the lunch line, and then the process of sitting and eating. Photo sizes were 2 inches by 2 inches (5.08cm by 5.08 cm), with the exception of the "open spork" photo which was 1 ½ inches by 3 inches (3.81 cm by 7.62 cm) so the integrity of the photo would not be lost.

Participant 4: Molly. Molly's task, similar to Jose's, was the completion of the entire lunch time routine, which was comprised of 10 steps. The lunch line routine required modification for Molly, as she did not have in her behavioral repertoire the skills of standing still and waiting, nor the skills of verbally stating her name and teacher's name; Molly did greet the cafeteria director.

Molly's visual support (Figure 4) consisted of using an actual object, a lunch tray, with the visual support adhered to the top. Her visual support consisted of all photographs that were comprised of key items or close-ups of critical actions being completed. For Molly, eating was a step that required a photo to prompt completion of the step. Initially, Molly would look around and repetitively tap on her milk or sandwich until someone opened her packages for her. She would continuously watch other students and would need to be prompted to begin eating.

Figure 4. *Molly's visual support*

Each photo was 2 inches by 2 inches (5.08cm by 5.08 cm) in size. Because she is successful at matching objects and photos; her visual support was designed to provide the opportunity to match the real objects obtained during the lunch routine with the individual steps necessary for task completion.

Instructional Process

Instructional prompts including verbal directives, gestures, and physical assistance were used for task completion during baseline (i.e., no visual support) and in Phase 2 (i.e., visual support present but not specifically taught). And during Phase 3 (i.e., use of visual support taught).

Throughout Baseline and Phase 2, prompts were delivered using increasing assistance, or least-to-most-intrusive prompting; allowing the students to be as independent as possible. Instruction began with the prompt that provided the least amount of assistance to elicit the desired student response (Demchak, 1997). The instructional prompts began with a verbal directive, then a gesture (e.g., pointing to the correct picture/activity), a model, partial physical assistance, and finally full physical assistance as determined by individual student need. The teaching process and prompt hierarchy (adapted from Light & Binger, 1998) occurred in the following sequential order:

1. Orient the student to the activity "Time for [type sentences, silent reading, lunch]"
2. I = Independent (Wait for response indicating independent initiation of task and first step completion); upon no response
3. G = Gesture (Gesture to step 1);
4. Wait for response; upon no response
5. V = Verbal (Provide verbal cue paired with gesture to step 1)
6. Wait for response; upon no response
7. P = Physical (Provide Physical guidance paired with verbal cue to step 1)
8. Wait for response for initiation of step 2 indicating independent step completion.

This process was followed for each successive step through all 10 steps of the task analysis. Data were collected on task analysis sheets (Appendix C) for each participant's designated activity.

Phase 3 initiated the beginning of systematically teaching the students to use the visual support. With the independent steps of the task no longer prompted; the emphasis switched to prompting use of the visual support. Using a specific prompt hierarchy of least-to-most prompts, each student was taught to use their visual support to complete their task. The prompt hierarchy used to teach the visual support followed the same 10 steps of the task analysis and was standardized through a least-to-most prompt hierarchy as follows:

1. Gain attention of the child.
2. I = Initiates work/step with presentation of visual support
3. Wait up to 10 seconds for child to respond
4. G = Initiates work/step with gesture to visual support
5. Wait up to 10 seconds for child to respond
6. G,VP = Initiates work/step with gesture and verbal prompt “Look at your schedule”
7. Wait up to 10 seconds for child to respond
8. G, IVP = Initiates work/step with gesture and indirect verbal prompt “what is it telling you?”
9. Wait up to 10 seconds for child to respond
10. G, DVP – Initiates work/step with gesture and direct verbal prompt “it is telling you to_____”
11. Wait up to 10 seconds for child to respond
12. G, PP, DVP = Initiates work/step with gesture, combined with partial physical prompt, and direct verbal prompt “it is telling you to _____”

13. Wait up to 10 seconds for child to respond
14. G, FP, DVP = Initiates work/step with gesture, combined with full physical prompt, and direct verbal prompt “it is telling you to _____”

Again, teaching the use of the visual support for each successive step was done using this hierarchy. Data were collected on visual support analysis sheets (Appendix D) for each participant’s designated activity.

Symbol Assessment

When developing a visual support, it is important to understand the student’s symbol skills and to provide instruction as needed to master new symbols (Mesibov, Browder, & Kirkland, 2002). A symbol assessment (Beukelman & Mirenda, 2005) was conducted to determine the symbol understanding of each participant. The assessment required the students to match symbols with their object referents. Each student was assessed in the following successive order: objects, photographs, and line drawings. “The goal of the assessment is to select the types of symbols that will meet the individual’s current communication needs and match his or her current abilities as well as to identify symbol options” (Beukelman & Mirenda, p. 191, 2005). Each student participated in an assessment following teacher identification of 10-15 referent functional items that were known to the student. During the assessment process, the student:

a. Identified 10 functional items agreed upon by individuals familiar with the student as being known; in this case, the speech and language pathologist and the Special Day Class teacher identified items that were used consistently by the student in the school setting. The identification process can be receptive (match the “object”, or point to the “object”, or look at the “object”) or

expressive (“what is this “object””, “show me the “object””) For Will and Seth expressive communication was used and for Jose and Molly receptive communication and matching were used;

b. Identified symbols that represent the selected items as presented by miniature objects, color and black and white photographs, line drawings, and words.

Data were collected using Beukelman and Mirenda’s Symbol Assessment: Receptive labeling, and Visual-matching, (p. 194-195) (See Appendix E).

Data Collection

All data coded during each phase of the study was graphed by hand and input into Microsoft Excel. All data were evaluated graphically via visual analyses (Kennedy, 2005) at the end of each week’s data collection sessions. Visual analysis were completed to identify a)level of independence for the whole task and type and level of prompt at each step of the task analysis with or without the visual support, and b) the data trend to facilitate prediction of future behaviors.

Data collection methodology included the use of task analysis sheets in which the prompt level for each step of the task was recorded by date for each student (Appendix C). Upon implementation of the visual support, task analysis sheets were used to record the prompt level to the visual support for each step of the task by date for each child (Appendix D). Additionally video was used for 92% of all sessions across all participants in each phase.

The study lasted a total of 6 months. Data collection began in January 2009, following the school Winter Break and ended on the last day of school June 2009. Within

this time there were two, 1-week breaks. Data were collected between two and five times per week; varying due to absences and school activities.

Variables

The independent variable was presentation of the visual support with and without systematic prompting. The dependent variable was percentage of task or activity steps completed independently. A student was considered independent on a task step when he or she: (a) began the task step without teacher or peer prompting (identified by observing the student follow, within the natural environment, teacher or peer instructions); (b) engaged in task step, defined as engaging with appropriate materials necessary for step completion; (c) finished the step, defined as placing task in identified location, putting materials away, following natural expectations of the environment such as putting work in its location upon transitional cue, closing a program after completion of designated work that had a clear beginning and end, and throwing trash away at the end of a meal routine. In order to determine percentages of independent task completion behavior, data were summarized by tallying steps completed independently within each task analysis and dividing by the total number of steps.

Phase 1: Baseline

Baseline data were collected for student participants in a staggered non-concurrent fashion. During baseline, students were observed in their task settings, and data were gathered on individual task step completion. Each student was prompted through the steps of their task systematically until data indicated stability or a decreasing trend. Baseline continued with intervention introduced in a staggered sequence consistent with a non-concurrent multiple baseline design. Observations were conducted three to

five times each week. Observations of all participants in their task settings, took place by the researcher to maintain integrity and consistency of data collection procedures. Eighty percent of all sessions were videoed for inter-observer reliability and procedural integrity purposes.

Phase 2: Intervention: Visual Supports Introduced without Teaching

In a staggered sequence consistent with the experimental design, each participant was introduced to their visual support without any teaching of the use of the support. In this phase, the objective was to determine if the mere presence of the visual support would increase task independence. During this phase, the task continued to be prompted without specifically referencing the visual support. For each participant this phase continued in a manner consistent with the non-concurrent multiple baseline design.

Phase 3: Intervention: Teaching the Use of Visual Supports

Each participant was oriented to their visual support at the beginning of this phase. Least-to-most prompts were used to orient the student to individual visuals for each step of the task as necessary. The occurrence or nonoccurrence of initiation of each individual step of the task was recorded using the least-to-most prompt hierarchy. The following data were collected for each student on the Visual Support Analysis Sheets (Appendix D):

a) Task steps are not initiated and not completed independently

b) Task steps are initiated, but successive task steps are not completed

c) Task steps are completed

Inter-observer Reliability

After the initial development of the prompt-hierarchy and task analysis sheets (Appendix C), the researcher and the observer (i.e., the research advisor) met frequently to practice observing videotape (Kennedy, 2005). The research advisor served as the secondary observer for inter-observer reliability. Initial agreement was established on the prompting procedures through the videotaping of a typically developing young child, who was not involved with the study, being prompted to complete a multi-step task. The primary researcher scored the prompts assigned and then trained the secondary observer until a minimum of 80% agreement was reached. At any point during the study, if agreement dropped below 80%, training occurred again.

Inter-observer agreement was assessed for greater than 30% of all sessions within each phase of the study. Inter-observer agreement was calculated using a point-by-point method to compare each prompt level recorded by the researcher and the research advisor. The number of agreements was divided by the total number of agreements and disagreements with the result multiplied by 100 to yield a percentage of agreement (Table 3).

Table 3 *Inter-observer Reliability*

Participant	% Sessions Observed			Mean % Agreement (Range)		
	Baseline	Phase 2	Phase 3	Baseline	Phase 2	Phase 3
Will	75	100	86	97 (90-100)	94 (70-100)	98 (80-100)
Seth	82	67	100	92 (80-100)	98 (90-100)	96 (80-100)
Jose	50	71	100	93 (90-100)	98 (90-100)	98 (90-100)
Molly	50	100	N/A	95 (80-100)	100	N/A

Procedural Reliability

Procedural reliability refers to the degree of accuracy with which the conditions are implemented as specified. The researcher developed a checklist that highlighted the procedures to be implemented in each phase (Appendix F). The researcher and the research advisor met weekly to review sessions and used this checklist in a minimum of 30% of the sessions across conditions. A percentage of procedural integrity was calculated by determining the percentage of procedures implemented as stated within the checklist (Table 4).

Table 4 *Procedural Reliability*

Participant	% Sessions Observed			% Agreement	% Agreement	% Agreement
	Baseline	Phase 2	Phase 3	Baseline	Phase 2	Phase 3
Will	63	100	99	86	96	99
Seth	45	83	47	100	99	99
Jose	33	100	63	96	97	99
Molly	50	100	N/A	91	91	N/A

Social Validity

In order to assess social validity, the general education teacher, the cafeteria director, and the special day class teacher were asked to fill out a questionnaire rating the perceived successfulness of the visual support on the student's task completion and activity acquisition during the research project. This measure was included to see if changes in task completion and independent behavior were apparent to the persons who work with the students on a daily basis. Each respondent was asked to answer open-ended questions on how they thought the students did both prior to and after the study. This questionnaire provided a subjective measure of perceived value of the outcome of the visual support on the learning and task completion in comparison to how the students did pre-intervention. Additionally each respondent was asked to rate how easy they felt the support system was to use, how helpful it was to the student, and how likely they are to use this type of support in the future (See Appendix G).

Results

The development of visual supports using digital photos of actual objects and actions, line drawing symbols, and screenshots of computer icons supported students participating in inclusive school environments. Each visual support was developed with communication symbols that enabled accurate, efficient and non-fatiguing understanding of the symbols that required minimal instruction (Beukelman, & Mirenda, 2005, p. 197). The visual supports augmented routines and activities that previously required teacher, paraprofessional, or peer support. Students utilized the visual supports during specific naturally occurring routines throughout the school day.

After baseline data were collected and showed a trend or pattern indicating stability, intervention Phase 2 was implemented, followed by Phase 3. If a change occurred from baseline phase to the intervention phase, then the researcher can be confident that the independent variable (the visual support) is causing the change (Carr, 2004). Additionally, if the change from baseline phase to Phase 1 is negligible and the change from Phase 2 to Phase 3 indicates an increasing trend, the researcher can provide additional support for the necessity of systematic teaching as an influential part of the implementation of the visual support intervention.

Research Question

The research question examined was:

To what extent does the use of a visual support system increase independent task completion by students with severe disabilities in activities in the general education setting?

a. What effect do visual supports have on task behavior without systematic teaching?
b. What effect do visual supports have on task behavior with systematic teaching through least-to-most prompting?

These questions sought to determine if the use of a visual support could provide sufficient information to a student to enable them to complete a 10-step task independently. The level of prompts necessary for each student to complete a computer writing activity, a silent reading activity, or two lunchtime routines was systematically recorded throughout three phases of the research process. A task step was considered independent if the student initiated and completed a step. If there was no response to a task step and a gesture, verbal, or physical prompt was necessary the step was considered prompted and thus not recorded as having been completed independently. The highest prompt level necessary to complete steps within each task were recorded across all phases.

The entire study took 6 months. The amount of time each participant remained in each phase varied. No participant moved from baseline phase to Phase 2 or from Phase 2 to Phase 3 until either data were stable or showed a decreasing trend for independent responding. Table 6 shows the number of sessions each participant spent in each phase.

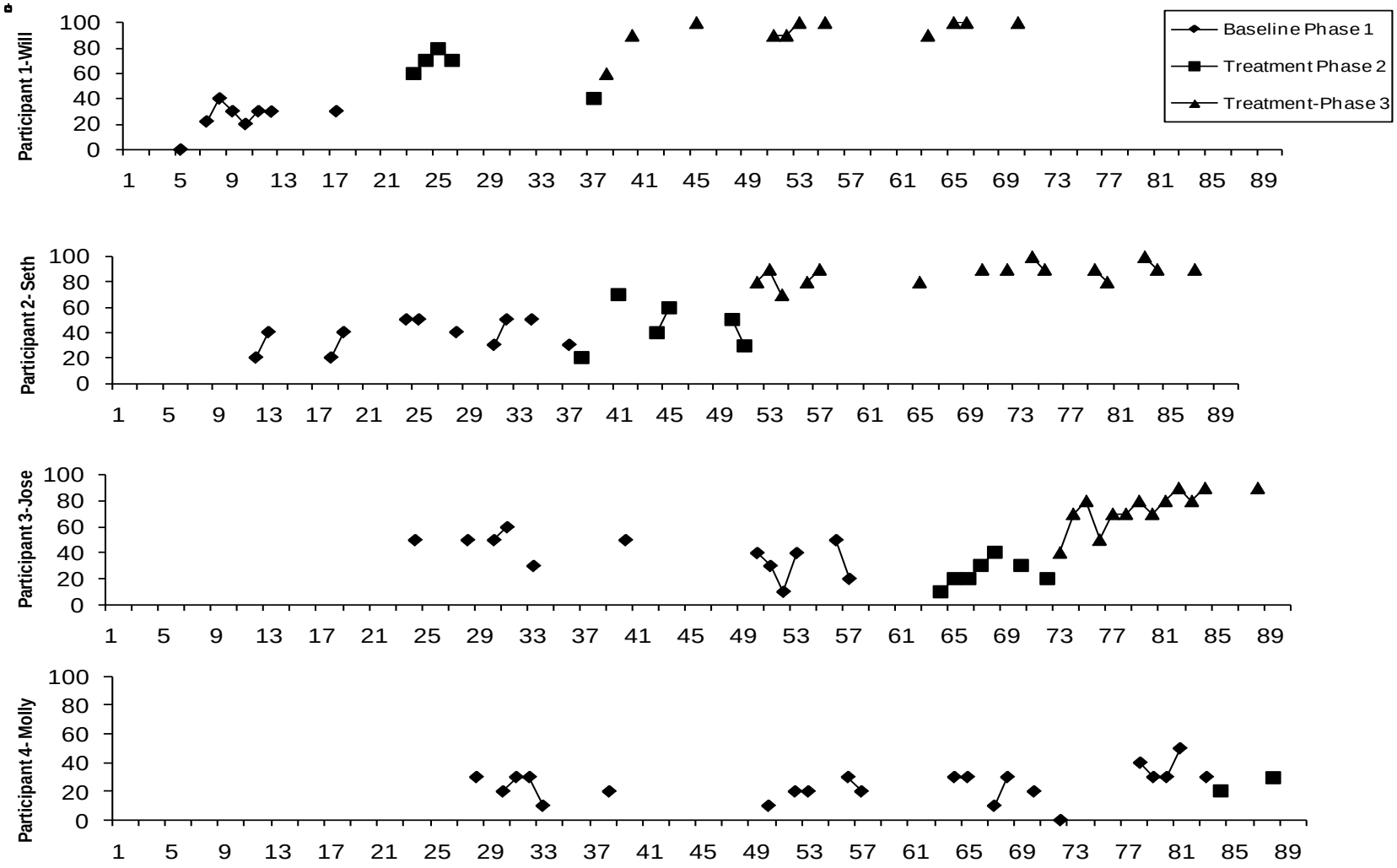
Table 5

Number of sessions each participant spent in each phase

Participant	Baseline Phase1	Treatment Phase 2	Treatment Phase 3
Will	7	5	11
Seth	11	6	15
Jose	12	7	13
Molly	22	2	0

Figure 5 shows data for all participants across conditions. Each data point represents a single day on which the participants completed the targeted activity and shows the percentage of independent task completion across all phases of the study. Visual inspection and analysis, assisted by comparisons of phase means, ranges and phase changes, are reported for percentage of independence by each participant.

Figure 5.
Percentage of independence for each participant across Baseline Phase 1, Treatment Phase 2,and Treatment Phase 3.



Participant 1: Will

During baseline, Will began his typing activity upon the verbal cue “It’s time to type sentences.” Initially, Will needed prompting through each of the 10 steps required to complete the task. Will averaged 24.3 %; (range 0 to 40%) independence across the seven sessions in the baseline phase. Figure 5 illustrates Will’s independence levels in the completion of the task.

Will’s visual support was introduced in his ninth session; beginning Phase 2, intervention without systematic teaching. Although Will initially began looking at his visual schedule, he discontinued making reference to it throughout his activity. Prompting to the task was still required throughout his typing activity Will averaged 64% (range 40 to 80%) independent task completion with the introduction of the visual support alone; no systematic teaching implemented in Phase 2. Although there was a 39.7% improvement from Baseline to Phase 2 with the introduction of the visual support, Will required prompting throughout the task for completion. Visual analysis of the data indicates there was an initial increase in task independence followed by a decline and an overall decreasing trend.

Will began Phase 3 after 13 sessions. Will made a jump in his level of independence in task completion on the second day of teaching. With gestures to the visual support Will immediately began to show behaviors indicating he was using the support to give him the information on the next steps that needed to be completed. Will was observed to be looking and pointing to the visual support steps, completing a step and again referencing the visual support to provide him with the next step. Figure 5 illustrates the level of independence Will achieved and maintained after teaching to use

the visual support began. Will averaged 92% independence in Phase 3 (range 60 to 100%); which was a 67.7% improvement over baseline and 28% improvement over Phase 2 (visual support with no teaching of its use). When Will demonstrated a stable trend in his use of his visual support and task independence, Phase 3 began with Seth. Phase 3 data collection continued for Will and indicated that he maintained task independence.

Participant 2: Seth

Seth was in the baseline phase for 11 sessions. Seth began his silent reading activity with the verbal cue “It’s time to read” or “Get a book” given by his second grade teacher. Seth needed prompting throughout the activity, averaging 38% (range 20 to 50%) independence throughout his silent reading activity during the baseline phase.

Seth’s visual support was introduced in his twelfth session. During silent reading, Seth was required to get his visual support, which was placed in a basket that contained books on CD, a CD player and headphones. Seth immediately asked “What’s that?” He looked at the visual support but did not use it to guide the activity steps. Seth averaged 45%, (range 20 to 70%) independence in Phase 2, which was 6.8% improvement over baseline. Seth continued to require prompting to complete the silent reading activity. There was an initial jump in Seth’s task independence; however, an overall decreasing trend was noted in Phase 2.

Seth began Phase 3 on his eighteenth session. Seth made an observable jump in his task independence when teaching of the visual support was implemented. Figure 5 indicates the task independence Seth demonstrated during Phase 3. Seth averaged 87.3 % (range 70 to 100%) independence in task completion, a 42.3% increased improvement

over the use of the visual support without systematic teaching and a 49.1% increased improvement over baseline. When Seth demonstrated a stable trend in task completion and independence, Phase 3 was implemented with Jose.

Participant 3: Jose

Jose was in baseline for 12 sessions. Jose began his task when the researcher, teacher, or paraprofessional gave the verbal cue “it’s time for lunch” at his Special Day Class. At that time, he gathered his backpack and walked with Molly, a participant in the research project, to the cafeteria for lunch. Jose averaged 39.2% (range 10 to 60%) independence in his lunch routine during baseline.

Jose’s visual support was introduced in his thirteenth session. He was required to carry his visual support with him through the lunch line routine and then place it on the table when he sat down. Jose initially showed interest in the visual support, particularly the digital photograph of the cafeteria director. However, he did not use the support to assist in the completion of the lunch routine in Phase 2. Jose averaged 24.3% (range 10 to 40%) independence in Treatment Phase 2; a decrease of 14.9% in task independence. Upon Jose demonstrating a decrease in independence in Phase 2, Treatment phase 3 with systematic instruction of the visual support began.

Jose began Phase 3 in his twentieth session. As with the other participants, Jose’s data indicated a greater level of task independence was achieved after systematic instruction of the visual support began. Jose, more than any other participant, liked to talk about his visual support and was observed labeling the pictures and saying the steps as he was walking down the hall to the cafeteria. He would repetitively say “Hi Dani” and point to her picture. Jose exhibited limited functional verbal skills, usually

communicating in single words, or through gestures, in the school setting and his behavior indicated he very much enjoyed looking at and talking about the pictures.

Data for this third phase, ending during the last week of school, indicate that Jose achieved an average of 74.6% (range 40 to 90%) independence in task completion when taught to use the use of the visual support to complete his designated task. Jose's performance in this phase represents 35.4% improvement over baseline and 50.3% improvement over Phase 2 (the visual support without teaching its use). Three of the last four sessions show Jose at 90% task independence.

Participant 4: Molly

Molly was in baseline longer than all of the other participants, for 22 sessions. Molly began her lunchtime routine when the researcher, special day class teacher or paraprofessional gave the verbal cue "It's time for lunch" paired with a transition object, a purse, that was used to cue her anytime she was leaving the classroom. The researcher continued with this routine until the visual support was introduced in Phase 2. Molly averaged 25 % (range 0 to 50%) independence throughout the baseline phase. Timing of the introduction was contingent on stable data exhibited by Jose while in Treatment Phase 3.

Molly was introduced to her visual support in the last week of the school year. Due to the end of the school year, Phase 2 was not completed with Molly and she was unable to participate in Phase 3. Although the data are inconclusive on the effects of the visual support, her results are included through the end of the study.

Effectiveness of the Intervention

In order to synthesize the outcomes of this single subject methodology and present objective, reliable data, the percentage of non-overlapping (PND) data points between treatment and previous baseline phases were calculated (Scruggs et al., 1986). PND is primarily used by researchers to quantify the impact of the effectiveness of interventions across participants in multiple baseline studies and reflects non-overlapping data between baseline and intervention phases. In order to rectify deficiencies that are associated with PND and the regression effect size; the percentage of all non-overlapping data (PAND) were also calculated. The effectiveness of treatment outcomes were calculated by computing the proportion of treatment data points which exceeded (non-overlapping) preceding baseline data points in the anticipated direction, resulting in PND. Additionally, the effect size between treatment and baseline were calculated for both treatment Phase 2 and treatment Phase 3. In this study Phase 2 data, the use of the visual support without teaching, was calculated proportionately with the preceding data of baseline, no visual support present; followed by Phase 3 data, the visual support without teaching, calculated proportionately with the Baseline Phase 1 data.

Percentage of non-overlapping data. Table 6 shows the percentage of non-overlapping data (PND) for each participant for Phase 2 and Phase 3. PND (Scruggs, et al., 1986) is an index of effectiveness for single-case research designs such as the multiple baseline design used in this study. The target behavior, task independence, was intended to increase; data points counted were only those treatment data points that are higher than the highest point in the baseline data. PND is hand-calculated by examining graphed data and determining the percentage of data points in intervention that do not

overlap with baseline data. Scruggs et al. (1986) and Mastropieri and Scruggs (1986), suggest that PND values <50 suggest unreliable effectiveness; >50 but <70 equate to questionable effectiveness; PND values >70 but <90 are fairly effective interventions; while PND values >90 are highly effective interventions.

Using these guidelines and reviewing the PND values for the present study (Table 6) show that use of a visual support without systematic teaching was fairly effective for Will and ineffective for both Seth and Jose. In contrast, the visual support paired with systematically teaching its use was highly effective for both Will and Seth and fairly effective for Jose (Table 9).

However, PND is criticized for (a) not being equivalent to an effect size and thus needing its own interpretation guidelines, (b) having unknown reliability due to lack of a sampling distribution, and no p values or confidence intervals, (c) ignoring all baseline data except for the highest data point (which could be the most unreliable due to being an outlier), and (d) a lack of sensitivity for very successful interventions (Parker, Hagen-Burke, and Vannest, 2007). Thus, percentage of all non-overlapping data (PAND) has been proposed as an alternative (Parker et al.).

Table 6 *Descriptive Summary of Baseline Phase 1, Intervention Phase 2, and Intervention Phase 3 across Participants and PND*

	Participants		
Statistics	Will	Seth	Jose
Phase scores	A: 0, 20, 40, 30, 20, 30, 30	A: 20, 40, 20, 40, 50, 50, 40, 30, 50, 50, 30	A: 50, 50, 50, 60, 30, 50, 30, 40, 10, 40, 40, 20
	B: 60, 70, 80, 70, 40	B: 20, 70, 40, 60, 50, 30	B:10, 20, 20, 30, 40, 30, 20
	C: 60, 90, 100, 90, 90,100, 90, 100, 100, 100	C: 80, 90, 70, 80, 90, 80, 90, 90,100, 90, 90, 80, 100, 90, 90	C: 40, 70, 80, 60, 70, 70, 80, 70, 80, 90, 80, 90, 90
Number of scores	B: 12 C: 17	B: 17 C: 26	B: 19 C: 25
SDs	B: 24.29 C: 36.41	B: 14.35 C: 26.52	B: 14.61 C: 22.78
Phase Means	B: 40.83 C: 64.12	B: 40.59 C: 66.54	B: 33.68 C: 57.6
PND	B: 4/5=80% C: 5/5=100%	B: 2/6=40% C: 8/8=100%	B: 0/7=0% C: 9/11=82%

Percentage of all non-overlapping data. Parker et al.'s (2007) guidelines for calculating PAND are (1) determine the total number of overlapping scores between baseline and intervention for each participant, (2) determine the total number of baseline and intervention scores, (3) calculate the percentage of overlap by dividing baseline overlapping scores by the total number of baseline and intervention, (4) subtract the percentage of overlap from 100 for the PAND value, and (5) finally subtract 50 from the PAND value to determine the non-overlap beyond chance level.

In the present study, PAND was first calculated for use of the visual support without systematic teaching (i.e. Phase 2). Overlapping data (the minimum number that would have to be swapped across phases to eliminate all overlap) between this phase and baseline were 1 for Will, 4 for Seth, and 7 for Jose, totaling 12. Overlap is 12/48 or 25%. The resulting PAND is 100 - 25 = 75%. Non-overlap beyond chance level is 75- 50 = 25% (Table 9).

PAND for use of the visual support with systematic teaching (i.e. Phase 3) is similarly calculated. Overlapping data between Phase 3 and baseline were 0 for Will, 0 for Seth, and 2 for Jose, totaling 2. Overlap is 2/69 or 2.9%. The resulting PAND is 100-2.9 = 97.1%. Non-overlap beyond chance level is 97.1 - 50 = 47.1%.

Pearson *Phi* Effect Size. A *phi* effect size is calculated for each phase of the intervention by creating a 2x2 contingency table (Parker et al., 2007). The percentages of data points are calculated for baseline, Phase 2 (see Table 7): 30/48 = 62.5%, 18/48 = 37.5% and Phase 3 (see Table 8): 30/68 = 44.12%, 38/68 = 55.9%. These percentages are entered into respective columns. Next, the proportion of overlapping data is split between cells *b* and *c* (25% in Phase 2, 2.9% in Phase 3). These two cells represent "too high" scores in the baseline phase (*cell b)* and "too low" scores in the intervention phase (*cell c).* Through a mathematical subtraction equation, cells *a* and *d* are filled in: Phase 2: 62.5-12.5 = 50 and 37.5-12.5 = 25; Phase 3: 44.12-1.45 = 42.67 and 55.88-1.45 = 54.43. "Because this table has completely balanced vertical and horizontal marginals, a Pearson *Phi* effect size can be calculated as the difference between the two cell ratios" (Parker et al., p. 197); Phase 2: 50/62.5-12.5/37.5 = .467 and Phase 3: 42.67/44.12-1.45/55.88 = .942 The Pearson *Phi* calculated results indicate that the effects of intervention Phase 2

(visual support without teaching) were .467; determining presentation of the visual support when presented in isolation was not effective in its ability to increase task independence. The Pearson *Phi* calculated results for intervention Phase 3 (visual support with systematic teaching) were .942; indicating the use of the visual support combined with systematic teaching was a highly effective intervention used to increase task independence (Table 9).

Table 7 *2x2 Table of Proportions for Intervention Phase 2*

	Baseline Phase 1	Intervention Phase 2	Total
High	50 *cell a*	12.5 *cell b*	62.5
Low	12.5 *cell c*	25 *cell d*	37.5
Total	62.5	37.5	100

Table 8 *2x2 Table of Proportions for Intervention Phase 3*

	Baseline Phase 1	Intervention Phase 3	Total
High	42.67 *cell a*	1.45 *cell b*	44.12
Low	1.45 *cell c*	54.43 *cell d*	55.88
Total	44.12	55.88	100

Table 9 *Effect Size, PND and PAND values for Intervention Phase 2 and Phase 3*

	Intervention Phase 2			Intervention Phase 3		
	Will	Seth	Jose	Will	Seth	Jose
PND	80%	40%	0	100%	100%	82%
	PAND (across participants)					
	75%			97.1%		
	Pearson Phi Effect Size (across participants)					
	.467			.942		

Social Validity Results

Social validity is the estimation of the importance, effectiveness, appropriateness, and satisfaction various people experience in relation to the intervention (Kennedy, 2005). The special day class teacher, the second grade teacher, and the cafeteria director filled out a social validity questionnaire regarding their thoughts on the use of the visual supports by the students. The information they provided was their subjective understanding of the effects the visual support intervention had on each participant's task independence. Table 9 is a summary of the written answers given to the social validity questions. All three reported that the visual supports were effective instructional tools for the participants with an overall decreased need for prompting from support staff. There were unanimous observations as reported on the questionnaire indicating that all of the participants were perceived to be more independent in their tasks than they were prior to the intervention process.

Table 10 *Social Validity Results*

Questions	Participants			
	Will (Reported by Special Education Teacher)	Seth (Reported by 2nd Grade Teacher)	Jose (Reported by cafeteria director)	Molly (Reported by cafeteria director)
Do you think that the visual support was an appropriate instructional strategy for the student?	Yes	The visual support was a great strategy to use during reading time every day.	Yes	Yes
Did you notice changes in task completion behavior on the part of the targeted student?	The need for staff prompts decreased; levels of independence increased, with a decrease in difficult behaviors.	I noticed the student could successfully read/write for 20 minutes with no reminders.	Yes	Yes
Did the child display any activity behavior that he/she did not display before the use of the visual supports?	A greater level of independence	Behaviors including screaming “No, I won’t”; “I’m out of here” and wandering around the class disappeared at this time.	More talking	More communicating

Do you feel this instructional strategy created more opportunities for the student to participate in the general classroom activities?	Yes	Picture cues were implemented for other class times and sometimes effective or not; not a lot of carry-over.	Yes	Yes
Do you think the visual support is difficult to implement in the classroom?	Implementation of visual supports in general ed. Environments and levels of difficult depend on individual staff skill levels and willingness	No- it is very easy to use at all times- any cues are helpful.	No	No
Do you feel that it is important to receive training before implementing visual supports in your [setting]?	Yes, I believe there's a level of training needed prior to implementation.	No- Visual strategy cues are great. What needs to happen is "SYSTEMATIC" implementation. This structure/expectation is a must.	Yes- in 5 words or less	Yes
Do you feel you could implement the use of visual supports with other students in the future?	I can and do implement visual supports presently. Overall time to develop visual supports becomes a	Yes- I have and will continue as needed.	Yes- it kept him focused	Yes- it kept her focused

	barrier at times.			
Do you think visual supports are at all disruptive to your classroom routine and activities?	No- Visual supports decrease disruptions within the general education routine.	Not at all- all visual supports are helpful at any time.	No	No
Do you feel that you need more training and support in the classroom when using visual supports?	More guidance/ suggestions/ time.	No- after 25 years and lots of "tricks", I try "all" to see what will work for the student to have effective learning every day.	No	No
Did you notice any new behaviors on the part of the student because of the visual support put in place?	Student began referring to visual support prior to asking for assistance from staff.	The student was able to verbalize calmly what the job and behavior expectation was for him to do.	He knew his job and task	She knew her job
Did you notice any new behaviors on the part of other students in your [setting] because of the use of the visual supports?	No	They were compassionate and understanding and a few learned to give a few reminders to redirect for learning the task. They generally like the visual	More talking	More talking

		support for themselves.		
Did you feel that visual supports met the communication and behavioral needs of the targeted student in your classroom?	Yes- the student developed a means to request assistance without disrupting class.	The visual support helped meet the expected behaviors for the 20 minute time period of reading because it was systematic and with structure and had expectations for the student to follow.	Yes	Yes

Discussion

The purpose of this study was to examine the effectiveness of using visual supports within the general education classroom, and other inclusive school environments. Additionally, this study sought to expand prior research that utilized visual supports to demonstrate a variety of increased positive behaviors (Anderson et al., 1997; Bryan & Gast, 2000; Dettmer et al., 2000; Jaime & Knowlten, 2007). Specifically, the implementation of the intervention was hypothesized to affect task independence, allowing students identified as having severe disabilities to become more independent in their completion of various general education and inclusive school activities and routines.

The visual supports were designed for four students with various needs and disabilities and used objects, digital photos, line drawings and computer icons in a variety of formats to meet individual needs of students completing one specific routine or activity. An essential component in the development of the visual supports was a symbol assessment to ensure understanding of the visual support each student would need to ensure their understanding of the task. Following symbol assessments, the researcher began by completing task analysis of specific routines and designed 10-step visual supports for the students to use in lieu of extended support from teachers, paraprofessionals, or peers.

The major findings of the present investigation indicate that a) visual supports are an essential component in increasing task independence in students with severe disabilities, b) visual supports presented without systematic teaching of their use are not effective intervention strategies for skill acquisition, and c) students with severe

disabilities acquired skills necessary to be more independent across inclusive settings with the systematic teaching of a visual support.

Results of this study indicate that the visual support intervention was successful for three of four participants, with the last participant not having the opportunity to complete the intervention due to the school year ending. The research question was examined in two phases:

1. The use of visual supports without systematic teaching and its effect on increasing task independence for students with severe disabilities, and
2. The use of visual supports combined with systematic teaching and its effect on increasing task independence.

Results suggest that visual supports are a successful intervention strategy, but they must be combined with systematic teaching to have the greatest impact on student behavior. Results are discussed relative to the research question as it pertains to each individual participant and in context of all participants together. Additionally, implications for teachers and support personnel are explored along with recommendations for future research.

The Use of Visual Support without Systematic Teaching

In this phase of the intervention two students, Will and Seth demonstrated a brief increasing trend in their independent completion in the steps of their targeted tasks. Will averaged 64%, an increased difference of 40%, independence in this phase. Seth averaged 45%, an increased difference of 7%, independence in this phase. Jose demonstrated 24% independence, a decreased difference of 15%, and Molly demonstrated no change over Phase 1 with 25% independence. Although increases were

demonstrated for Will and Seth, task independence was not maintained and independent responses decreased across participants with student behavior requiring an increase in prompts.

When assessing use of the visual supports, each student was monitored as they demonstrated behavior indicating they were referencing individual steps of the visual support. Behaviors including visual tracking, pointing, or labeling were observed and indicated use of the support. However, both Will and Seth stopped looking at the support; and independent task completion returned to baseline levels, demonstrating that simply introducing the visual support was not sufficient for increasing task independence. Interestingly, although all of the participants had previously used visual supports for tasks not targeted within the present study, none generalized these skills to use of the visual supports developed for use in this study. Jose demonstrated an initial curiosity about the visual support by identifying all of the visual representations, there was no observable behavior that indicated he understood the visual support was an informational tool for assisting him in completing the task.

Unlike Will and Seth, Jose did not demonstrate an increase his task independence when the visual support was presented. Although Jose demonstrated curiosity and seemed to like to look at the pictures, without the teaching component he did not use the support for actual completion of task steps. Instead, Jose would match or label the photographs with objects and people that he saw. During the completion of his lunchtime routine, Jose looked at his support while he was walking to the lunch room, labeling pictures or asking “como se llama?” (i.e. “what is the name?”). Additionally, motor skill deficits created some challenges for Jose. He was taught how to grip the spork, apply pressure to the

package, leveraging it on the table so the spork and the straw would slide out the top. As with opening his spork, motor skill deficits made it difficult to open his milk. Jose was taught to increase his ability to use a functional double pincer grasp on both sides of the milk carton opening to increase his ability to access the carton independently. However, these accommodations for motor skill deficits were taught from the onset of baseline and so the deficits did not confound the presentation of the visual support.

Molly participated in the phase in which the visual support was introduced only for two sessions and did not demonstrate any change in her independence as compared to baseline. Her visual support was on a small serving tray that allowed her to look at the support as well as carry her lunch items. As with Jose, motor skill deficits created some challenges for Molly. From the onset of baseline, she was taught how to grip the spork, apply pressure to the package, leveraging it on the table so the spork and the straw would slide out the top. Additionally, opening milk and lunch packages were skills that Molly had to be taught. Previously staff opened all of her items for her. Molly was taught, from the beginning of the baseline phase, to use a pincer grasp to open her sandwich packages or yogurt tabs, the two types of lunches she chose most frequently. Due to her motor skill and organizational difficulties, use of a tray was thought to be a systematic way to incorporate the visual support and the functional use of an object. The first 2 days she was taught how to use the tray by holding it in two hands and placing all of her lunch items on top and carrying it to the table. During this time, Molly made no observable reference to the pictures on the tray and continued to require prompting for 70% to 80% of the task steps; this performance was commensurate with her baseline data.

One variable that was considered during this process was the effect initial systematic task prompting might have on the students' acquisition of the task steps. Although all of the students had previously engaged in the targeted activities with various types and levels of support, some for many years, none had previously been taught in a systematic manner. Systematic teaching through least-to-most prompting and visual supports for the tasks was introduced during this study. Any effects the initial prompting had on the tasks were taken into account by establishing and maintaining a stable baseline before beginning Phase 2 of the intervention process. Based on baseline performance for each participant, it appeared the use of systematic prompting of the task was insufficient to increase task independence for the targeted activities.

Visual analysis of baseline established that teaching the task through least-to-most prompting did not affect the task in a manner that indicated definitive improvement in task independence. Additionally, introduction of the visual support without systematic teaching did not influence the behavior in a dramatic way. It was not until the visual support was combined with systematically teaching use of the support that a marked improvement in participant performance was noted.

The Use of Visual Supports Combined with Systematic Teaching

Will, Seth, and Jose demonstrated immediate increases in task independence when systematic teaching focused on the visual support. After only a few prompts to the visual support, Will and Seth demonstrated task independence at 90% to 100% over several activity sessions. After systematic teaching to use the visual support began, Jose demonstrated task independence at 80% to 90%. Once Jose began to use the visual support for task completion he remained at 90% independence and did not achieve 100%

independence; however this can be attributed to motor skill difficulties with opening his milk. Even though Jose did not reach 100% independence, it was very clear he knew what steps to engage in to complete his task as demonstrated by repeatedly pointing to the “open milk” photo and saying “open”. Jose indicated repeatedly during Phase 3 that he used the visual support for obtaining information on completing each step of the activity by pointing and making verbal approximations indicating the action expectation of the picture cue. .

In Phase 3 of the intervention, utilizing the visual support combined with systematic teaching, 3 students, Will, Seth, and Jose, demonstrated a marked improvement in their independent completion in the steps of their targeted tasks. When assessing use of the visual supports, each student was monitored as they demonstrated behavior indicating they were referencing the individual steps of their visual support. Behaviors including visual tracking, pointing, or labeling were observed and indicated use of the support. Will averaged 92%, independent task completion and the final 3 sessions in Phase 3, Will was 100% independent in completing his activity with the use of the visual support. Seth averaged 87.3% independence in task completion and the final 3 sessions in Phase 3 indicated Seth was completing 90% to 100% of the task independently. Jose achieved an average of 74.6% independence in task completion and data indicated that in his last two sessions he was 90% independent. These results indicated there was dramatic improvement in beginning a task, completing each step, and finishing a task without the support of a teacher, paraprofessional, or peer. Additional analysis of the data and review of the PAND supported systematic teaching of a visual

support as a highly effective intervention for Will and Seth and moderately effective for Jose.

Increases in overall independence upon presentation of the visual supports with systematic teaching are supported by research that visual schedules provide students with a greater level of organization, task information, and receptive understanding of the expectations (Hodgdon, 1999). Additionally the systematic teaching of the visual supports rather than the prompting of the task steps of themselves, demonstrate the value of the teaching the use of the activity schedule rather than repetitively teaching the task. The key elements to the intervention process not only include the presentation of the visual support but highlight the necessity of completing a symbol assessment to ensure the understanding of the symbol level that will be used to develop the visual schedule. It is an essential component of developing an intervention and teaching strategy and is the foundation for understanding by the participant who will use it.

Both Will and Seth were able to demonstrate they could complete their tasks with 100% independence. Both students had the necessary motoric abilities to complete their tasks while motor skill deficits could have been an interfering factor in Jose's ability to demonstrate 100% task independence. Although Jose was taught through increasing assistance to open his milk, a skill deficit that was recognized early in the study, he continued to be unable to apply enough pressure to the milk carton opening to separate the package and create an opening.

Visual analysis of Phase 3 offered additional support for the necessity of teaching the use of the visual support systematically. Teaching the task through least-to-most prompting had an negligible effect on task independence. The results indicate that

without the systematic teaching of the visual support, simply providing the support is not sufficient to change behavior. This is an important finding for this study demonstrating the necessity of specifically teaching the use of visual supports. For all of the participants skill acquisition was greater once teaching began and indicated that the individual students were acquired skills not previously demonstrated; in some cases the students had been working for many years on skills that they had not generalized nor maintained.

Social validity results added to the understanding of the larger context of this study by providing subjective information on the perceptions of others who were working with students in a variety of settings. The information aided in supporting the positive functional relationship between the uses of the visual support as an effective intervention strategy in a social context. The respondents to the social validity questionnaire indicated that the goal of increasing task independence was met through the use of the visual supports, the procedures were acceptable and aided in an increased level of understanding of the task expectations for both the participants and others that worked with them, and the outcomes were favorable, leading to an overall successful intervention strategy that not only assisted in teaching of new skills, but increasing overall participation in the settings in which the students were included. The ease of their use and acceptance by teachers and support staff without specific knowledge of methodology used in special education is encouraging for their future use in a variety of general education settings.

With the proper supports, students with severe disabilities have a greater access to the core curriculum, peer models, and general classroom routines and activities. The uses of the visual supports as an intervention potentially provide students with a greater level of access by decreasing their need for additional staff for curricular, behavior, and

communication support. Visual supports create a greater level of understanding of the environment and expectations, and an additional mode of communication; all of which can increase participation and potentially decrease problem behaviors.

Practitioner Implications

Results of this study have implications for efficiently and effectively incorporating recommended best practices into the teaching of students with severe disabilities educated in their home schools, least restrictive environments, and general education settings. The three participants who completed all phases of this study demonstrated they could not only use the visual support to complete tasks with 80 % independence or better, but enjoyed its use as a communication tool. The researcher chose activities that the students were already participating in and developed those opportunities to provide the students a greater level independence. The visual supports were incorporated into routines already in place and could be easily implemented without disruption to the natural scope and sequence of the activity. The ease of the implementation suggests that general education teachers, special education teachers, paraprofessionals, and other support personnel could find additional opportunities across the day and throughout various environments to increase the opportunities to use visual supports.

The visual supports in this study were developed using low technology devices, they were easy both to put together and to transport across environments. Visual supports of this nature could be beneficial to expanding the educational opportunities of all students who have difficulties with information presented only through spoken word with the expectation that they will understand what they hear. The students in the present

study exhibited growth across their activities and demonstrated enthusiasm over their successes. The visual supports were easy to implement across environments and encouraged socially appropriate, on-task behavior giving students a greater level of access and interaction with their same-age peers in the school environment. The expectation that the results would be favorable for the use of visual supports with students with severe disabilities in the general education classroom and inclusive school environments proved to be true.

One other noteworthy aspect of the use of visual supports is the relative amount of time during which behavioral changes were observed. The study lasted one semester's time in reference to school. For teachers looking at ways to increase student skills across a variety of domain areas and behaviors, and increase opportunities for participation, and successful completion of activities, visual supports are an effective intervention strategy. The supports are viewed as socially appropriate, and have a research base as an effective strategy for students with disabilities. This intervention is both effective and efficient, allowing teachers to spend a relatively short time for a potential marked gain in student skill development. The broad scope of the intervention's success suggest that the use of visual supports as an integral part of a student's curriculum leads to increased success that may not otherwise be observed.

One anecdotal observation made by the researcher was the use and understanding of least-to-most prompts in a systematic way. Initial observations of classroom staff suggested that none of the staff was following a systemic prompt hierarchy to teach skills within specific routines. Statements such as "He needs a verbal prompt to do that" or "She can't do that, you need to do that for her", suggest that revisiting and training the

specifics of various methods of systematic prompting would be valuable for all staff working with students with special needs.

Limitations and Future Research

Potential limitations of this research include broad generalization to all students with severe disabilities due to the single subject research design. The present study had only three participants that completed all of the phases. This research could be replicated with a larger number of participants across a wider variety of educational opportunities. Additional follow-up to this research could be completed to determine if the activities in which students demonstrated a high level of independence carried over and generalized to other environments or to the next grade level where the classroom is different but the activity is the same. The present study had only four participants. This research could be replicated with a larger number of participants across a larger number of activities. Parents could also be included to determine if activity schedules were successful within home routines.

Additional limitations lie in the development and use of the visual supports. For all of the students, a 10-step task analysis was completed and led to the development of the individualized visual supports. In this research it may have been possible to decrease the number of steps for each student, essentially chunking their task so a smaller number steps could be learned, particularly for Molly. It is possible that by chunking portions of the task and systematically teaching a smaller number of visuals, students may be able to acquire, generalize, and maintain skills before they are presented with the next chunk of the visual support and task. The visual supports did not account for potential motor limitations in the participants. Some motor limitations will limit the level of skill

independence a student can achieve. Additions to visual supports such as adaptive equipment that enable a greater level of independence may be necessary for some students.

There is some caution in the interpretation of the effectiveness of the intervention of the visual support combined with systematic teaching. Each of the participants had the opportunity to look at and experience their visual support prior to the beginning of the systematic teaching (Phase 3). Although there was no notable effect for the participants it cannot be said that the stability of the data in Phase 3 of the intervention would have been as high or determined to be as effective if the visual support had not been introduced prior to systematic teaching.

Conclusion

The primary objective of all teachers is to provide students with skills that are essential to their growth academically, socially and communicatively across a variety of settings. This is particularly true for teachers of students with disabilities. This means students must be given the tools necessary to function more independently in all of their environments. Additionally, it is important to the progress of students in the quest for greater access to the general education environment and curriculum, to have the skills and tools necessary for success. Findings of this study indicate that visual supports in the form of activity schedules aided the participants in becoming more independent within those natural environments. This level of independence has the potential to increase students' social relationships, acceptance, communication, and self-esteem.

Results of this study have implications for how to teach children with severe disabilities across a variety of activities and settings. The participants demonstrated that

they could access the general curriculum appropriately and understandably with the use of their specifically designed visual supports. The teachers and support staff working with the students found the visual supports could be easily implemented and could effectively decrease the amount of adult support necessary for students to complete activities. Teachers, parents, therapists and other service providers could find opportunities throughout the day to use visual supports as a teaching component for a variety of activities across a variety of settings.

References

Alberto, P. A., & Troutman, A. C. (2006). *Applied behavior analysis for teachers* (7th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Ali, S., & Frederickson, N. (2006). Investigating the evidence base of social stories. *Educational Psychology in Practice, 22*, 355-377.

Anderson, MD., Sherman, J. A., Sheldon, J. B., & McAdam, D. (1997). Picture activity schedules and engagement of adults with mental retardation in a group home. *Research in Developmental Disabilities, 18,* 231-250.

Beukelman, D. R., & Mirenda, P. (2005). *Augmentative and alternative communication: management of severe communication disorders in children and adults (3rd ed.).* Baltimore: Brookes Publishing.

Breitfelder, L. M. (2008). Quick and easy adaptations and accommodations for early childhood students. *Teaching Exceptional Children Plus, 4(5),* 1-15.

Brown, K. E. & Mirenda, P. (2006). Contingency mapping: Use of a novel visual support strategy as an adjunct to functional equivalence training. *Journal of Positive Behavior Interventions, 8,* 155-164.

Bryan, L. C., & Gast, D. L. (2000). Teaching on-task and on-schedule behaviors to high functioning children with autism via picture activity schedules. *Journal of Autism and Developmental Disorders, 30,* 553-567.

Buckley, S., Bird, G., & Sacks, B. (2006). Evidence that we can change the profile from a study of inclusive education. *Down Syndrome and Practice, 9(3),* 51-53.

Carr, E. G., & Durand, V. M. (1985). Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis, 18,* 111-126.

Carr, J. E. (2004). Recommendations for reporting multiple baseline designs across participants. *Behavioral Interventions, 20,* 219-224.

Carson, K. D., Gast, D. L., & Ayres, K. M. (2008). Effects of a photo activity schedule book on independent task changes by students with intellectual disabilities in community and school job sites. *European Journal of Special Needs Education, 23, 269-279.*

Clarke, S., Dunlap, G., & Vaughn, B. (1999). Family-centered, assessment based intervention to improve behavior during an early morning routine. *Journal of Positive Behavior Interventions, 1,* 235-241.

Conroy, M. A., Asmus, J. M., Sellers, J. A., & Ladwig, C. A. (2005). The use of an antecedent-based intervention to decrease stereotypic behavior in a general education classroom: A case study. *Focus on Autism and Other Developmental Disabilities, 20,* 223-230.

Crozier, S., & Tincani, M. J. (2005) Using a modified social story to decrease disruptive behavior of a child with autism. *Focus on Autistic Behavior, 20,* 150-157.

Demchak, M. A. (1997). Teaching students with severe disabilities in inclusive settings. *American Association on Mental Retardation: Innovations,* 12.

Dettmer, S., Simpson, R. L., Myles, B. S., & Ganz, J. B. (2000). The use of visual supports to facilitate transition of students with autism. *Focus on Autism and Other Developmental Disabilities, 15,* 163-169.

Fisher, D., & Frey, N. (2001). Access to the core curriculum: Critical ingredients for student success. *Remedial and Special Education, 22,* 148-157.

Fossett, B. (2004). Visual Support Strategies for Literacy Development (Electronic Version), *SEA Croscurrents Magazine,* Spring, 23-32, http://www.bctf.ca/TeachingToDiversity/ResourceInventory/crosscurrents/Spring04pp23-32.pdf (accessed August 4, 2008).

Ganz, J. B., Kaylor, M., Bourgeois, B., & Hadden, K. (2008). The impact of social scripts and visual cues on verbal communication in three children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 23,* 79-94.

Glennen, S. L., & DeCoste, D. C. (1997). *Handbook of augmentative and alternative communication.* San Diego: Singular Publishing.

Goldstein, H. (2002). Communication intervention for children with autism: A review of treatment efficacy. *Journal of Autism and Developmental Disorders, 32,* 373 - 396.

Gray, C. A. (2000). *The new social story book: Illustrated edition*. Arlington, TX: Future Horizons.

Griffin, H. C., Griffin, L. W., Fitch, C. W., Albera, V., & Gingras, H. (2006). Educational interventions for individuals with asperger syndrome. *Intervention in School and Clinic, 41(3),* 150-155.

Hall, L.J., McClannahan, L.E., & Krantz, P.J.(1995). Promoting independence in integrated classrooms by teaching aides to use activity schedules and decreased prompts. *Education and Training in Mental Retardation and Developmental Disabilities, 30,* 208-217.

Harrower, J. K., & Dunlap, G. (2001). Including children with autism in general education classrooms. *Behavior Modification, 25,* 762-784.

Harvey, M. T., May, M. E., & Kennedy, C. H. (2004). Nonconcurrent multiple baseline designs and the evaluation of educational systems. *Journal of Behavioral Education, 13,* 267-276.

Hastings, R. P. (2005). Staff in special education settings and behavior problems Towards a framework for research and practice. *Educational Psychology, 25,* 207-221.

Hemmeter, M. L., Ostrosky, M., & Fox, L. (2006). Social and emotional foundations for early learning: A conceptual model for intervention. *School Psychology Review, 35,* 583-601.

Hess, K. L., Morrier, M. J., Heflin, L. J., & Ivey, M. L. (2007). Autism treatment survey: Services received by children with autism spectrum disorders in public school classrooms. *Journal of Autism and Developmental Disorders, 38,* 961-971.

Hodgdon, L. A. (1999). *Visual strategies for improving communication: Practical supports for school and home.* Troy, MI: Quirk Roberts Publishing.

Holdnack, J. A., & Weiss L. G. (2006). IDEA 2004: Anticipated implications for clinical practice-Integrating assessment and intervention. *Psychology in the Schools, 43,* 871-882.

Ivey, M. L., Heflin, L. J., & Alberto, P. (2004). The use of social stories to promote independent behaviors in novel events for children with PDD-NOS. *Focus on Autism and Other Developmental Disabilities, 19,* 164-176.

Jaime, K., & Knowlton, E. (2007). Visual supports for students with behavior and cognitive challenges. *Intervention in School and Clinic, 42,* 250-270.

Jameson, J. M., McDonnel, J., Johnson, J. W., Riesen, T., & Polychronis, S. (2007). A comparison of one-to-one embedded instruction in the general education classroom and on-to-one massed practice instruction in the special education classroom. *Education and Treatment of Children, 30,* 23-44.

Johnson, J. W., McDonnell, J., Holzwarth, V. N., & Hunter, K. (2004). The efficacy of embedded instruction for students with developmental disabilities enrolled in general education classes. *Journal of Positive Behavior Interventions, 6, 214-227.*

Johnston, S., Nelson, C., Evans, J., & Palazolo, K. (2003). The use of visual supports in teaching young children with autism spectrum disorder to initiate interactions. *Augmentative and Alternative Communication, 19,* 86-103.

Kennedy, C. H. (2005). *Single-case designs for educational research.* Boston: Pearson Education.

Light, J. C., & Binger, C. (1998). *Building communicative competence with individuals who use augmentative and alternative communication.* Baltimore, MD: Brookes.

MacDuff, G. S., Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to use photographic activity schedules: Maintenance and generalization of complex response chains. *Journal of Applied Behavior Analysis, 26,* 89-97.

McDougall, D. (1998). Research on self-management techniques used by students with disabilities in general education settings: A descriptive review. *Remedial and Special Education, 19,* 310-320.

Mayer-Johnson, LLC. (1994). *Boardmaker 6.0 for Windows*. P.O. Box 1579 Solona Beach, CA 92075: USA. Phone: 858-550-0084, Fax: 858-550-0449, Email: mayerj@mayer-johnson.com, Web Site: http://www.mayer-johnson.com

Mesibov, G. B., Browder, D. M., & Kirkland, C. (2002). Using individualized schedules as a component of positive behavioral support for students with developmental disabilities. *Journal of Positive Behavior Interventions, 4,* 73-79.

National Dissemination Center for Children with Disabilities (NICHCY). (2004). *Module 15: LRE Decision Making*, Washington, DC. Retrieved from http://www.nichcy.org.

Norris, C., & Dattilo, J. (1999). Evaluating effects of a social story intervention on a young girl with autism. *Focus on Autism and Other Developmental Disabilities, 14,* 180-186.

Parker, R. I., Hagan-burke, S., & Vannest, K. (2007). Percentage of all non-overlapping data (PAND): An alternative to PND. *The Journal of Special Education, 40 (4),* 194-204.

Quilty, K. M. (2007). Teaching paraprofessional how to write and implement social stories for students with autism spectrum disorders. *Remedial and Special Education, 28,* 182-189.

Rao, S. M., & Gagie, B. (2006). Learning through seeing and doing: Visual supports for children with autism. *Teaching Exceptional Children, 38 (6),* 26-33.

Reynhout, G., & Carter, M. (2006). Social stories for children with disabilities. *Journal of Autism and Developmental Disorders, 36,* 445-469.

Scruggs, T. E., Mastropieri, M. A., Cook, S. B., & Escobar, C. (1986). Early intervention for children with conduct disorders: A quantitative synthesis of single subject research. *Behavioral Disorders 11(4),* 260-271.

Stokes, J. V., Cameron, M. J., Dorsey, M. F., & Flemming, E. (2004). Task analysis, correspondence training, and general case instruction for teaching personal hygiene skills. *Behavioral Interventions, 19,* 121-135.

Swanson, T. C. (2005). Provide structure for children with learning and behavior problems. *Intervention in School and Clinic, 40, 182-187.*

U.S. Department of Education. (2002). Elementary & secondary education act (ESEA). Retrieved from http://www.ed.gov/policy/elsec/leg/esea02/index.html.

Warnes, E. D., Sheridan, S. M., Geske, J., & Warnes, W. A. (2005). A contextual approach to the assessment of social skills: Identifying meaningful behaviors for social competence. *Psychology in the Schools, 42,* 173-187.

Waters, M., Lerman, D.C., & Hovanetz, A (2009). Separate and combined effects of visual schedules and extinction plus differential reinforcement on problem behavior occasioned by transitions. *Journal of Applied Behavior Analysis, 42,* 309-313.

Watson, P.J. & Workman, E.A. (1981). The non-concurrent multiple baseline across individuals design: An extension of the traditional multiple baseline design. *Journal of Behavior Therapy and Experimental Psychiatry, 12(3),* 257-259.

Appendices

Appendix A

November 14, 2008

Dear Parents,
My name is Annamarie Cohen. I am a teacher at Truckee Elementary and teach a special day class for students with multiple disabilities. I am also a student at University Nevada, Reno. Over the next year I am working on completing my Doctorate Degree in Special Education. In order to complete this program I need to do a research study. My interests are in improving the general education classroom experiences for the students that I serve in my special day class setting; providing them with the opportunities for a greater level of participation in their general education classroom settings with their peers. In order to complete a research study I need to have parents agree to allow their children to participate.
The research study, approved by Superintendent Steve Jennings, Principal Cathy Valle, and the University Nevada, Reno, involves students receiving special education services in special day class settings at Truckee Elementary. I am proposing to use Visual Supports such as pictures to increase your child's completion of classroom tasks. The study will involve your child and their participation in the general classroom setting and look to increase completion of a variety of different tasks. These tasks may be social, academic, or routine oriented. The study will involve me working in the classroom settings to identify the specific skills your child needs to complete different activities and then I will design a visual support to help them improve their skills.
I am proposing to begin my study in the fall of 2008 when the 2008/2009 school year begins. I would like to invite your child to participate in this study. I look forward to meeting with you at your convenience and discuss the study in greater detail. Your participation is very much appreciated.
Sincerely,

Annamarie Cohen
Please contact me at your earliest convenience:
paulannacohen@msn.com
acohen@ttusd.org
775 722-1518 (cell)

Appendix B

University of Nevada, Reno Social Behavioral Institutional Review Board
Parental Permission for Child to Participate in a Research Study

TITLE OF STUDY: Visual supports to increase task independence in inclusive educational settings
INVESTIGATOR(S): MaryAnn Demchak, Ph.D. **(**775) 682-7852
Annamarie Cohen M.Ed., Student, (775) 787-5044; (530) 582-2650
PROTOCOL #: SB08/09-001

PURPOSE

You are being asked to allow your child to participate in a research study. The purpose of this study is to investigate the use of visual supports (pictures, schedules and task organizers) in the form of picture prompts as a tool for your child to complete classroom activities more independently. This research study will consider picture cues as an intervention method for students with multiple, various disabilities being mainstreamed and included in general education classrooms. The objective is to determine if the picture cues can increase your child's abilities to complete tasks without one-to-one teacher, aide, or peer support and improve their independence in the classroom.

PARTICIPANTS

You are being asked to give permission for your child to participate because your child is included in the general education classroom setting, receives special education support within that setting to enhance their participation in activities with their peers. Your child will be one of many of the students that receive services through a special day class that is being asked to participate.

PROCEDURES

If you agree to allow your child to participate, the student investigator will be going into the general classroom setting when your child is participating in activities and observing them while they are working. The student investigator will be looking at how much of an activity your child is completing with support from peers, the regular education teacher, the special education teacher, and how much they are completing by themselves. After the student investigator observes their participation in a variety of activities, the student investigator will design a visual support that will then be used to teach the child how to complete the activity more independently.

The student investigator will observe your child in the classroom setting over a period of three to four weeks to determine how much your child completes or participates with the supports already in place. After this period of time the student investigator will design a visual support to assist your child in achieving a greater level of independence across tasks. The student investigator will teach your child how to use the schedule over a period of 3-4 weeks and will then observe how tasks are completed with the use of the support that has been put in place. The student investigator will use the information gathered to determine if the visual support is making a difference in independence in the classroom setting. During this time no supports that are in place for your child will be removed. If the visual support is proving to be successful as a tool to

help your child in the classroom it will be left in place for use as long as needed. Throughout the course of this study the visual support will be evaluated for its effectiveness in meeting your child's needs and increasing participation in class activities. This information will be shared with you. If at any time data show the support is not meeting the needs of your child in their classroom settings, we will meet and determine what type of support would better meet your child's needs. This research study is only intended to add additional support for your child. It in no way will impede the Individual Education Plan (IEP) process or goals and objectives that have been written by the IEP team in the best interest of your child.

Your child will also be video taped for a portion of their participation in their use of visual supports.

If you agree to allow your child to participate the student investigator would like your permission to review your child's current IEP so that the student investigator can support the goals and objectives that are already in place.

ALTERNATIVES

The visual supports that the student investigator will be using will be designed to improve your child's educational participation in the general education setting. These visual supports will be taught to your child so they can be more independent and successful across the school and classroom settings with peers.

DISCOMFORTS, INCONVENIENCES, AND/OR RISKS

Little risk is associated with this study. The results of the study will not be tied to the implementation of or detract from the current goals and objectives in place for the educational benefit of your child. Nor will this study impede or prohibit the goals that have been put in place by the IEP team. This study is completely separate from the IEP that is currently in place and should only supplement and enhance the current educational goals you have for your child. Every effort will be made to keep the observations as unobtrusive as possible, so that regular classroom activities will not be interrupted.

BENEFITS

No direct benefits will be available to you. However, information learned in this study may serve to increase the use of visual supports across different environments and tasks that your child participates in. Additionally the information has the potential to give you insight into future educational planning.

CONFIDENTIALITY

Your identity and your child's identity will be protected to the extent allowed by law. You and your child will not be personally identified in any reports or publications that may result from this study.

The Department of Health and Human Service (HHS), other federal agencies as necessary, the University of Nevada, Reno Social Behavioral Institutional Review Board and Tahoe Truckee Unified School District may inspect your study records.

No personally identifying information will be collected during this study; your child will only be identified through a first name pseudonym during all documentation collected during the study. The master sheet linking your child's name to the pseudonym will be stored in a locked file drawer in the principal investigator's work office, separately from the handwritten data which will be stored in a locked drawer in the student investigator's office at the end of each day data are collected. Handwritten notes and observation data collection sheets will be kept as a part of the study process and used for data analysis at the summation of the study. All information will contain only the pseudonym used.

COSTS/COMPENSATION

There will be no cost to you nor will you be compensated for participating in this research study.

RIGHT TO REFUSE OR WITHDRAW

You may refuse to participate or withdraw from the study at any time and your child will still receive the education they would normally receive if they were not in the study. If the study design or use of the data is to be changed, you will be so informed and your consent re-obtained. You will be told of any significant new findings developed during the course of this study, which may relate to your willingness to continue participation.

QUESTIONS

If you have questions about this study or wish to report a research-related injury, please contact MaryAnn Demchak, Ph.D. at (775) 682-7852 at any time.

You may ask about your rights as a research subject or you may report (anonymously if you so choose) any comments, concern, or complaints to the University of Nevada, Reno Social Behavioral Institutional Review Board, telephone number (775) 327-2368, or by addressing a letter to the Chair of the Board, c/o UNR Office of Human Research Protection, 205 Ross Hall / 331, University of Nevada, Reno, Reno, Nevada, 89557.

CLOSING STATEMENT

I have read ( ) this consent form or have had it read to me ( ). [Check one.]

Annamarie Cohen has explained the study to me and all of my questions have been answered. I have been told of the risks or discomforts and possible benefits of the study.
If I do not take part in this study, my refusal for my child to participate will involve no penalty or loss of rights to which I am entitled. I may withdraw my child from this study at any time without penalty.

I have been told my rights as a research subject, and I voluntarily consent to having my child participate in this study. I have been told what the study is about and how and why it is being done. All my questions have been answered.

I will receive a signed and dated copy of this consent form.

Signature of Participant Date

Signature of Person Obtaining Consent Date

Signature of Investigator Date

Appendix C

Task Analysis

Name: Will

Task Steps	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:
Turn on Computer								
Click Write:Outloud icon to open program								
Click on name								
Enter Password								
Click on Write:Outloud								
Click on Wake-up Co:Writer icon								
Type Sentences								
Click on Save icon								
Type “Date”								
Click on “Close” icon								
% Task completed independently								

I = Independent G = Gesture V = Verbal P = Physical

Task Analysis

Name: Seth

Task Steps	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:
Get Book Basket								
Sit Down								
Choose a Book								
Open CD Player								
Put CD in								
Put on Headphones								
Push Play								
Read (Turn Pages of Book)								
Put CD/Book in Basket								
Put Book Basket Away								
% Task completed independently								

I = Independent G = Gesture V = Verbal P = Physical

Task Analysis

Name: Jose

Task Steps	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:
Stand in line								
Acknowledge Lunch Director								
Get Milk								
Get lunch								
Get Spork								
Sit at a table								
Open Milk								
Open Spork								
Eat								
Clean-up								
% Task completed independently								

I = Independent G = Gesture V = Verbal P = Physical

Task Analysis

Name: Molly

Task Steps	Date:	Date:	Date:	Date:	Date:	Date:	Date:	Date:
Acknowledge Lunch Director								
Get Milk								
Get lunch								
Get Spork								
Sit at a table								
Open Milk								
Open Spork								
Open Lunch Package								
Eat								
Clean-up								
% Task completed independently								

I = Independent G = Gesture V = Verbal P = Physical

Appendix D

Task:_____ Student:_____

	Date:_____	Date:_____	Date:_____
"It's time to work" Step 1	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP
Step 2	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP
Step 3	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP
Step 4	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP

	G, FP, DVP	G, FP, DVP	G, FP, DVP
Step 5	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP
Step 6	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP
Step 7	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP
Step 8	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP	I G G,VP G, IVP G, DVP G, PP, DVP G, FP, DVP

Step 9	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP
Step 10	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP	☐ I ☐ G ☐ G,VP ☐ G, IVP ☐ G, DVP ☐ G, PP, DVP ☐ G, FP, DVP

I – Initiates work/step with presentation of visual support

G- Initiates work/step with gesture to visual support

G, VP- Initiates work/step with gesture and verbal prompt “Look at your schedule”

G, IVP- Initiates work/step with gesture and indirect verbal prompt “what is it telling you?”
G, DVP- Initiates work/step with gesture and direct verbal prompt “it is telling you to_____.”

G, PP, DVP- Initiates work/step with gesture, combined with partial physical prompt, and direct verbal prompt “it is telling you to_____.”

G, FP, DVP- Initiates work/step with gesture, combined with full physical prompt, and direct verbal prompt “it is telling you to_____.”

Appendix E

Symbol Assessment

Format used: Receptive labeling_____ Yes/no_____ Standard matching____ Sorting____

Number of items in array_____

Instructions used_____

Response accepted as correct_____

List items used	Confirmation of item knowledge by team?

Indicate whether trial is correct (+) or incorrect (-) in appropriate column

Trial no.	Target Item	Real objects	Color Photographs	Line Drawings	Other
1					
2					
3					
4					
5					

Adapted from: Beukelman, D. R. & Mirenda, P. (2005). *Augmentative and Alternative Communication: Management of Severe Communication Disorders in Children and Adults*. Baltimore, MD: Paul H. Brookes.

Appendix F

INTEGRITY CHECKLIST
STUDENT:

Baseline - Task Analysis

	No Visual Support Present	Prompt Hierarchy Followed for Task Steps	Each step of Task Analysis followed	No Reinforcement Provided
DATE				
	1	1	1	1
	2	2	2	2
	3	3	3	3
	4	4	4	4
	5	5	5	5
	6	6	6	6
	7	7	7	7
	8	8	8	8
	9	9	9	9
	10	10	10	10

Visual Support- No Teaching Phase

	Visual Support Present	Prompt Hierarchy Followed for Task Steps	Each step of Task Analysis followed	No Reinforcement Provided	No Prompting of Visual Support
DATE					
	1	1	1	1	1
	2	2	2	2	2
	3	3	3	3	3
	4	4	4	4	4
	5	5	5	5	5
	6	6	6	6	6
	7	7	7	7	7
	8	8	8	8	8
	9	9	9	9	9
	10	10	10	10	10

Visual Support- Teaching Phase

Visual Support Present	Prompt Hierarchy Followed for Visual Support									Each Step of Visual Support Followed								No Reinforcement Provided								No Prompting for each step of Task Analysis							
DATE																																
	1									**1**								**1**								**1**							
	2									**2**								**2**								**2**							
	3									**3**								**3**								**3**							
	4									**4**								**4**								**4**							
	5									**5**								**5**								**5**							
	6									**6**								**6**								**6**							
	7									**7**								**7**								**7**							
	8									**8**								**8**								**8**							
	9									**9**								**9**								**9**							
	10									**10**								**10**								**10**							

Appendix G

QUESTIONNAIRE FOLLOWING RESEARCH ON VISUAL SUPPORT INTERVENTION

1. Do you think that the visual support was an appropriate instructional strategy for the targeted student?

_____
_____
_____

2. Did you notice changes in task completion behavior on the part of the targeted student?
If so, what changes did you notice?

_____
_____
_____

3. Did the child display any activity behaviors that he/she did not display before the use of the visual supports? Please explain when and where in the classroom/environment these behaviors were observed.

_____
_____
_____

4. Do you feel this instructional strategy created more opportunities for the student to participate in general classroom activities?

_____
_____
_____

5. Do you think the visual support is difficult to implement in the classroom? Why or why not?

_____
_____
_____

6. Do you feel that it is important to receive training before implementing visual supports in your classroom? Why or why not?

_____
_____
_____

7. Do you feel you could implement the use of visual supports with other students in the future? Why or why not?

_____
_____
_____

8. Do you think visual supports are at all disruptive to your classroom routine and activities? Why or why not?

_____
_____
_____

9. Do you feel that you need more training and support in the classroom when using Visual supports? Why or why not?

_____
_____
_____
_____

10. Did you notice any new behaviors on the part of the targeted student because of the visual supports put into place? Please explain.

_____
_____
_____

11. Did you notice any new behaviors on the part of other students in your classroom because of the use of the visual supports? Please explain.

_____
_____
_____

12. Did you feel that visual supports met the communication and behavioral needs of the targeted student in your classroom? Why or why not?

_____
_____
_____