An Investigation Of The Proficiency Level Of High School Students With Autism And Mental Retardation Within Community-based Job Settings: The Relationship Between The Use Of A Hand-held Computer Compared To Staff Modeling For Accurate Novel Job Skill Acquisition And Student Learning

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by

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ABSTRACT

This study examined the effects and efficacy of two vocational instructional interventions - a *Hand-Held Computer* intervention versus a *Staff Model* intervention - as vocational instructional tools for high school students with autism and mental retardation. Specifically, the study analyzed the effects of these two treatments on the completion of authentic novel job tasks within a local department store. This research indicated the provision of specific technology as an instructional model positively influenced participants' ability to: accurately complete tasks, exercise increased independence during task completion, reduce problematic behavior during task completion, and lower necessary staff prompts during task completion.

The use of technology to support individuals with severe disabilities has the potential to increase their level of independence and accuracy of job completion within community-based settings. Five high school students with autism and mental retardation participated in this study, which compared the use of a palm-top computer with a traditional staff model during the completion of eighteen novel job tasks within various departments of a large department store. Five of eight variables subjected to ANOVA and independent t-test analyses demonstrated significance.

This project is dedicated to Alicia, David, Michael, Thomas, and Tyrell.

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LIST OF ABBREVIATIONS

A	Autistic
AAC	Augmentative or Alternative Communication
ANOVA	Analysis of Variance
ARIMA	Autoregressive Integrated Moving Averages
AT	Assistive Technology
ASD	Autism Spectrum Disorder
CAI	Computer Assisted Instruction
CD-ROM	Compact Disc- Read Only Memory
CDS	Center on Disability Access
CE	Compact Edition
CRI	Community-Referenced Instruction
ESE	Exceptional Student Education
FSIQ	Full Scale Intelligence Quotient
HELP	Senate Health, Education, Labor, and Pensions Committee
HH	Hand-Held Computer
H.R.	House of Representatives Bill
IDEA	Individuals with Disabilities Education Act
IEP	Individual Education Plan
IRB	Institutional Review Board
LI	Language Impaired
MR	Mental Retardation
NATRI	National Assistive Technology Research Institute
NCSET	National Center on Secondary Education and Transition
NICHCY	National Information Center for Children and Youth with Disabilities
NIDRR	National Institute on Disability and Rehabilitation Research
OSEP	Office of Special Education Programs
OT	Occupational Therapy
PC	Personal Computer
PDA	Personal Digital Assistant
PL	Public Law
S.	Senate Bill
S/L	Speech and Language
SM	Staff Model
TMH	Trainably Mentally Handicapped
VA	Visual Assistant
VE	Varying Exceptionalities Class

CHAPTER ONE: INTRODUCTION

A critical need exists to prepare high school students with severe disabilities for transition and the world beyond (Conley, 2003; Frank & Sitlington, 2000; Grigal, Test, Beattie, & Wood, 1997; Kiernan, 2002; Kraemer, McIntyre, & Blacher, 2003; Nuehring & Sitlington, 2003; McDonnell, Hardman, Keifer-O'Donnell, & Drew, 1993; Melching & Gast, 1997; Neubert, Moon, & Grigal, 2002; Wehman & Gibson, 1998). This developmental stage in a student's life necessitates specialized transition services, which are defined by the *Individuals with Disabilities Education Act (IDEA)* as:

> …a coordinated set of activities for a student with a disability that- are designed within an outcome-oriented process, which promotes movement from school to post-school activities including post secondary education, vocational training, integrated employment (including supported employment), continuing and adult education, adult services, independent living, or community participation; are based upon the individual student's needs, taking into account the student's preferences and interests; and include instruction, related services, community experiences, the development of employment and other post-school adult living objectives, and when appropriate, acquisition of daily living skills and functional vocational curriculum (p. 8).

During transition, students leave the ranks of high school programs to actively join local adult communities. The metaphor of a vehicle is often used to describe the metamorphosis that takes place for students during this period (Nuehring & Sitlington, 2003) and is frequently described as a car reaching an intended destination.

According to Cooney (2002) "…significant evidence exists that transition activities do not function as intended (p. 425)" for students with severe disabilities; further, those transition plans with palatable goals are often ineffective, not properly implemented, and evidence a lack of quality programming (Grigal et al., 1997; Wehman,

1992; Neubert et al., 2002). Frequently, the quality of transition goals defined within Individualized Education Plans (IEPs) are inadequate and contain vague, rather than specific, references to critical outcome expectations for students. Several studies indicate a considerable amount of transition plan goals for students with disabilities are difficult to identify and translate into meaningful practice (Frank & Sitlington, 2000; Grigal et al., 1997; Halpern, 1985; Halpern, 1994; Wehman, 1992).

Little empirical evidence exists illuminating how schools are preparing individuals with severe disabilities for the world beyond school or the type of outcomes targeted for these students when they exit high school (Cooney, 2002; Grigal et al., 1997; Kraemer & Blancher, 2001; Pearman, Elliot, & Aborn, 2004; Snell & Brown, 2000). Much of the evidence that does exist on the issue of transition outcomes for people with severe disabilities has been produced through descriptive research reporting (Kraemer & Blancher, 2001; Mank et al., 1997). Unfortunately, young adults with disabilities continue to experience high school failure and drop out, low employment rates, low participation in post-secondary education, and low satisfaction with their adult lives (Halloran & Simon, 1995; Johnson & Rusch, 1993; Katsiyannis, deFur, & Conderman, 1998; Unger, 1999; Unger, 2002; Wehman & Gibson, 1998; Wehman & Revell, 2002).

Several well-documented barriers to transition planning have been consistently cited in research literature. Among them are inadequate pre-service or in-service training of professionals, single agency rather than cooperative interagency management, insufficient resource incentives, poor coordination of multi-agency involvement, failure to seek or achieve consensus among stakeholders, and inconsistent resource allocation in state and federal transition practices (Burgstahler,

2003; Blackorby & Wagner, 1996; Cooney, 2002; deFur & Taymans, 1995; Derer, Polsgrove, & Rieth, 1996; Frank & Sitlington, 2000; Katsiyannis et al., 1998; Noyes & Sax, 2004). Research further indicates transition planning often centers on student disabilities, rather than student needs (Cooney, 2002; Grigal et al., 1997; McDonnell, Mathot-Buckner, & Ferguson, 1996; Wehman & Gibson, 1998). This type of stereotyped service delivery, one based upon type or label, occurs within many settings to the detriment of students (Noyes & Sax, 2004; Wittenburg & Magg, 2002).

Community-Based Vocational Instruction

According to Evers and Elksnin (1998) the benefits for students with disabilities taking vocational courses does little to increase the numbers of students who enroll in specialized vocational programs. Specialized vocational instruction within community-based settings is critical for students with severe disabilities (Grossi, 1998; McDonnell et al., 1993; Noyes & Sax, 2004; Neubert et al., 2002; Nuebert & Sitlington, 2003; Pearman et al., 2004; Sale, Metzler, Everson, & Moon, 1991; Wehman, 1992). The element of community-based instruction, in the *real world*, is particularly important for this group of individuals due to their difficulty in generalizing instruction between settings and functional instruction (Grigal et al., 1997; Nietupski, Hamre-Nietupski, Donder, Houselog, & Anderson, 1988; Post & Storey, 2002; Ross, Forte, Storey, Gaylord-Ross, & Jameson, 1987; Wehman & Gibson, 1998). Compounding this issue, few schools offer sound community-based programs for students with severe disabilities (Grigal et al.; Neubert et al., 2002; Moon & Inge, 2000). It is imperative students receive

vocational instruction within the communities they are likely to seek gainful employment (McDonnell et al., 1993; Noyes & Sax, 2004; Neubert & Sitlington, 2003; Patton, 1999; Ross et al., 1987; Wehman & Revell, 2002).

Assistive Technology

Experts recommend technology as a powerful means to teach and support students with severe disabilities (Davies, Stock, & Wehmeyer, 2002b; Davies, Stock, & Wehmeyer, 2003; Huntinger, Johanson, & Stoneburner, 1996; Langone, Clees, Rieber, & Matzko, 2003; Parette, 1997; Riffel, Wehmeyer, Turnbull, Lattimore, Davies, Stock, et al., in press; Sturmey, 2003; Taber, Alberto, & Fredrick, 1998; Todis, 1996). Specifically, Davies et al. (2002b) propose computer-based technology as a means of providing people with mental retardation and developmental disabilities support within community-based settings. Advantages to the use of specialized computer technology include multimedia applications and the ability to customize training to meet the needs of specific individuals.

Research scrutinizing assistive technology support for individuals with severe disabilities in community-based settings is relatively limited (Davies, et al., 2003; Kraemer & Blancher, 2001; Lagnone et al., 2003; Parette, 1997; Todis, 1996; Wehmeyer 1998; Wehmeyer, 1999), which makes retrieving meaningful information that could be used to assist teachers, schools, and parents in the successful transition of these students from high school programs extremely difficult. In a review of special education technology literature, Edyburn (2001) reported the following findings:

> (1) there are many more articles about issues of practice in special education technology than there are research articles, (2) there are more articles published that have application across disabilities rather than those published for any specific disability, (3) there are more articles published with K-12 applications than are published for any specific grade/age level, and (4) there appears to be an overabundance of articles on technology use in post-secondary education (pp. 15-16).

Though some research articles continue to be published, a void exists in this area.

The potential for assistive technology to benefit transition-age students with severe disabilities appears promising (Langone et al., 2003; Riffel et al., in press; Taber et al., 1998; Todis, 1996). In fact, Davies and Stock (2002b) recommend a set of functional features for technology use with individuals with intellectual disabilities including:

1. Incorporating the combined use of pictures and auditory prompts for navigation;
2. User interface designs that increase efficiency and minimize clutter;
3. Error minimization features;
4. Capacity to customize and individualize the software to accommodate a wide array of user needs and capacities; and
5. Designing software that is motivating to use (p. 212).

Legislative Impact

The 1997 amendments to IDEA resulted in substantial additions to the implementation of transition services for students with disabilities. Particularly, the change of the beginning age for transition from 16 years old to 14 years old for students began requiring that schools, families, and agencies begin planning a full two years earlier. With this change, the law enacted additional expectations, accountability, and

required preparation services for adult independence and employment (Individuals with Disabilities Education Act, 1997).

In addition to transition services, assistive technology (AT) devices and services have the potential to dramatically improve the lives of people with severe disabilities in several environments. This premise, endorsed by Congress in their *Findings and Purposes* section of the Technology-Related Assistance for Individuals with Disabilities Act (Tech Act) of 1988 (Technology-Related Assistance Act for Individuals with Disabilities Act of 1998, P.L. 100-407, Title 29, U.S.C. 2201, 1998), was an integral component during the development of the technology sections of IDEA. In the Tech Act legislation (Technology-Related Assistance Act for Individuals with Disabilities Act of 1998, P.L. 100-407, Title 29, U.S.C. 2201, 1998), Congress stated that the provision of AT devices and services to people with disabilities would enable individuals to:

> (A) Have greater control over their own lives, (B) participate in and contribute more fully to activities in their home, school and work environments, and in their communities, (C) interact to a greater extent with non-disabled individuals, and (D) otherwise benefit from opportunities that are taken for granted by individuals who do not have disabilities (p. 86).

The 1997 Amendments to IDEA mandated that AT be considered for every student receiving special education services, including clear definitions of AT and AT services to be provided to all students qualified within special education programs (Individuals with Disabilities Education Act Amendments of 1997, P.L. 105-17, Section 602, U.S.C. 1401). An assistive technology device is defined by IDEA (Individuals with Disabilities Education Act Amendments of 1997, P.L. 105-17, Section 602, U.S.C. 1401), as ”…any item, piece of equipment or product system, whether acquired

commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of children with disabilities" (p. 4).

AT services to be provided according to IDEA (Individuals with Disabilities Education Act Amendments of 1997, P.L. 105-17, Section 602, U.S.C. 1401) are listed as:

> Any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive technology device. Such services include the following: (A) the evaluation of the needs of such child, including a functional evaluation of the child in the child's customary environment, (B) purchasing, leasing, or otherwise providing for the acquisition of assistive technology devices by such child, (C) selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing of assistive technology devices, (D) Coordinating and using other therapies, interventions, or services with assistive technology devices, such as those associated with existing education and rehabilitation plans and programs, (E) training or technical assistance for such child, or where appropriate, the family of such child, and (F) training or technical assistance for professionals (including individuals providing education and rehabilitation services), employers, or other individuals who provide services to, employ, or are otherwise substantially involved in the major life functions of such child. (p. 284)

The 1997 IDEA amendments explicitly specify the responsibility of each IEP team to consider every student's need for assistive technology devices and services. Recent research findings indicate members of IEP teams are often unprepared to implement this statue effectively; in addition, school districts are frequently unprepared to provide proper AT support to IEP teams (Laham, Busch, Hasselbring, & Blackhurst, 2001; Zabala, Blunt, Carl, Davis, Deterding, & Foss, et al., 2000). While verbiage of the law is explicit, there are currently no legislated guidelines on how states should implement these very specific legal mandates.

On April 30, 2003, the full House of Representatives approved its bill to reauthorize IDEA under a new name and statue number, *H.R. 1350 Improving*

Education Results for Children with Disabilities Act of 2003 (Public Policy, 2003; H.R. 1350 Improving Education Results for Children with Disabilities Act of 2003, April 30, 2003).

In November 2003, the Senate Health, Education, Labor and Pensions (HELP) Committee sent the approved Senate bill for IDEA reauthorization to the full Senate for consideration. This substitute bill was approved by the Senate HELP Committee, and was then recommended for consideration by the full Senate. On November 21, 2003, the Senate passed a unanimous consent order permitting S. 1248 to be introduced on the floor of the Senate.

If the Senate passes their version of IDEA reauthorization (S. 1248 bill), the House of Representatives and the Senate will then have to convene to reach some type of agreement between the two proposed bills for reauthorization (H.R. 1350 and S. 1248), and create a new IDEA reauthorization bill.

Senate Majority Leader Bill First (R-TN) released a tentative schedule for Senate consideration in February 2004, indicating S. 1248 would be considered by the full Senate in March of 2004 (Kathy Moeder-Christensen, personal communication, February 27, 2003). Most recently, Representative First announced IDEA was not scheduled for discussion on the Senate floor prior to the Senate spring recess beginning April 12, 2004 (Council for Exceptional Children, 2004).

Assistive Technology Challenges

Across the United States, contrary to the suggested intent of the 1997 legislation, is the fact that legal mandates alone have not resulted in an immediate and meaningful impact upon the lives of children in need of AT and AT services (Derer, Polsgrove, & Rieth, 1996; Katsiyannis et al., 1998; Zabala et al., 2000). Several agencies, institutes, and consortiums have offered advice, recommendations, and listings of quality indicators for state departments of education to adopt in an effort to provide uniform AT services to all students with disabilities (Bowser & Reed, 1995; Derer, et al., 1996; Lahm et al., 2001; NICHCY, 1999; Zabala et al.). These suggestions have illustrated a lack of data reflecting exactly how these mandates are being implemented throughout the United States, and the effect they are having upon children identified under IDEA (Derer, et al.; Lahm et al.; Morris & Button, 1995; and Zabala et al.).

In an attempt to better understand the impact of AT, the Office of Special Education Programs (OSEP), recognized the need to identify the current use and impact of AT, and provided four years of funding to establish a National Assistive Technology Research Institute (NATRI) at the University of Kentucky. The primary goals of NATRI are to examine factors related to the planning, development, implementation, and evaluation of AT services in schools, and to disseminate the findings in ways that will assist school personnel to develop and improve AT policies and practices (Lahm et al., 2001). Though NATRI does not house a legislative body or work with states regarding compliance, this center is poised to provide dramatic statistics in the area of AT and its use throughout the nation's schools. To this end,

several other entities such as The Center on Disability Access (CDS), The Rehabilitation Research and Training Center, the National Center on Secondary Education and Transition (NCSET), and the National Institute on Disability and Rehabilitation Research (NIDRR), have received a great deal of federal funding in an effort to better understand the comprehensive nature of AT and needed AT services (NICHCY, 1999). To date, limited formal research exists in the use of AT in community-based work environments for individuals with severe disabilities.

Statement of the Problem

There is a paucity of information regarding the use of AT for the provision of vocational instruction to high school students in community-based settings (Davies, et al., in 2003; Kraemer & Blancher, 2001; Lagnone et al., 2003; Parette, 1997; Todis, 1996; Wehmeyer 1998; Wehmeyer, 1999), especially literature relating to individuals with severe disabilities that include autism and mental retardation. Few studies illustrate research-based best practices in the area of AT use within community-based work environments for individuals with moderate to severe mental retardation and autism within the context of additional and/or effective instructional supports (Davies et al., 2003; Edyburn, 2000; Edyburn, 2001; Furniss et al., 2001; Le Grice & Blampied, 1994; Langone, 2000; Mechling & Gast, 1997; Morgan et al., 2000; Post & Storey; Smith et al.). Issues surrounding the use of AT for the purpose of vocational instruction within community-based settings and supports necessary for people with autism and mental retardation are pervasive, yet, identification of these difficulties is limited within

research literature. There is an enormous need to conduct research to identify sound instructional methods for individuals with severe disabilities who could receive vocational instruction within various community-based settings.

Purpose of the Study

The purpose of this study was to determine which of two instructional interventions, a Hand Held Computer (HH) or a Staff Model (SM), was more effective for support purposes and in assisting the completion of novel work tasks by individuals with autism and mental retardation. The specific research questions involved the measurement of HH use, compared to SM use for instructional purposes to increase the level of accuracy in novel work task completions. Equally important to the measurement of accuracy levels were findings regarding levels of prompting and assistance by staff to each of the students. The intention of the present study was to gather functional information that could be applied by school-based personnel to better equip students with severe disabilities to work independently within a variety of community-based vocational settings.

For individuals with pervasive disabilities, including those with autism and severe mental retardation, continued advances in instructional techniques and support models are necessary to ensure that a positive outcome of gainful employment will be realized by students exiting transition programs (Davies et al., 2003). Validated knowledge regarding the use of technology and how teachers might use specific devices with students with severe disabilities is essential. Because technology can support people

with cognitive and developmental impairments in the areas of independence, decision-making, and self-determination, it offers a socially validated (Storey & Horner, 1991) method of instructing and supporting students with severe disabilities within community-based settings (Davies et al.; Davies, Stock, & Wehmeyer, 2002a; Riffel et. al, in press; Wehman & Gibson, 1998).

The research in this study adds to the existing knowledge-base regarding the use of technology to support individuals with autism and mental retardation within authentic, community-based settings. The need for sound instructional methodologies is essential for all students with disabilities, especially those requiring specialized modalities of instruction and intervention involving assistive technology. Of paramount importance is the need for all teachers to demonstrate functional knowledge of empirically supported instructional techniques for use when working with students identified with severe disabilities.

Research Questions

The primary focus of this study was to investigate the effects of HH use versus SM use for vocational instructional purposes within community-based settings. Specifically, the focal measurement will detail the overall accuracy of completion of a novel job task by high school students with autism and mental retardation. In addition to accuracy measurements, a determination of whether behavior within three specified categories (Requests, Problem Behaviors, and Levels of Assistance) increased or decreased with

the use of the HH intervention compared to the SM intervention. Specific research questions that addressed this focus were:

1. Did the use of a HH intervention, compared to a SM intervention, for vocational instructional purpose, increase a student's level of accuracy on an assigned novel work task in a community-based setting?
2. Did the use of a HH intervention, compared to a SM intervention, for vocational instructional purpose, decrease the amount of requests initiated by participants while completing a novel work task in a community-based setting?
3. Did the use of a HH intervention, compared to a SM intervention, for vocational instructional purpose, reduce student's problem behavior in a community-based setting?
4. Did the use of a HH intervention, compared to a SM intervention, for vocational instructional purpose, reduce the overall amount of assistance (from staff) required by students for the successful completion of a novel work task in a community-based setting?
5. Did the use of a HH intervention, compared to a SM intervention, for vocational instructional purpose, reduce different levels of assistance (from staff) required by students for the successful completion of a novel work task in a community-based setting?

Dependent Measures

Dependent measures included: (a) the percentage of accurate novel job task completions per session when the HH intervention was employed during a task, and (b) the percentage of accurate novel job task completions per session when the SM intervention was employed during a novel job task. During baseline and intervention sessions, additional data was also gathered on the frequency participants requested help, the frequency participants exhibited problem behaviors, and the frequency of levels of assistance required for task completion. Chapter 3 contains operational definitions of all identified behaviors.

Independent Measures

Independent variables were two instructional methods assigned to each participant during a novel job task session: HH intervention or a SM intervention. Chapter 3 contains a full description of these variables.

Importance of the Study

At the high school level, virtually no research exists on vocational instruction provided in community-based settings for individuals with autism and mental retardation. Relatively few studies have been conducted targeting high school students with significant disabilities in *real-world* community settings. Most professionals agree the use of a HH has the potential to de-stigmatize and normalize public perceptions of students with severe disabilities during training or work situations. Since non-disabled individuals utilize hand-held devices in the course of their day, use of such a device might assist students with disabilities in appearing more like their typical peers on a work site. Results of this study may contribute to a better understanding of how educators can provide vocational instruction within community-based settings to best foster skills of independence within their students.

Definitions

Federal

The federal government and Public Law 105-17 identify *mental retardation* and *autism* as two disabilities eligible for services under IDEA (Individuals with Disabilities Education Act, Amendments of 1997, Public Law 105-17). This federal law defines *autism* as, " …a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age 3, that adversely affects a child's educational performance" (Individuals with Disabilities Education Act, Amendments of 1997, Public Law 105-17, p. 217). Further, *mental retardation* is defined in part as, "…significantly sub-average general intellectual functioning, existing concurrently with deficits in adaptive behavior and manifested during the developmental period, that adversely affects a child's educational performance" (Individuals with Disabilities Education Act, Amendments of 1997, Public Law 105-17, p. 221). Individual states are required to identify the specifics of each disability category IDEA deems eligible under section 602 (Individuals with Disabilities Education Act, Amendments of 1997, Public Law 105-17), and the state criteria for that eligibility.

Florida

The selected county adheres to the definition of mental retardation that is defined, recommended, and utilized by the state of Florida. According to the *Florida*

Statues and State Board of Education Rules (2003), mental handicapping conditions are aligned closely with the American Association on Mental Retardation's (AAMR) 1983 definition of mental retardation (Denning, Chamberlain, & Polloway, 2000; Grossman, 1983), which includes levels of severity. Florida's definition (State Statues, 2003) is similar to the IDEA interpretation, "A mental handicap is defined as significantly sub-average general intellectual functioning existing concurrently with deficits in adaptive behavior and manifested during the developmental period" (pp. 165-166). For a complete listing of the state's educational eligibility criteria for Mental Retardation, please refer to Appendix A.

In a similar fashion, the selected county adheres to the definition of autism that is defined, recommended, and utilized by the state of Florida. According to the *Florida Statues and State Board of Education Rules* (2003), individuals with autism spectrum disorders are served under the categorical label *autistic* and are defined as, "One who has a disability reflected in severe disorders of communication, behavior socialization and academic skills, and whose disability was evident in the early developmental stages of childhood. The autistic child appears to suffer primarily from a pervasive impairment of cognitive and perceptual functioning, the consequences of which are manifested by limited ability to understand, communicate, learn, and participate in social relationships" (p. 175). For a complete listing of the state's educational eligibility criteria for autism, please refer to Appendix A.

Severe Handicapping Condition

According to the state statues of Florida, students who qualify under the categorical label of autism or profound mental retardation are considered *profoundly handicapped* or *severe* (State Statues, 2003). As such, students with these qualifying diagnostic profiles are eligible for a multitude of services within specially designated programs for those identified as profoundly handicapped (State Statues, 2003).

Community-Based Instruction

This type of instruction entails educating students within actual community-based settings (e.g., Wendy's, Wal-Mart, Publix, etc.), rather than a school-based classroom. Instruction includes a wide variety of skills that will be applicable to specific settings students may wish to work in upon the completion of High School. Community-based instruction has been consistently recommended by experts in the field for the purpose of preparing youth with severe disabilities to function in actual work or community settings they may desire once they exit high school (McDonnell, et al., 1996).

Vocational Instruction

Effective vocational instruction includes: work within community programs with job-related tasks, community mobility training, functional academic training, and actual training in real jobs, where the instruction should be balanced over several areas (Moon

& Inge, 2000). Vocational preparation for students with severe disabilities should lead to meaningful work within their community after high school.

Visual Assistant

The Visual Assistant program, used to illustrate individual task analyses of each work task to be measured, is a multimedia-training program designed to run on the Windows CE platform of the HH (Davies et al., 2002b; *Visual Assistant*, Retrieved April 21, 2003). It enables a user with special needs to view step-by-step pictures paired with auditory instructions on a hand-held computer screen, and to work at his or her own pace (Davies et al.; Riffel et. al, in Press). Pictures can be loaded into the HH to illustrate the correct sequence of a work task and are loaded in sequential order along with corresponding verbal instructions.

Staff Modeling

Staff Modeling refers to a traditional and commonly used method of teaching students with significant limitations. Davies et al. (2003) defined this type of instructional method as the, “Traditional methods included in the commonly used approach of describing and demonstrating the task during training phases, followed by hands-on performance of the task by the individual.”

Limitations

Though the accepted scientific use of single-subject experiments has increased considerably over the past several years, limitations can result from these design types (Fraenkel & Wallen, 2000). The present study was designed to investigate the use of technology within community-based settings for a very specialized, low incidence population. Specifically, it carefully examines whether or not students with autism and mental retardation would be able to acquire novel work skills, the accuracy with which they could acquire said skills, whether or not increased support via questioning or requests for assistance was needed, and the effect treatment of on problem behaviors. This study involved the measurement of five students, a relatively small sample size, which will make any references to replication and/or generalization difficult. The differential selection of subjects in this study poses a threat to internal validity due to the non-random nature of participant selection. When participants are selected for an experiment by a procedure other than random selection, which is a truer representation of the population at large (Gall, Gall, & Borg, 1999), results are often difficult to generalize to the population that was studied as a whole. Therefore, any attempts to generalize the findings of this study to similar populations must be made with caution.

Because the study involved individuals with autism and mental retardation, who typically have difficulty with new environments or people they are not familiar with, a threat to the ecological validity, or *experimenter effect*, was possible. Experimenter effect is an occurrence where the effectiveness of a treatment may depend upon the specific individual who administers an intervention (Mertens & McLaughlin, 1995). It

was anticipated the presence of familiar staff members, in addition to consistent research team members, would have decreased the possibility of experimenter effect occurring during the intervention phase of the study.

Attrition, also a threat to internal validity, is always a possibility in a single-subject design (Gall et al., 1999; Richards, Taylor, Ramasamy, & Richards, 1999). Because there are so few participants in such studies, there is always the chance of losing one or more of the participants due to a myriad of circumstances. Though it is difficult to control this threat, the families of the participating students in this study gave every indication their children would return to the selected high school for the 2003 – 2004 school year, and none had any intention of withdrawing.

Multiple Treatment Interference is a general term for the confounding effects that may occur during an observation of one treatment variable, that are actually caused by the presence of other treatment variables (Cooper, Heron, & Heward, 1987). Confounding effects from one treatment variable can sometimes manifest during the observation of a second treatment variable (Cooper et al., 1987). The research team anticipated the opportunity to assess effects of observed treatments, when administered in isolation, following the experimental comparison with the application of two treatments.

In an alternating treatments design it is critical to carefully counterbalance each treatment across each of the different conditions of its administration. This is necessary to separate the effects of the specific treatments from any effects of the administrative variables. The following examples are commonly cited as problematic during the counterbalancing process: time of day, order of presentation, settings, and

administrators (Cooper et al., 1987). In an attempt to minimize this particular threat, a large calendar/schedule was developed to organize the treatments of all participants in a manner that attempted to limit any type of predictability, similar feature, or routine.

Due to the nature of their disabilities, participants could have experienced difficulty learning to operate the HH independently, and/or to manipulate them as required by the study protocol. A *Participant PDA Training Protocol* was implemented prior to the study with a goal of 100% independent mastery of at least one novel job task (please see Chapter 3 for a complete description of the *Participant PDA Training Protocol*). Prior to participation in the intervention phase, the goal was to successfully teach each participant how to use the HH. In previous studies, participants with mental retardation were able to learn to use a HH successfully, as well as manipulate them correctly (Davies et al., 2002a; Davies et al., 2002b; Davies et al., 2003; Riffel et. al, in press; *Visual Assistant*, Retrieved April 21, 2003).

Difficulty or malfunction with the equipment, specifically the HH, digital cameras, and/or video cameras, could have posed an additional threat to the study. To combat trouble with programming issues, the primary investigator and two of the research team members began programming the devices for use one month prior to the initiation of the study. Also, ongoing communication was maintained with support staff at AbleLink Technologies Inc. (inventors of the equipment utilized in the study). Each member worked with their assigned device daily in an attempt to work through any problematic issues prior to initiation of the study. Furthermore, two of the Assistive Technology specialists in the selected county and an independent consultant agreed to assist the research team with all aspects of equipment management during the entire course of

the study. When a malfunction occurred with the HHs, the primary investigator shipped them back to AbleLink Technologies Inc., where they were promptly fixed and returned. Because only one device was used per session, possessing a total of four decreased the possibility of problematic equipment issues. The team had access to three digital video cameras in addition to the four cameras provided with the equipment bundles, and there were adequate provisions in place regarding pieces of back-up equipment necessary for all study related activity.

Assumptions

The participants in this study are representative of high school students with autism and mental retardation throughout the state of Florida, as well as the entire United States. The selected job site is representative of a continuum of possible post-school options for each of the participants in the study. The treatments will increase the targeted behaviors in each of the participants. The treatments will be beneficial to each of the participants involved in the study.

CHAPTER TWO: LITERATURE REVIEW

The past three decades have given rise to a proliferation of technological advances within the field of special education. Technology plays an integral role in the lives of all citizens within our society, and the promise of continued innovation within various arenas for people with severe disabilities has been particularly well recognized within research literature (Burgstahler, 2003; Davies et al., 2002a; Davies et al., 2002b; Davies et al., 2003; Mirenda, Wilk, & Carson, 2000; Parette, 1991; Parette, 1997). Recently, a movement to develop additional techniques appropriate for students with severe disabilities has encompassed an emphasis on functional approaches to program design and delivery. A need continues to exist for professionals to recognize the specialized needs of students with severe disabilities and the importance of recognizing diverse profiles of each individual (Garcia-Villamisar et al., 2000;Sternberg, 1994).

Instructional Evolution

Historically, instructional programs for students with moderate to severe mental retardation and autism include a multitude of nonfunctional tasks (Iovannone, Dunlap, Huber, & Kincaid, 2003; Sternberg, 1994; Wehman, 1997; Wehman, 2002), such as unnecessary paper and pencil assignments and a lack of community focus (Nietupski et al., 1988; Sternberg, 1994). Often, the instruction provided within these segregated settings was at skill or developmental levels that were not appropriate. With the increased acceptance of the normalization movement in the late 70's (Perske, 2004),

questions began to surface regarding the efficacy of merely providing instruction within segregated school-based environments to students with severe disabilities. Educators and parents expressed concerns about non-functional skills identified as irrelevant to individuals with severe handicaps, and recommended independent functioning within communities as a main priority and goal for instruction. Due to these global concerns, many educators began to focus on the development of chronological, age-appropriate skills within the realistic environments students would be living and working in as adults (Fisher & Pumpian, 1998; Neubert et al., 2002; Nuering & Sitlington, 2003; Nietupski et al., 1988; Perske, 2004; Sternberg, 1994).

With the increased adoption of community-based instruction and transition programming for students with severe disabilities, a parallel occurred in research literature regarding recommended best practices for students with severe disabilities (Grigal et al., 1997; Wehman & Gibson, 1998). For nearly two decades, literature on transition practices increased dramatically. In this vein, several studies outline the following characteristics as necessary to successful transition planning for student outcomes: early planning, interagency collaboration, individualized transition planning, focus on integration, community-relevant curriculum, community-based training, business linkages, job placement, ongoing staff development, program evaluation, including specific individuals involved, identifying the role of each person involved, and identifying the time that services should begin (Garcia-Villamisar et al., 2000; Grigal et al., 1997; McDonnell et al., 1993; Morgan, Gentry, & Ellerd, 2000; Neubert et al., 2002; Smith, Belcher, & Juhrs, 1995).

Two facets of community-based vocational instruction indicate great promise for people who have mental retardation and autism - *Community-Referenced Instruction* (CRI) and the consistent use of *Assistive Technology* (AT). Because parents, teachers, and professionals working with people who have autism and mental retardation wish to optimize opportunities for successful integration into community-based work and living arrangements, CRI and AT may potentially provide practical strategies during the implementation of various work and/or living supports (Davies et al., 2002a; Davies et al., 2002b; Davies et al., 2003; Koegel & Koegel, 1995; Riffle et al., in press; Wehman, 1998). Research findings indicate CRI, coupled with the use of AT, benefits the instruction and retention of generalized skills. These findings are significant because people with severe mental retardation and autism do not generalize well across persons, settings, materials, or language cues (Branham, Collins, Schuster, & Kleinert, 1999; Gaylord-Ross, et al., 1987; Koegel & Koegel, 1995; McDonnell et al., 1993; Noyes & Sax, 2004). CRI and AT, utilized in conjunction, have proven highly effective when teaching within community-based settings. AT that can be used in multiple environments can assist students in the development of skills and strategies necessary to their independent participation within the community (Gaylord-Ross et al., 1987; Morgan et al., 2000). To date, a wide range of AT devices, both high and low tech, are available to people who are severely disabled. In an attempt to address this issue Schneider (1999) recommend the following as a list of commonly cited devices within community and work settings for persons with cognitive impairments:

> Aids for everyday living, Augmentative or Alternative Communication (AAC) devices, Computer Access and Alternative Input Interfaces (Which include: special or modified keyboards, single and multiple switches, pointing devices,

> and voice recognition systems), Alternative Output Interfaces (Which include: Image magnification devices and specialized software), Environmental Control Systems, Prosthetics and Orthotics, Accommodations to wheelchairs or other seating systems, Service Animals, Aids for Vision Impaired, Aids for Hearing Impaired, Wheelchairs/Mobility Aids, Vehicle Modifications, and accommodations in the areas of sensory limitations, motor limitations, neurological functioning, and multiple limitations (p. 160).

Best Practices

Specialized instruction for students with mental retardation and autism requires sound educational planning and instruction by teaching staff, therapists, job coaches, and parents. Decisions that drive specific instructional modalities include: how a student learns, how a student might complete a given task, what type of feedback should be provided, and how instruction might be segmented for specialized instruction (Garcia-Villamisar, Ross, & Wehman, 2000; Iovannone et al., 2003; Langone et al., 2003; Wehman & Kregel, 1997). Of particular importance to instructional decision making for this special population is whether or not the characteristics of a specific disability should determine the most effective method of performing a task, organizing task content, and/or providing actual instruction (Iovannone et al., 2003; Langone et al., 2003; Wehman & Kregel, 1997).

Autism Spectrum Disorders

The abundant array of instructional techniques identified for individuals with autism spectrum disorders (ASD) includes a wide range of delivery modalities,

environmental structures, and philosophical foundations grounded in behavioral theory. Because ASDs are developmental disabilities that affect behavior, learning, and cognition (Muller, Schuler, Burton, & Yates, 2003; Garcia-Villamisar et al., 2000) strategies for these individuals require a multi-faceted approach. Despite an enormous range of instructional options, a lack of agreement exists among instructional personnel regarding which techniques prove most effective for their students with ASDs. To date, reliable literature, with respect to one identified methodology for all students with ASDs, has not emerged (Charlop-Christy, Le, & Freeman, 2000; Iovannone et al., 2003). Moreover, researchers have yet to identify any single programmatic approach eliciting successful outcomes for all participants with ASDs (Iovannone et al., 2003). These findings, when translated into everyday use, suggest that teachers and other community providers should employ the instructional techniques best suited for each individual student. The notion of employing several different methods, based upon an individual's specific needs, is commonly referred to as *best practice*, and is in the best interest of all students (Iovannone et al., 2003; Lovaas, 1981; Muller et al., 2003; Simpson & Smith-Myles, 1998).

Compounding the difficulty of an appropriate pedagogical selection is the fact that individuals with ASDs represent a substantial range of abilities and functional levels, and often demonstrate highly developed splinter skills over a wide continuum (Simpson & Smith-Myles, 1998; Smith et al., 1995). Because such a wide range of skills exists, the use of one specified standard of instruction is inadequate for the provision of appropriate instruction for students with ASDs. Instructional literature exists detailing several methodological options including: incidental teaching, discrete trial

teaching, and modeling. These three instructional techniques are heavily grounded in behavior analytic intervention, and are frequently cited as effective instructional methodologies (Goldstein, 2002; Green 2001; Smith 2001). These strategies are frequently cited as a direct result of numerous years of research demonstrating their efficacy within multiple settings (Simpson & Myles, 1998; Smith, 2001; Browder & Snell, 2000; Westling & Fox, 2000).

Incidental Teaching

Incidental teaching is defined as, "…a process that occurs when the natural environment is arranged to attract children to desired materials or objects" (Simpson & Myles, 1998, p. 81) and is prescribed for people with ASDs because they commonly choose to avoid others in a given area. This method entails a teacher moving about a classroom, while remaining available to provide reinforcement and instruction on a topic (s) of immediate interest to students (Maurice, Green, & Foxx, 2001; Simpson & Myles, 1998; Westling & Fox, 2000). Three of the most notable research findings regarding the use of incidental teaching with individuals with autism include: a demonstration of greater skill acquisition, stronger generalization of skills across many other environments, and the fostering of the spontaneous use of speech among children with severe language impairments (Simpson & Myles, 1998). Green (2001) and Maurice, Green, and Foxx (2001) illustrate steps in incidental teaching with the following list:

1. arranging a setting that contains materials of interest to the child;
2. waiting for the child to initiate an interaction about an object of interest;
3. asking for more elaborate language, or approximations of speech; and

4. providing the object for which the child initiated. (p. 185)

When employing this strategy, it may be necessary to physically guide a student through a request to assist them in understanding specific expectations, requests, or commands from a teacher. Incidental teaching often occurs during topics of high student interest, and can be utilized to teach a variety of skills.

Discrete Trial Training

Discrete trial training consists of several components, beginning with a teacher prompt for a student to attend to a given command. This command can be verbal, gestural, or visual, and is for the purpose of gaining the student's attention. The designated student must follow this step in a compliant fashion. For example, a teacher might say, "Look at me", and the student should look at them in a timely fashion. Next, the instructor gives a specific command to the student, which is followed by a specific reinforcement to increase a desired or targeted behavior (Maurice et al, 2001;Simpson & Myles, 1998).

Smith (2001) lists five commonly accepted parts of a discrete trial: cue, prompt, response, consequence, and inter-trial interval. He strongly recommends the use of discrete trials for children with autism when instructional staff desires to add new forms of behavior to a student's repertoire.

Modeling

Modeling, which has received a great deal of attention within ADS specific literature, generally involves a child observing another person or another person on video engaging in a targeted behavior (Charlop-Christy et al., 2000; Maurice et al., 2001; Quill, 2000; Sherer, Pierce, Paredes, Kisacky, Ingersoll, & Schreibman, 2001; Simpson & Myles, 1998). Charlop, Schreibman, & Tryon (1983) indicate that modeling is an effective instructional method for enhancing generalization and maintenance skills in children with autism. Furthermore, Dowrick (1999) was among the first to demonstrate the effectiveness of video modeling for children with ASDs, and found video self-modeling to be an effective strategy in a variety of settings. Additionally, he found video modeling proved an extremely effective instructional teaching strategy for a variety of populations, including developmental disabilities and ASDs.

Mental Retardation

With increased opportunities to participate within their communities in a variety of settings, individuals with mental retardation have a resolute need for functional skills. Many students will require knowledge of functional approaches to a few precisely designed academic skills for use in everyday activities. According to Snell and Brown (2000), these functional academic skills typically include: sight word reading, skills to read numbers, counting and money skills, and time telling skills.

A legion of instructional strategies exists for teachers of students with severe mental retardation; however, relatively few have been studied for overall efficacy and long-term outcomes. Two well-cited teaching strategies, with several years of research evidence indicating positive student outcomes, are *constant time-delay*, and *system of least intrusive prompts* (Browder & Minarovic, 2000; Knight, Ross, Taylor, & Ramasamy, 2003; Browder & Snell, 2000; Westling & Fox, 2000).

Constant Time Delay

Constant time delay is an effective instructional technique for teaching new skills to students with mental retardation (Browder & Minarovic, 2000; Knight et al., 2003; Browder & Snell, 2000; Wall & Gast, 1997; Westling & Fox, 2000). An instructor begins by providing an attention cue to a student, such as, “Are you ready?” and then presents a *task direction* (a verbal or non-verbal cue the student receives to complete or engage in a targeted behavior) such as, “Read the card.” In this example, the instructor intends for the student to read the sign being presented. A delay period of a few seconds follows the direction to read the sign, and is then followed by a controlling prompt, which may be a verbal model, a gesture, a physical prompt, or any other appropriate prompt. The importance of a controlling prompt is to entice a student’s completion of a targeted behavior; consequently, it must have enough control over the student’s behavior to elicit the desired response (Browder & Minarovic, 2000; Knight et al.; Browder & Snell, 2000; Westling & Fox, 2000). One of the advantages to using this instructional methodology is the simplicity of intervention, as it does not require any specified curriculum or

material. Thus, parents and caregivers who may have little or no educational training can provide this highly regarded instructional technique (Wall & Gast, 1997). Also, the delivery is tailored to meet specific student needs, and can be easily tracked utilizing the most basic of data tracking systems.

System of Least Prompts

Like constant time delay, *system of least prompts* utilizes an initial stimulous, followed by a brief waiting period, and then the provision of a hierarchy of prompts. The prompt hierarchy moves from minimal influence to maximum-intensity types of stimulus, and is dependent upon a scripted protocol and/or corresponding task analysis for parameters and guidelines for implementation (Knight et al., 2003). This skill acquisition training system is one of the most commonly utilized strategies for teaching students with severe disabilities (Knight et al.; Browder & Snell, 2000; Westling & Fox, 2000). To teach utilizing this method, a teacher first identifies a targeted skill to be taught, and then completes a corresponding task analysis to teach the task. As the teacher moves from step to step in the task analysis, prompts are given for specific step completion in the task analysis via a prompt hierarchy. A student may be able to complete several of the individual steps in the task analysis with low-level verbal prompts, and still require partial or full physical prompts to complete the entire sequence. This type of instruction is highly flexible and should be provided at appropriate times and in naturally occurring environments for maximum instructional benefit (Browder & Snell, 2000; Westling & Fox).

Staff Modeling

First introduced by Albert Bandura in the 1960's (Sherer et al., 2001), modeling for instructional purposes has been widely reviewed by many instructional and educational practitioners. As a result, many studies have also established modeling as an effective instructional tool for typically developing children (Charlop-Christy et al., 2000). Simpson and Myles (1998) outline a commonly accepted definition of modeling within the context of instructional intervention, "Modeling involves teaching a behavior by performing the act while the student observes" (p. 131). This involves performing a desired task or behavior for a student while the student watches, and explaining specific steps if necessary. During such interactions it is important for adults to consistently model desired behavior or instructional information, so students will be clear about the expectation(s) of their behavior (Lovaas, 1981; Quill, 2000). Reporting on a review of behavioral and instructional literature, Maurice, Green, and Foxx (2001) report modeling is the second most commonly used instructional intervention for people with autism, and describe research studies suggesting modeling is most effective when a similarity exists between the model and the learner. In a similar fashion, Sherer et al. (2001) report visual modeling is an extremely beneficial instructional intervention due to the attention, language, and motivational deficits most people with autism experience. Similarly, in a study that reviewed the use of modeling with different groups of students, Biederman, Fairhall, Raven, and Davey (1998) report modeling to be an effective strategy for students with developmental delays, mental retardation, and autism.

Assistive Technology

Assistive technology (AT) frequently brings to mind visions of complicated, high tech equipment, and is viewed by many as a reference to communication devices (Langone, 2000; Mirenda & Wilk, & Carson, 2000) or technology employed by those with physical impairments. AT devices include a range of items, pieces of equipment, or product systems that may be used to increase, maintain, or improve the functional abilities of children with disabilities (Galvin & Phillips, 1994; Lahm & Nickels, 1999; Parette, 1997; Schneider, 1999). AT includes any type of tool that could be used on a daily basis with the potential to increase the functional abilities of children with disabilities (Galvin & Phillips, 1994; and Parette). In practice, AT devices can range from very simple to quite complex, and generally fall into two categories, *low-tech* and *high-tech*. *Low-tech* devices tend to be simple, have few moving parts and are relatively inexpensive. They are easy to manipulate and require little training for effective use (Lahm & Nickels, 1999; Parette, 1997; and Schneider, 1999). Conversely, *high tech* devices tend to be more complex, often have an electronic component, are generally more expensive, and usually require more training for staff on proper use (Lahm & Nickels, 1999: Parette, 1997; and Schneider, 1999).

The benefits of specialized vocational instruction for students with severe disabilities, within community-based settings, is documented in research literature (Gaylord-Ross et al., 1987; Hutlinger, Johanson, Stoneburner,1996; Post & Storey, 2002). Notably, many individuals with moderate and severe mental retardation and autism can benefit from specialized AT support services in order to function at their

maximum potential (Brodin, 1998; Davies et al., 2003; Langone, 2000; Parette, 1997; Post & Storey 2002; Smith et al., 1995).

Frequently people with severe disabilities require increased supervision and instruction within community-based job sites. Consequently, their performance is often dependent upon a job coach, teacher, or other type of support person. Job coaches provide specific training and extended support, such as instruction of new tasks, re-training of previously taught skills, and the systematic training of skills for new job acquisition (Lee, Storey, & Anderson, 1997; Nuehring & Sitlington, 2003). The absence of these support personnel often results in poor skill demonstration and/or overall poor job performance by people with severe disabilities. Research indicates use of AT increases competency and independence of individuals with moderate to severe mental retardation and autism in community-based settings. Also, AT increases their probability of success in self-management skills in community work settings (Langone, 2000; Post & Storey, 2002; Smith et al., 1995; Wehman, 1997). Despite these promising findings, little research exists in the area of AT use within community-based work environments for individuals with moderate to severe mental retardation and autism within the context of additional and/or effective instructional support (Davies et al., 2003; Edyburn, 2000; Edyburn, 2001; Furniss et al., 2001; Le Grice & Blampied, 1994; Langone, 2000; Mechling & Gast, 1997; Morgan et al., 2000; Post & Storey; Smith et al.).

Community-Based Vocational Education

A considerable number of professionals agree that curriculum for high school students with moderate to profound mental retardation and autism should focus on employment, personal management, and leisure activities that enhance their participation within community settings after high school (Nietupski et al., 1988; McDonnell et al., 1993; McDonnell, Mathot-Buckner, & Ferguson, 1996). The importance of community-based instruction is delineated by the reality that most students with mental retardation and autism have great difficulty generalizing skills learned within the classroom to actual job sites within the community (Iovannanone et al., 2003; Nietupski et al.; McDonnell et al., 1993; McDonnell et al., 1996; Moon & Inge, 2000), therefore, community-based instruction is essential. Moreover, numerous studies indicate the need for students with severe mental retardation to be educated within the settings they will likely become employed after high school (Kraemer & Blacher, 2001; Nietupski et al.; McDonnell et al.; McDonnell et al., 1996; Smith et al., 1995). Therefore, there is a specific need to design instructional practices for these students that will meet the expectations and realities of specific post-school settings, like work or supported employment (Chadsey-Rusch, & Gonzalez, 1996; Kraemer & Blacher, 2001; Nietupski et al.; McDonnell et al.; McDonnell et al.; Smith et al., 1995; Moon & Inge, 2000; Wehman, 1997; Westling & Fox, 2000). The use of curriculum emphasizing employment, personal management, and leisure activities has had significant impact on the development and implementation of high school programs for students with severe disabilities, including those with mental retardation and ASDs

(Iovannanone et al.; Nietupski et al.; McDonnell et al., 1993; McDonnell et al., 1996; Moon & Inge, 2000; Westling & Fox).

Given this knowledge, it is incumbent upon educators to design instructional programs containing specialized vocational instruction in school and community-based settings. Because learning in school differs from learning in community-based settings (Chadsey-Rusch, & Gonzalez, 1996; McDonnell et al., 1993), there is a need for students with severe disabilities to receive community-based instruction on actual job-sites. Furthermore, it is important for students to have opportunities to engage in school experiences in preparation for meaningful work within community environments (Chadsey-Rusch, & Gonzalez, 1996; Nietupski et al., 1988; McDonnell et al., 1993). To date, technology has become an essential tool in nearly every educational, employment, and community environment (Burgstahler, 2003). For people with severe disabilities, access to such equipment potentially maximizes their independence and participation within a myriad of community-based settings. As these individuals continue to participate in integrated community settings, researchers and practitioners need to identify effective and socially acceptable methods of intervention and instruction (Alberto, Taber, & Fredrick, 1999).

Transition

Preparing students with mental retardation and autism for the completion of their high school experience and the beginning of their post-school existence is of critical importance to parents, educators, and community leaders (Conley, 2003; Kraemer &

Blacher, 2001; Nuerhing & Sitlington, 2003; Smith et al., 1995; Wehman & Gibson, 1998). As secondary students with severe disabilities prepare to transition into integrated, post-school community settings, a clear need exists for the implementation of instructional strategies that increase appropriate student behaviors while decreasing aberrant and/or off-task behavior (Alberto et al., 1999) by students with autism and mental retardation. Because researchers have identified that individuals with autism who engage in aberrant behaviors are at risk for community failure, social intolerability, and underemployment (Alberto et al.) immense effort should be placed into the proper planning, training, and implementation of community-based instruction.

While transition has been extensively reviewed and studied by many qualified professionals, relatively few investigators have scrutinized this process in relation to individuals with severe mental retardation (Kraemer & Blacher, 2001) and autism (Nuehring & Sitlington, 2003). According to Kraemer & Blacher (2001), references to students with severe mental retardation within transition literature consist of a narrow focus, "…researchers typically describe 'how to' implement a transition program as opposed to examining how transition programs are actually implemented or experienced" (p. 423). As a result of limited literature, very little is know about how schools are actually preparing students with severe mental retardation to leave the school system (Kraemer & Blacher, 2001). Further, researchers report families are critical components to the well-being of students with severe mental retardation as they prepare to engage in meaningful transition (Bowser & Reed, 1995; Hutinger, Johnson, & Stoneburner, 1996; Kraemer & Blacher, 2001; McDonnell et al., 1996; Nuehring & Sitlington, 2003; Patton, 1999; Todis, 1996). Recommended practices in the field of

transition for individuals with severe disabilities include: person-focused direct supports, the ability to exercise choice within their career path, and greater control over decisions that impact employment outcomes (Davies et al., 2003; Nuehring & Sitlington, 2003). Moreover, findings demonstrate a need for schools and transition programs to develop systematic transition services for all students with severe mental retardation (Kraemer & Blacher, 2001; McDonnell et al., 1996) and autism (Nuehring & Sitlington, 2003).

Supported Employment

Over the past three decades, pervasive increases in nation-wide employment rates of individuals with developmental disabilities (Sowers, McLean, & Owens, 2002) has established that people with severe disabilities are indeed capable of meaningful work within a variety of community settings. In addition, recent studies indicate societal trends have shifted in the area of employment for those people historically viewed as unemployable, including those with mental retardation and autism (Unger, 2002; Unger 1999). Individuals previously served by *medical models,* employing a clinical approach emphasizing the *fixing* or *curing* of those with disabilities, now have increased service options based upon their capabilities, choice, and viable workplace supports (Unger, 1999; Unger 2002). Unfortunately, labor statistics paint a grim picture for people with severe disabilities desiring work. At least 80% of people with disabilities remain unemployed, and of the very small percentage of people who are working, 80% of those individuals who receive employment or day services funded by state departments of Mental Retardation/Developmental Disabilities agencies continue to do so in sheltered

workshops and day activity programs (Louis Harris & Associates, 2000; Sowers et al., 2002).

According to Wehman, Revell, and Kregel (1998), there is an important need for individuals with disabilities to be employed and earning wages and benefits within competitive work settings. They further report individuals with disabilities who are capable of work within their own community demonstrate greater independence and mobility in that community, improved self-esteem and dignity, and an increase in social opportunities. One method of providing employment opportunities for individuals with severe disabilities is referred to as supported employment

Supported Employment is a specialized program that provides training and assistance to people with the most severe disabilities so they might achieve competitive work within an integrated community setting (Mank, Cioffi, & Yovanoff, 2003; Wehman & Revell, 1996; Wehman et al., 1998). Supported employment was originally designed to transition people with severe disabilities from segregated workshops to competitive employment within community settings (Cimera, 1998; Wehman et al., 1998), and has received professional acceptance as a successful model for individuals with severe mental retardation and autism (Wehman & Revell, 1996). According to Wehman and Gibson (1998), individuals receiving supported employment services, "…should be viewed in terms of their abilities, strengths, and interests, rather than their disabilities" (p. 131). Further, they note, "…one of the distinguishing features of supported employment that sets it apart from other rehabilitation models is the presence of long-term follow-along support" (Wehman & Gibson, 1998, p. 131). Supported employment provides the vocational options and necessary supports for individuals with severe

disabilities that enable them to work within integrated environments and receive *real* wages (Kraemer & Blacher, 2001; Mank, Cioffi, & Yovanoff, 1998; Mank et al., 2003; Wehman & Revell, 1997).

Despite its potential as a promising model, individuals with severe mental retardation seldom participate in supported employment situations (Cimera, 1998; Kraemer & Blacher, 2001). To date, the supported employment movement has accomplished considerable success by people with mild to moderate developmental disabilities, but has had limited impact on opportunities for people with severe cognitive limitations (Derer et al., 1996; Furniss et al., 2001; Mank, Cioffi, Yovanoff, 1997; Wehman, 1992).

The systematic use of AT may contribute to a future increase in the number of individuals with severe disabilities who are able to successfully transition into supported employment opportunities. In this vein, the provision of specialized vocational training for secondary students, within community-based settings could assist in enabling a seamless transition into the work force. For individuals with severe disabilities, this particular model, when implemented properly, holds a great deal of promise for increasing employment opportunities in a variety of settings.

Technology Implementation

According to recent research literature, AT support within work or other community settings for individuals with mental retardation and autism has been almost exclusively implemented with the use of visual and audio support systems. Specifically,

these specialized AT strategies have included the use of: sundry software applications, video modeling and prompting systems, auditory prompting systems, and audio/visual prompting systems. Additionally, visual strategies may include photographs, illustrations, or line drawings of steps in a task that can support a student in the completion of an activity. Audio strategies may include pre-recorded, taped directions or instructions that a student can listen to as he or she performs a task (Riffle et. al, in Press).

Software Applications

Emerging in the mid 1970's, *Computer-Assisted Instruction* (CAI) has been widely utilized with students with mild disabilities with mixed results (Okolo, Bahu, & Reith, 1993). It is most often defined as, "…the use of a computer and other associated technology with the intention of improving students' skills, knowledge, or academic performance (Okolo et al., 1993, p. 1)."

In a promising study by Frost (1981), students with autism learned to control the movement and characteristics of an object on a computer monitor or to manipulate a displayed object on a computer screen. These findings are limited in overall scope and/or transferability, though they lay groundwork for professionals attempting to teach students with autism utilizing CAI. In another study examining the effects of CAI on people with autism, Pleinis and Romanczyk (1983) identified a positive effect of computer use on students' attention and performance compared to other forms of instruction and intervention. They reported CAI use increased the level with which

participants engaged in verbal interactions due to a decreased need for instructional prompts by staff and peers. While these interactions were limited, any increase in this area is an important finding when reporting on individuals with pervasive developmental disorders. Hsing, Chen and Bernard-Optiz (1993) listed several viable benefits to the use of CAI with students with autism and developmental disabilities:

1. Computers provide consistency, regularity, availability, and on demand stimulation without "taking over" or making return demands on the child, and give the child control over the learning situation.
2. Structured, "patient" computer programs can help children with autism overcome stimulus over-selectivity through practice or sufficient overtraining.
3. The use of a speech synthesizer could allow a similar strategy for the acquisition of verbal language.
4. Multiple input/output devices can be adapted to the progress of the child.
5. The computer can be a means of communication for children who do not develop spoken language through the voice synthesizer, visually represented language, or symbol systems. (p. 369)

While this list is not exhaustive, it illustrates the clear benefits of CAI instruction for students with autism and developmental disabilities.

More recently Bernard-Opitz, Sriram, & Nakhoda-Sapuan (2001), conducted a study reviewing the effects of CAI on the enhancement of problem solving skills by children with autism after being instructed by computer simulated social skills model. Students were taught to navigate a specific social skills training program on a computer by problem solving for specific solutions presented. Students navigated the program by making selections within specific simulated situations that would effectively solve a presented social problem. Though the study involved participants who were neither severely impaired (by mental retardation or autism) or of high school age, the results were significant in that they demonstrate the ability of children with autism to learn to solve social problems with the use of animated computer models or CAI.

A federally funded grant, from the Office of Special Education Programs (OSEP) at the U.S. Department of Education, allowed the development of a video CD-ROM job preference program for use by youth with severe disabilities, including mental retardation and autism (Morgan et al., 2000). Video and video software technology were developed to assist students in the completion of a job choice inventory. Video and CD-ROM technology have been extensively used in career exploration and assessment activities for typical students, though have infrequently been applied to students with severe disabilities (Morgan, et al.; Stock, Davies, Secor, & Wehmeyer, 2003). While CD-ROM technology may hold advantages over photographs or videos, it continues to fall short of realistically portraying complex employment environments (Langone et al., 2003; Morgan et al.; Wehman, 1992; Wehman, 2002) for individuals who demonstrate no contextual understanding of such atmospheres. Clearly, the most functional way for people to gather information on job preferences is through exposure to community-based job placements in integrated work environments (Langone et al.; Wehman, 1992; Wehman, 2002). This technology does not directly support individuals with moderate to severe mental retardation and autism in community-based work settings, but appears to have the potential to provide an excellent tool for teachers, job-coaches, and vocational rehabilitation coordinators in assisting this population in the area of career development and freedom of choice (Stock et al., 2003; Wehman, 2002).

Video Modeling and Prompting Systems

According to Quill (2000), the main function of video modeling is to directly "…teach specific social and communication skills" (p. 158) to students. The well-documented use of *visual modeling* has been employed for the purposes of instruction, initiation, and communication (Maurice et al., 2001; Mirenda et al., 2000) for individuals with mental retardation and autism. This strategy usually entails the use of a videotape format, in which a videotape representation of the performance of specific skills (Branham et al., 1999) or behavior are constructed and then systematically reviewed with students in order to teach them specified skills or tasks. This type of intervention often facilitates generalization to natural settings for students who may have limited access to community-based sites (Alcantara, 1994).

Branham et al. (1999) documented the successful use of video modeling in community-based settings with students with moderate impairments. Their study reviewed the intervention of three different techniques (classroom simulation, videotape modeling, and community-based instruction) combined in various ways for use with high school students. Results indicated the video modeling intervention was most successful when used in conjunction with community-based instruction and classroom instruction together or in close succession. The video modeling in this study consisted of a videotape of a peer performing each task in a community-based setting according to a predetermined task analysis. Additionally, at the conclusion of each videotape model, the teacher embedded still photos into the videotape.

Le Grice and Blampied (1994) developed a *video prompting* system to instruct students with moderate to severe mental retardation in the acquisition of new skills and the appropriate performance of existing skills. Their strategy, based upon the work of others who had previously utilized picture prompting, included tape-recorded prompts or video prompts to successfully train individuals to complete a task analysis or specific skill. To instruct students via *video prompting*, videos were prepared of a model completing tasks broken down by a task analysis. The video was then turned off, and students were prompted to complete the same task without the video model. In the procedure described by Le Grice and Blampied (1994), once the video was turned off, it was no longer available to guide the participant. Results of this study were positive; the authors reported each student learned skills identified for treatment. Furthermore, the students maintained the learned skills for over three weeks and generalized these new skills to different settings.

Auditory Prompting Systems

According to Mitchell, Schuster, Collins, and Gassaway (2000) auditory prompting systems can be an effective method of skill acquisition for students who are generally considered prompt dependent. They define a self-auditory prompting system as a "…step by step process that teaches individuals to use audiotapes with recorded steps of a task analysis in order to complete a skill without the direct supervision of a teacher" (Mitchell et al., 2000, p. 415).

Research suggests that people with autism who fail to tune out auditory stimuli can benefit from increased auditory input (Taber, Seltzer, Heflin, & Alberto, 1999). Specifically, two different studies indicate that students with autism respond favorably to the use of an auditory system employing headphones coupled with auditory prompts. Results illustrate that students with autism who utilize the auditory prompting systems demonstrate an increase in appropriate behavior, communication attempts, and improvements in visual attention (Grossi, 1998; Taber, Alberto, & Fredrick, 1998; Taber et al., 1999).

A recent study by Post and Storey (2002) demonstrated the successful implementation of an *auditory prompting system* designed to improve the performance of persons with moderate to severe mental retardation. Based upon their findings, as well as other studies, they provide the following suggested guidelines for designing a step-by-step instructional auditory prompt system:

> *Step 1*: Create a task analysis by breaking down the targeted task into sequential performance steps.
> *Step 2*: Create a written script of these steps for recording on a cassette tape. Designate a script reader who is known and liked by the individual, or experiment with various readers for a positive effect. Choose precise wording tailored to an individual's language usage.
> *Step 3*: Make recording. Wait time between prompts should be determined by observation of the individual's work pace. Adjusting the length of intervals between prompts may take some experimenting.
> *Step 4*: Prompts of encouragement, or imbedded music to provide positive reinforcement may be inserted into the wait time between instructional prompts. This step may be used if the prompt system is designed to stay on (not to be turned off to perform the instruction and turned on again to listen to the next instructional step).
> *Step 5*: Model the physical operation of the tape player with the headsets and have the individual practice wearing and operating

the equipment. Many players are designed so they may be attached to a belt, apron, or vest pocket. An individual's favorite tape-recorded music may be used for this step.
Step 6: Modify operational buttons, if necessary.
Step 7: Once it is determined that the individual can put on, operate, and remove the tape-recording equipment, introduce the recorded cassette with the script containing the task analysis.
Step 8: Instruct the individual to press the on button, listen to the step, then turn off the player and perform the step. If there is difficulty performing the step, have the individual speak the step out loud before performing it. It may be necessary to model or prompt with verbal or physical support.
Step 9: Monitor the individual's use of the system until he/she has demonstrated competence and independence with system operations and task performance.
Step 10: Once a specific task has been learned, the prompt system may be removed or gradually eliminated. Some individuals may prefer to continue to use the prompt system according to their need or comfort level. If the auditory prompt system is removed, it can be easily reintroduced if learning fades (Post & Storey, 2002, p. 322).

Post and Storey (2002) reviewed ten studies involving auditory prompting systems, as well as their own research. They found evidence of a functional relationship between the use of an audio prompting system and the increase of task performance in individuals with moderate to severe mental retardation. The relative ease of use and low cost of such an effective strategy make audio prompting a likely intervention for individuals with various impairments in a multitude of settings.

Audio/Visual Prompting Systems

Melching and Gast (1997) developed an audio/visual self-prompting system, designed to teach chained tasks to students with moderate mental retardation. New tasks were successfully taught to each study participant using an electronic, augmentative communication device (e.g. a Digivox) that employed the use of overlays

and recorded speech for both visual and auditory prompting and feedback to the listener. Students were taught how to use the device prior to testing through adult modeling. During the instructional phase, a student looked at a photograph representing a step (visual prompt), pressed the photograph, heard the description of the step (auditory prompt), and then removed the photograph from the device and placed it into a container after the step was completed. This study indicated that the use of this particular self-prompting system for completing untrained tasks was very effective. Notably, the investigators did not employ a large number of participants or measure students within the community. Regardless of these limitations, this strategy appears promising to those attempting to provide specialized instruction within the community.

In the United Kingdom, a team of British researchers developed and evaluated a palmtop-based job aid for workers with severe developmental disabilities (Furniss, Ward, Lancioni, Rocha, Cunha, Seedhouse, et al., 2001). The VICAID system enables an individual to access pictorial instructions (developed as a task analysis) designed to help him/her in the accurate completion of a task. Additionally, the system provides reminders to access the instructions, and/or alert a job coach or supervisor if the worker's interaction with the system suggests that they are having difficulty with an identified task. The device gives prompts when too much time is taken to complete the next task in a chain. These can be auditory, or the device will actually vibrate if the person is in a loud environment or responds best to vibration as a prompt versus an auditory prompt. Because each of the devices were programmed to meet the specific needs of an individual, prompts were programmed at time intervals suited for that

individual in a designated working situation. This kind of autonomy offers job coaches, teachers, and co-workers an ample window to assist someone who may be experiencing difficulty with a specific job. While research is currently limited in the area of palm-top use by people with significant disabilities, these results and strategies appear promising for many individuals who may be able to work in previously inaccessible work settings.

In a recent study, three participants with moderate disabilities, including mental retardation and autism, utilized a palmtop computer to complete vocational and independent living tasks within community-based settings (Riffel et al., in press). The palmtop computer utilized a Windows CE platform with touch screen capabilities and was programmed with the *Visual Assistant* software program. The *Visual Assistant* was programmed to display all of the required steps for each task completion. Digital pictures were loaded into the palmtop, and then verbal instructions were programmed using the *Visual Assistant* to compile a single work task. A single icon represented each task on the palmtop computer screen, and was used to initiate the task analysis for each specific job by the participants. The authors reported that all participants demonstrated a reduction in the number of prompts necessary to complete tasks while using the palmtop computer for specified tasks, and that some of the students were able to use the *Visual Assistant* system independently to complete follow-up tasks (Riffel et al.).

Riffel et al. (in press) included one participant with autism and reported this particular student had the following outcome, "…(he) made promising progress until the end of the school year… but did not reach mastery on the device due to changes in his

medication and a family emergency involving his teacher. Though this student demonstrated a positive trend, and likely would have continued to experience the same success as his peers in the study, experimental control was lost (Riffel et al., in press, p. 17)." The overall findings indicate students with intellectual and developmental disabilities can benefit from the use of a palmtop computer to promote independence and productivity in transition-related tasks.

Davies et al. (2003) studied the use of a palmtop computer on the ability of adults with mental retardation to facilitate decision-making skills during vocational tasks. The forty participants in their study were required to fill orders at a local computer company, and were trained to fill orders and operate the palmtop computers prior to the study. All participants used the *Pocket Compass*, a multi-media decision-aiding software application program. This program runs on a palmtop computer and uses customized picture and auditory prompts to guide users through a decision making process. Like the *Visual Assistant* (and made by the same company), the *Pocket Compass* software works with an integrated digital camera, and can be programmed to provide picture icons and corresponding verbal directions for a given task that can operate off of a standard palmtop computer. The palmtops used in the study had touch screens with picture icons for each of the designated tasks participants were expected to complete. The program worked by allowing chained tasks, beginning with the depression of the job icon, to run after a participant's interaction with specific equipment. Results of the study indicated statistically significant results in the participants' ability to correctly navigate a specific job/task versus the same job/task navigation without the assistance of the palmtop computer. Further, the authors noted that participants required

significantly less assistance from staff when the *Pocket Compass* was employed for job completion. This study suggests the *Pocket Compass* system, an audio/visual prompting system, may provide a highly effective tool for individuals with cognitive disabilities within various community-based settings.

Visual Assistant

In 1993, AbleLink Technologies, Inc. began conducting research to investigate the applied use of the *Visual Assistant* (Visual Assistant, Retrieved April 21, 2003) for individuals with mental retardation. Since then, several studies have successfully demonstrated the feasibility of using a multimedia training program on a Handheld Personal Computer (PC). In particular, the *Visual Assistant* program effectively increases independence, self-determination, decision-making, time management, and transition skills of individuals with intellectual disabilities (Davies et al., 2002a; Davies et al., 2002b; Davies et al., 2004; Riffel et al., in press; Visual Assistant, Retrieved April 21, 2003).

According to Dan Davies, founder of AbleLink Technologies, Inc., no previous research exists that examines these types of specialized technology for individuals with ASDs. He stated, " The research teams were not aware of any study participants with the formal diagnosis of autism" (Daniel Davies, personal communication, August 7, 2003). However, Mr. Davies conveyed his belief that some of the participants may have been on the autism spectrum, "I think a few have been…based upon observations of their behavior by the research teams" (Daniel Davies, personal communication, August

7, 2003). He further noted that the "…focus (focus group of each study) was mental retardation and we (research teams) did not pursue documentation of other diagnoses" (Daniel Davies, personal communication, August 7, 2003).

Because individuals with autism have difficulty acquiring lengthy response chains, the use of visual cues (e.g., pictures, photographs) are often very effective in helping people complete specified steps in a task (Davies et al., 2002; MacDuff, Krantz, & McClannahan, 1993). Several studies demonstrate the efficacy of visual cues for people with developmental disabilities to acquire skills such as self-care, meal preparation, computer use, clerical skills, and laundry tasks (MacDuff et al, 1993).

AT Literature Summary

Service providers for people with significant disabilities have traditionally regarded skill acquisition as an exclusive route to independence within community-based settings. Furthermore, social and vocational skill developments have long been considered key goals for persons with severe disabilities. In recent years, the emphasis on skill development (Post & Storey, 2002) has been complimented by a growing interest in the possibilities AT has to offer individuals who otherwise would not have had an opportunity to work within their own communities.

Several researchers have speculated why there is little currently known regarding the comprehensive impact of AT devices and services for people with moderate to severe mental retardation within community settings (Derer et al., 1996). Theories include financial limitations, lack of staff training, and the premise, "AT introduces

additional complexity into an already complex situation: the education of a student with disabilities" (Todis, 1996, p. 60). According to Wehmeyer (1998), AT devices are underutilized by people with more significant limitations, with fewer than 10% of the population of individuals with mental retardation and developmental disabilities utilizing this form of assistance. Yet, the small amount of literature available documents that AT positively impacts the lives of students and study participants (Todis, 1996), and user benefits can be anticipated when these devices and services are provided (Parette, 1997). Limited, comprehensive, statistics currently exist supporting quality of life issues for people with severe disabilities such as job satisfaction, levels of independence, choice-making capabilities, and an individual's increased ability to perform in the workplace. However, generalizations and conclusions can be made based upon the findings of the studies previously reviewed; still, there is a lack of necessary evidence in order to make sound assumptions and decisions regarding promising AT interventions for transition into community settings for people with autism and mental retardation. Theoretically, each of the developments previously reviewed could provide individuals with significant limitations a greater level of independence in work environments, as well as an opportunity for exposure to different types of jobs and job settings. AT devices and strategies could make it possible for individuals who historically completed relatively few tasks in a given work setting to complete an increased amount of work, in multiple settings, and to make choices about jobs *they* wish to complete versus those they are *assigned* to complete (Wehmeyer & Schwartz, 1997).

CHAPTER THREE: METHODOLOGY

Research Design

This study used an alternating treatments design across subjects (Alberto & Troutman, 2003; Cooper et al., 1987; Horner, Carr, Strain, Todd, & Reed, 2002; Kazdin, 1982) to investigate the effects of HH use compared with a SM intervention on variables possible for novel job completion. High school students with autism and mental retardation completed work in community-based settings with the use of vocational instruction.

Design Review

An *alternating treatments design* provides an experimentally sound and efficient method for comparing two treatments (Alberto, & Troutman, 2003; Cooper et al., 1987; Gay & Airasian, 2000; Richards et al., 1999). This particular design is characterized by the rapid alternation of two or more treatments that are concurrently presented to a participant in close succession, while effects on a single target behavior are recorded (Alberto, & Troutman, 2003; Cooper et al.; Kazdin, 1982; Richards et al.). *Rapid*, a qualifier often attached to descriptions of alternating treatment effects, does not necessarily occur within a fixed interval of time (Gay & Airasian, 2000). Its implementation implies that the use of two different intervention effects will be presented to participants separately, within a proximal time period. With an alternating treatments

design, different treatments may be alternated across daily sessions, or administered in separate daily sessions over a period of days (Alberto, & Troutman, 2003; Cooper et al.). All treatment intervention sessions must be random in their order of delivery.

One of the great strengths of an alternating treatments design is the ability to minimize the extent to which an experimenter's results are confounded by sequence events (Alberto, & Troutman, 2003; Cooper et al., 1987). Because sequence events are a major threat to internal validity in any experiment involving multiple treatments, coupled with the fact that individuals with autism tend to seek predictable patterns and routines in most settings, the minimization of this type of threat was critical. An advantage to the use of an alternating treatments design is an unnecessary application of a withdrawal phase of treatment. Therefore, a withdrawal phase is not a requirement with the use of an alternating treatments design in order to determine the existence of a functional relationship between the independent and dependent variables (Cooper et al.; Gay & Airasian, 2000; Richards et al., 1999). Often, no baseline data are recorded or considered necessary because an investigator employing this design is typically not interested in determining if the absence of treatment is worse than specified treatment phases (Gay & Airasian, 2000).

An alternating treatment design is advantageous for educators primarily concerned with which of several intervention procedures is most effective (Richards et al., 1999) for their students. Because it allows for the comparison of the effects of two or more treatments on the same behavior, the alternating treatments design is a preferred design by those who seek to measure the effects of an intervention not previously introduced to participants (Richards et al.). The use of a single subject

design provides investigators with experimental control for most threats to internal validity, which allows the confirmation of a functional relationship between the manipulation of the independent variable and noted change(s) within the dependent variables (Horner et al., 2003). The concern of this study included which of two instructional interventions provided via vocational instruction, a HH intervention or a SM intervention, were more effective in assisting job completion by students with severe disabilities in community-based settings.

Research Questions

This study primarily investigated the instructional effects of a HH intervention compared to a SM intervention upon high school students with autism and mental retardation. These interventions were provided in the form of vocational instructional strategies within community-based settings. Specific research questions that addressed this focus included:

1. Did the use of a HH intervention, compared to a SM intervention, for vocational instructional purpose, increase a student's level of accuracy on an assigned novel work task in a community-based setting?
2. Did the use of a HH intervention, compared to a SM intervention, for vocational instructional purpose, decrease the amount of requests initiated by participants while completing a novel work task in a community-based setting?
3. Did the use of a HH intervention, compared to a SM intervention, for vocational instructional purpose, reduce student's problem behavior in a community-based setting?
4. Did the use of a HH intervention, compared to a SM intervention, for vocational instructional purpose, reduce the overall amount of assistance (from staff) required by students for the successful completion of a novel work task in a community-based setting?

5. Did the use of a HH intervention, compared to a SM intervention, for vocational instructional purpose, reduce different levels of assistance (from staff) required by students for the successful completion of a novel work task in a community-based setting?

Sample

Five high school students, who participated in a specialized community-based vocational program within the central Florida area, were selected to participate in the study. The high school these students attended was a large, suburban school comprised of 2058 students (according to the 2002 - 2003 School Improvement Plan), of which 16.4% were listed as minorities, 8.79% received a free/reduced lunch, and 14.38% were served by non-gifted exceptional student education services (2002 – 2003 School Improvement Plan). Identified study participants were served in a special education classroom designated by their local school district under the categorical label of Trainably Mentally Handicapped (TMH). These students received instruction within a self-contained classroom, school-based jobs, and community-based jobs. Participants were assigned to the following grades during the 2003 – 2004 school year: *Student 1*, *Student 3*, and *Student 4* – 12th grade, *Student 2* – 11th grade, and *Student 5* – 10th grade. The students ranged in age from 15 to 19 years old when the study began. According to school records, each participant has a diagnosis of an Autistic Disorder (DSM-IV, 1994), and Mental Retardation (Grossman, 1983). Prior to the study, independent evaluators provided clinical diagnoses for the purpose of identification for school-based eligibility within special education services. These diagnoses were made

independent of the study, and were conducted before most participants reached the age of five years. Please refer to Table 1 for a listing of each participant's birth date, sex, race, Full Scale Intelligence Quotient (FSIQ), and school-based categorical assignment.

Table 1

Participant Profiles

Student	DOB	Sex	Race	FSIQ	Label
1	5.5.84	M	white	*60	A,LI,OT
2	7.14.86	F	black	**40	A, TMH, S/L
3	11.15.84	M	black	**40	A, S/L, OT
4	3.2.84	M	white	****48	A, S/L
5	7.15.88	M	white	**47	A, LI

Note. DOB = date of birth. FSIQ = a participant's full scale intelligence quotient. * = the use of the Leiter-R International Performance Scale-Revised (Leiter-R). ** = the use of the Stanford -Binet Intelligence Scale, 4th ed. (SB IV). *** = the use of the Wechsler Intelligence Scale for Children, 3rd ed. (WISC III). **** = the use of the Battelle Developmental Inventory. Label = a student's school-based label. A = Autistic. LI = Language Impaired. OT = Occupational Therapy. S/L = Speech and Language Impaired. TMH = Trainably Mentally Handicapped.

Student 1, a white male, was assigned to the 12th grade and 19 years old when the study began. He had attended the selected high school and participated within the school's specialized community-based instructional program for 5 years prior to

completing study-related activity. This participant was reportedly mainstreamed for the majority of his school experience, and had received little community-based instruction prior to transitioning to the high school program.

Student 2, a black female, was assigned to the 11th grade and 17 years old when the study began. She had attended the selected high school and participated within the school's specialized community-based instructional program for 2 years prior to completing study-related activity. This student transitioned from a middle school with a similar vocationally oriented program, but had not received community-based instruction prior to her attendance at the selected high school.

*Student 3***,** a black male, was assigned to the 12th grade and was two months shy of his nineteenth birthday when the study began. Student 3 attended the selected high school and participated within the school's specialized community-based instructional program for almost one year prior to completing study-related activity. Because he transferred to Florida from another state, school-based personnel had difficulty ascertaining what type of instructional and communicative intervention this young man had received prior to joining the group in the study.

Student 4, a white male, was assigned to the 12th grade and 19 and a half years old when the study began. This student was never provided an IQ examination by the school system, and his parents reported this type of testing had not occurred or been measured by a private psychiatrist or psychologist. On the Battelle Developmental Inventory (completed when this student was still in elementary school), his functioning level was reported to fall within the moderately mentally handicapped range. Student 4 had attended the selected high school and participated within the school's specialized

community-based instructional program for 4 years prior to completing study-related activity. Reportedly, this participant received numerous specialized services throughout his school career, including but not limited to: language intervention, speech intervention, behavioral intervention, and specialized curricular planning.

Student 5, a white male, was assigned to the 10th grade and 15 years old when the study began. This participant attended the selected high school and participated within the school's specialized community-based instructional program for 1 year prior to completing study-related activity. He transitioned from a middle school with a similar vocational program, but had not received community-based instruction prior to his attendance at the selected high school due to significant behavioral issues.

Although extremely limited in their communicative capability, each of these participants could verbalize their basic needs to research staff and school personnel when necessary, with the exception of *Student 3*. This student was completely non-verbal, and had no formal communication system. Participants demonstrated similarities in behavior and limited abilities in the following areas: social skills, self-determination skills, global skills acquisition ability, communication skills, and self-management skills. Aberrant behavioral displays, and frequent outbursts of inappropriate behavior by the majority of participants often compounded these limitations. When participants experienced difficulty understanding requests, expectations, instructions, and communication, the research staff frequently witnessed exhibitions of stereotypic behavior and/or inappropriate vocalizations.

Selection

According to the Exceptional Student Education (ESE) Resource Teacher for the Autism and Mentally Handicapped Programs in the selected county, twelve high school students with the categorical label of autism were served in the entire county at the close of the 2002 – 2003 school year (personal communication with the lead teacher for the Mentally Handicapped program in the selected county, June 30, 2003). Of these 12 students, identified from a computer printout of all students within the selected County who qualified for services under the categorical label of autism, six received their ESE services at the selected high school. The Florida Department of Education reported 973 students, grades 9 – 12, received service under the categorical label of autism during the 2002 – 2003 school year (Marie LaCap, personal communication, July 21, 2003). For a complete county listing of all high school students served under the categorical label of autism in the state of Florida during the 2002 – 2003 school year, please refer to Appendix A.

Participants were selected on the basis of their primary categorical designation of autism and their secondary categorical label of mental retardation. Selection was in no way based upon teacher, therapist, or parent opinions regarding perceived skills (or lack of skills) in the area of technology, and did not reflect participant's knowledge (or lack of) in the use of basic computer operations and/or software. Additionally, each participant shared the following characteristics: a similar profile of impairments in terms of developmental level and social functioning, placement within a self-contained program at the same school, and previous exposure to community-based work

environments. Additionally, these five students were selected instead of eight others in their district because they attended a high school with the greatest number of potential study participants.

Of five schools identified by the ESE resource teacher for the Autism and Mentally Handicapped Programs, one school was deemed inappropriate for this study due to students' frequent outbursts of aggressive behavior and a lack of community-based instruction for potential study candidates. Two other schools serving similar students were ruled out because they each only served one student. Although a fourth school served three students with autism and mental retardation, a concern existed that this designated classroom might be moved to another location during the 2003 - 2004 school year, thus could have contributed to study limitations. Finally, participants were selected from a high school where a long-standing, positive, professional working interaction existed between the primary investigator and the school staff, local community providers, parents, and students affiliated with the school.

The investigator obtained consents to participate in the study from study participants, the participants' parents, the teacher of the identified classroom, classroom assistants, the speech language pathologist assigned to the classroom, the school Principal, an area superintendent, the Office of Accountability, Testing and Evaluation in the selected county, and the Institutional Review Board (IRB) at the University of Central Florida.

Research Team

The research team consisted of: a primary investigator, the classroom teacher responsible for the instruction of each participant, and the speech-language pathologist assigned to the designated high school and each participant. Students were very familiar with each member of the research team, and had consistently worked with the primary investigator, their teacher, and the speech-language pathologist prior to the onset of the study.

Each of the three members on the research team provided the following support during the course of the study: delivered instruction over the HHs prior to intervention, provided intervention on the research site during the implementation of each model, provided assistance to participants on the research site, and shot videotape for later observations on the research site. No other school staff members or department store personnel were involved with participants for study purposes, nor did any other individuals provide any of the previously mentioned supports.

Setting

A Belk's department store in the central Florida area was chosen as the study site. According to the regional manager, this store is considered a low volume or slow merchandise moving location compared with others of its kind throughout the southeast region. The store contains name brand cosmetics, clothing, shoes, accessories, luxury items, sheets, towels, and decorations. Belk's department store may be compared with

other large department stores such as Burdines, Macy's, and Dillard's, which are also located throughout the central Florida area. Participants could physically move independently about the store, and each completed eighteen novel job tasks in various departments. The research site was approximately 3 miles from the high school the participants attended, and students were transported to and from their classroom by authorized school staff. No more than two students and two staff members were transported to the research site per session.

Timeline

The study was launched in September 2003 at the selected high school, and began with specialized training procedures for the correct use of the HH. Baseline data collection concerning identified behavioral variables began in September 2003, and occurred for two weeks. Intervention data collection began in October 2003, and occurred for ten weeks. Research team members collected frequency count data from participants two times per week during the baseline and intervention data collection phases.

Dependent Measures

Dependent measures included: (a) the percentage of accurate novel job task completions a participant completed per session when the HH intervention was employed during task demand, and (b) the percentage of accurate novel job task

completions a participant completed per session when the SM intervention was employed during task demand.

This study gathered additional data on the frequency with which participants made requests, the frequency participants exhibited problem behaviors, and the frequency of the provision of different levels of assistance required to assist students in task completion. *Novel Job Tasks* were defined as a job or task participants had not previously been exposed to in any other setting, such as community-based work sites, school-based job sites, or classrooms.

Requests

Help Requested was defined as a participant requesting staff intervention to assist them in correctly completing a task. This included requests to physically or verbally assist the participant in task completion. Requests for help could be verbal, physical, and gestural or a combination of these. *Feedback Requested* was defined as a participant requesting staff feedback or acknowledgement on their progress if a job was being completed correctly. Requests for feedback could be verbal, physical, gestural or a combination of these. Staff did not intervene in the completion of a task upon these requests; they were for verification purposes only (staff verification was verbal or gestural). A *Request for Termination of Task* was defined as a request by a participant to stop a task in progress. This could have been accomplished verbally, using sign language, or through the use of picture supports for communication. Staff would acknowledge these requests and prompt the participant to continue or resume a

task at hand. Task termination would only have occurred if a participant had eloped or engaged in some type of dangerous behavior. Each category of requests was adapted from *The Effects of Extinction, Non-Contingent Reinforcement, and Differential Reinforcement of Other Behavior as Control Procedures* (Thompson, Iwata, Hanley, Dozier, & Samaha, 2003).

Problem Behaviors

Aggression was defined as hitting, kicking, biting, pushing, scratching, shoving, slapping, head butting, hair pulling or pinching another person, or any attempts to engage in these behaviors (Anderson & Long, 2002; Kurtz, Chin, Huete, Tarbox, O'Connor, Paclawskyj, et al., 2003; Piazza, Fisher, Brown, Shore, Patel, Katz, et al., 2003; Vollmer, Borrero, Wright, Van Camp, and Lalli, 2001). *Disruption* was defined as crying, yelling, screaming, loud vocalizations, throwing or attempting to destroy materials, forceful contact of the hand or feet with tables, walls, or floors; property destruction and swiping objects off of surfaces or walls (Anderson & Long, 2002; Horner et. al, 2002; Kurtz et al., 2003; Moore et al., 2002; Thompson et al., 2003; Vollmer et al., 2001). *Elopement* was defined as leaving an assigned area without permission by walking, running, crawling, jumping, bouncing, etc., away from a task or staff by more than five yards. Elopement involves purpose and would have been evident if a participant had made an effort to remove him or herself from a designated area or building (Tarbox, Wallace, & Williams, 2003). *Self-Injurious Behavior* was defined as a participant engaging in head hitting, skin picking, forceful contact with the head, hands,

or feet with hard surfaces (e.g., floor, walls, table, objects, or self) and behavior that had the potential to cause tissue damage (e.g., body slapping or slamming) (Anderson & Long, 2002; Horner et al., 2002; Kurtz et al., 2003; Piazza et al., 2003 Thompson et al., 2003; and Vollmer et. al, 2001). *Stereotypic Behavior* was defined as covering ears with hands, waving the hand or fingers in a back and forth motion, opening and closing the hand with fingers touching the palm, rocking back and forth from one foot to another, hand or arm flapping (Kuhn et al., 2003; Horner et al., 2002), and repetitive non-functional vocalizations.

Levels of Assistance

Gestural Prompts were defined as movements made to direct a person's attention to something relevant; for example, pointing toward the desired direction, tapping next to material, or pointing to necessary items. *Verbal Prompts* were defined as words that communicated specific behavioral expectations to an individual and were matched to a student's level of comprehension. For example, on several occasions staff gave verbal prompts to a participant to return a task at hand, or to continue through a task already in progress. Staff indicated these expectations by physically pointing or motioning for participants to return to a task at hand, or where needed material might have been. If students ceased active engagement in designated task completion for 30 seconds, they were prompted with gestural or verbal prompts to return to job or sequence/step at hand. *Model Prompts* were defined as any physical demonstration of a target behavior a participant was expected to imitate with purpose. Model prompts

involved movement and may have provided partial or complete illustrations of a designated step or task. *Partial Physical Prompts* were defined as the brief touching, tapping, nudging, or lightly pulling or pushing of a student's hand, arm, leg, trunk, etc., in an effort to guide participants to or through a step or task. *Full Physical Prompts* were defined as full physical guidance through a behavior, often involving hand-over-hand assistance. Physical prompts matched task steps. Levels of Assistance were adapted from *Teaching Students with Moderate to Severe Disabilities* (Wolery, Ault, & Doyle, 1992, pp. 38-41).

Prior to the initiation of the study, research team members reviewed identified levels of prompting, and agreed to explicitly follow a prescribed prompt hierarchy when delivering prompts to participants during all intervention tasks. This decision was based upon an adherence of least to most restrictive prompting. The prompt hierarchy first used gestural prompts, then verbal prompts, model prompts, partial physical prompts, and finally full-physical prompts to assist students.

Independent Measures

Independent variables, a HH intervention and a SM intervention, were two vocational instructional methods concurrently assigned to each participant during a novel job work session.

Material

A HH equipped with a program called the *Visual Assistant,* was employed for the HH intervention. The Visual Assistant is a customizable, multimedia software application designed to help individuals with developmental disabilities learn skills in a self-directed format. Designed to run on a Windows CE platform, the Visual Assistant is a complete self-contained prompting system. This program allows a user to view pictures in a step-by-step manner (from a pre-designed task analysis) along with audio instructions on a computer at a person's own pace (Davies et al., 2002b; *Visual Assistant*, Retrieved April 21, 2003).

Four HHs were utilized during the course of the study. The Director of Special Education in the selected county purchased two HHs and the Florida Inclusion Network (FIN) purchased two more. Equipment purchased by the selected county remained with the designated high school at the conclusion of the study for use by participants, as well as other students within their assigned classroom. Equipment purchased by the FIN remained with their regional office at the conclusion of the study.

Procedures

Instruction

At the beginning of the study each participant was systematically trained on appropriate use of the HH within the classroom. For the purpose of training the

participants on the correct use of the HH, a *Participant PDA Training Protocol* was utilized with three specific tasks developed by the research team. The protocol was clearly scripted and began with staff modeling tasks for students, and was followed by prompting for task completion with some assistance. Prompts from staff for the completion of these tasks gradually faded. Please see Appendix D for the *Participant PDA Training Protocol*. Focus of the participant training program included: 1) how to safely handle the HH, 2) how to manipulate the keys and prompting system correctly, 3) how to scroll through a specified job, 4) rules governing where the HH could be placed or not placed, and 5) how to return the HH to staff once a job task was complete. Instruction with the HHs continued until each participant could independently demonstrate proficiency in job completion or task performance. Before participants were considered for the intervention phase of the study, they were required to independently master at least one novel job task with 100% accuracy when the HH was in use. The primary investigator, classroom teacher, and a speech-language pathologist provided instruction with the HHs.

Baseline

During baseline, each of the five participants was observed during regularly scheduled work sessions within the school and community. No intervention was provided, other than the characteristic instruction that occurred within these settings during a participant's typical school day. In these community-based work settings, the teacher or classroom assistants typically provided varying degrees of instruction,

support, and supervision to students attempting to acquire novel job task skills. Instruction to students, prior to the beginning of the study, was provided predominantly via *direct instruction* and *modeling*.

Baseline data was gathered while participants completed jobs as part of their usual school day. Data collection occurred six times for each participant, over the course of two weeks. In total, 30 observations were completed during the baseline phase. Frequency count data regarding: (1) the frequency participants made requests, (2) the frequency participants exhibited problem behaviors, and (3) the frequency and types of levels of assistance required to assist participants in the completion of job tasks during specified work sessions in a community-based settings. Data on accuracy was not collected during this period, due to the unavailability of staff to design and implement detailed task analyses and the lack of training available to staff identified for inclusion on the research team.

Intervention

An alternating-treatments design across subjects (Alberto & Troutman, 2003; Cooper et al., 1987; Horner et. al, 2003; Kazdin, 1982) was used to compare the effects of two vocational instruction intervention conditions. During the alternating treatments phase, presentation of these two conditions were randomized and counterbalanced in an alternating treatments fashion (Richards, et al., 1999). Intervention data was gathered bi-weekly on two separate tasks for each participant. Data was collected while participants completed designated novel jobs with staff in attendance. During each of

the eighteen designated work tasks, participants utilized one of the alternating treatments; nine tasks were completed using the HH intervention and nine tasks were completed using a SM intervention. Intervention data was collected on: (1) the percentage of accuracy in the completion of a novel job task (defined by a corresponding task analysis), (2) the frequency participants made requests during a specified work session in a community-based setting, (3) the frequency participants exhibited problem behaviors during a specified work session in a community-based setting and (4) the frequency of levels of assistance required to assist participants in the completion of a task during a specified work session in a community-based setting.

Hand-Held Computer

This intervention began with staff giving the following verbal prompt, “Watch, I am going to show you how to do a job” followed by staff scrolling through the first three to five steps of the novel job task (according to the pre-designated task analysis) with the student looking on. While scrolling through jobs with the HH, research staff provided necessary verbal instructions. Next, staff would verbally (using gestures if necessary) identify each item the participant would be interacting with during task completion (i.e. colors, shapes, hangers, etc.) and each area participants would be working in. Finally, staff issued the verbal prompt, ”Now it is your turn to do this job with the computer” and the HH was relinquished to the participant with the appropriate task ready for operation. See Appendix E for the scripted task analyses for each HH task.

Physical placement of the HH (for manipulation by participants during tasks) was determined by the research staff prior to the execution of each job and was based upon multiple factors. Areas for HH placement included a footstool, table or shelf in close proximity containing unrelated items, and an empty table or a shelf in close proximity to participants. Factors that influenced HH placement included: how much space participants needed to work within, a central location for access to a specific task, a secure area that could bear the weight of a participant leaning to depress keys while inadvertently applying their weight to a specified holding area, the availability of space for staff needed to assist and videotape, and attempts to limit up and down bending at the torso of each participant to utilize the HH.

Staff Modeling

The SM intervention began with staff giving the following verbal prompt, “Watch, I am going to show you how to do a job” and then physically and verbally modeling the first three to five steps of a task (according to the pre-designed task analysis). Necessary verbal instructions were provided while the job was modeled, along with the verbal (using gestures when necessary) identification of each item participants would work with. Additionally, staff verbally (using gestures if necessary) identified each area the participants would work in. Finally, staff gave the verbal prompt, “Now I want you to do this job by yourself” and moved a few feet away from the participant to allow for independent task completion. See Appendix E for the scripted task analyses for each of the SM tasks.

Videotaping Procedures

Research team members attempted to remain at least five feet away from participants while videotaping during all task completions. This was not always possible due to space or specific job constraints, but was the designated protocol for all video camera activity on the research site. Additionally, staff were required to completely capture on video: each individual step of task completion by each participant during each job, all staff intervention with participants, any interactions initiated by the participants during specific jobs, and the completed job for verification of the percentage correct per the task analysis.

Instrumentation

One instrument gathered baseline data for each participant over six sessions. Five participants, viewed over six sessions, culminated in 30 resulting permanent products. The observation instrument, created by the primary investigator, was sent to five experts in the field for face validation prior to initiation of the study. This data collection instrument was reviewed and edited by several experts, and the final product was used to gather baseline data. Experts are listed in Appendix C and the *Baseline Data Collection Sheet* can be found in Appendix E.

For each participant, intervention data was gathered with two instruments per task. Five participants engaged in 18 tasks each, and were rated by three independent evaluators for a total of 270 resulting permanent products. The primary investigator

created one instrument for each of the eighteen individual tasks, which was used to gather data over the percentage of accuracy of task completion per session (based on a specified task analysis) for each participant. *Percent Correct* (or accuracy) was determined by identifying *correct* and *incorrect* responses within the context of a designated task. The computation of this equation requires observers to determine which responses, *correct* or *incorrect*, occur during task completion (Richards et. al, 1999). *Correct* refers the correct completion of one part or step of a designated task analysis, and *incorrect* refers to either a missed step or an incorrect completion of one of the parts or steps of a designated task analysis. These ratings are compared to ensure adequate agreement (inter-observer reliability), and overall percent correct of an individual's response were calculated with the following formula: number of correct responses divided by the sum of correct responses added to the number of incorrect responses, multiplied by one hundred percent (Richards et. al, 1999). The use of *percent correct* analysis is highly recommended when the number of opportunities varies from session to session (Wolery, Baily, & Sugai, 1988).

The study also used an instrument to collect intervention data regarding the frequency participants made requests, exhibited problem behaviors, and required assistance to complete tasks during specified work sessions settings. This instrument, created by the primary investigator, was sent to five experts in the field for face validation prior to the initiation of the study. Once the instrument was reviewed and edited, the research team used the the final product was used to gather intervention data. A list of experts can be found in Appendix C and an example of the *Intervention Data Collection Sheets* for tasks 1 –20 can be found in Appendix E.

Fidelity of Treatment

The research team gathered fidelity of Treatment data from videotape shot prior to participant task engagement. Belk's allowed the research team to shoot video of all study-related activity, including research team members demonstrating tasks and participants completing tasks in all areas of the store. Research staff were filmed prior to every fifth task (i.e. Task 1, Task 5, Task 10, and Task 15) while introducing a designated intervention to a participant. Following the taping of this introduction, the entire research team reviewed the taped segments to determine the *Fidelity of Treatment*. The team collected measurements to ensure experimental conditions were implemented as described within the research design.

Data Collection

Observers included a classroom teacher, a speech-language pathologist, and the primary investigator. Prior to data collection, all observers met and reviewed the operational definitions of behavior identified for frequency and percentage of accuracy analyses, rules for scoring, and observation procedures. This research team met for two, 2 ½ hour sessions at the selected school and observers practiced observation and recording procedures while watching videotapes of participants in actual community-based work settings. The team reviewed video of each participant completing two different tasks in the community, and observational data was collected from these

videotapes to establish 80% (minimal criteria) inter-observer agreement among the three raters.

Inter-Observer Agreement

Observers were required to reach a criterion of 80% inter-observer agreement for all outcome measures for two consecutive practice sessions prior to actual data collection. For all intervention data, observers were required to have at least 80% inter-observer agreement for at least 50% of the total observations.

Social Validation

Social validation procedures are designed to determine if desired research outcomes are valued, acceptable, and appropriate for individuals with disabilities (Storey & Horner, 1991). This involves the careful assessment of the social importance of the effects of a research treatment on a person who may not have the ability to judge such effects on their own. Prior to the study, school staff, research team members, and the students' parents discussed the social validity of the study – all stakeholders strongly agreed that the study was socially valid for each of the participants.

Data Analysis

Analysis of frequency count data included visual inspection, descriptive statistical procedures, and time series analyses. A 2 X 5 Analysis of Variance (ANOVA) and several Independent t-tests were applied to the database of residuals for the purpose of further investigating three of the five research questions. Analyses of the residual data set, including eight dependent variables created by a time series model, included inferential statistics consisting of a factorial ANOVA and several independent t-tests. The percentage of accuracy per task was calculated with a widely accepted equation, and subsequently analyzed via visual inspection.

Time Series Analysis

Methodology

According to Jaeger (1988), the use of a time series model is useful in educational settings. He purports time series analyses are commonly selected to "…illustrate an objective that is common in educational research studies – trying to determine the effects of an instructional treatment" (Jaeger, 1988, p.465). When a time series model is used within the construct of educational research, data must be collected over an extended period of time and on a regular basis. Jaeger (1988) further suggests data should be collected weekly, and even more frequently if possible. In his work illustrating the applicability of time series analyses within educational research,

Willson (1982) cites the work of two widely regarded time series experts, ”The first applications of time series methodology to science education research were reported by Mayer and Lewis (1979) and by Mayer and Kozlow (1980)” (p. 293) making reference to the practicality of a time series model within a myriad of educational settings.

Time series methodology allows researchers to address issues closely related to temporal data, and to account for dependency (or autocorrelation) often found within single subject research data. Autocorrelation (also referred to as dependency) has been defined as a condition in which data collected within a specific time frame with the same participants demonstrates higher relationships than distally positioned observations (Fan et al., 2002). Fan, Felsovalyi, Sivo, and Keenan (2002) comment on the need for time series analyses when data has been collected from the same subject over time ”Data successively collected on the same person or phenomenon over time notoriously evidence a nuisance condition known as autocorrelation” (p. 213). To address the potential threat to internal validity the use of well-recognized time series analyses was applied to all frequency count data. Because probability existed and the potential to identify an interaction effect between dependent variables and treatment, the use of inferential statistics was highly desirable for the analysis of specific variables in the data. In theory, such statistical procedures are based upon assumptions that must be met in order for the statistical inferences to be accurate (Fan et al., 2002), and therefore require the use of residuals (errors), which are stripped from raw data sets.

CHAPTER FOUR: RESULTS

Review of the results include the following focal areas: study overview, data collection, individual task analyses, overall inter-rater reliability, fidelity of treatment, data conversion, statistical analyses, and finally a presentation of treatment outcomes.

Study Overview

The study concluded in December of 2003 with five of the six originally identified participants. Unfortunately, one participant was removed as a result of dangerous behavior directed at the primary investigator during one of the initial tasks. Though no one was injured during this incident that occurred on the research site, research team members and school staff decided upon the removal of this participant from the study due to concerns regarding safety. General safety concerns included the potential for aggression directed at research staff, store personnel and members of the community, elopement, and the destruction of store merchandise. The student's parents were immediately notified of her removal from the study.

Five participants completed eighteen novel job tasks during the course of the study, which took place over four consecutive months (September 2004 – December 2004). A listing of the job tasks can be found in Appendix E. After a scripted introduction by research team members, students completed nine job tasks with a HH and nine with a SM.

The eighteen novel job tasks completed by participants were videotaped on the research site and then reviewed and analyzed by three raters, for a total of 270 independent observations. Frequency count data and percentage of accuracy data for each participant was gathered with two data collection instruments per task, throughout the course of the study.

Percent Correct (or accuracy) was determined by identifying *correct* and *incorrect* responses within the context of a designated task. The store manager determined specifications and job criteria for the novel job tasks according to acceptable corporate standards for job accuracy and completion. These were recorded with the use of a distinct task analysis for each job. Independent observers determined which of the specific responses or steps within the tasks were *correct* or *incorrect* to determine the percent correct per task. *Correct* refers to the correct completion of one part or step of a designated task analysis per novel job task. *Incorrect* refers to a missed step or an incorrect completion of one part or step of a designated task analysis. Overall percent correct of an individual's responses per task was calculated with the following formula: number of correct responses divided by the sum of correct responses added to the number of incorrect responses, multiplied by one hundred percent (Richards et. al, 1999). The average number of steps for each of the eighteen tasks was consistent; in fact, there was little difference between the average numbers of steps in either treatment. Table 2 shows a comparison of the number of steps per treatment based upon the individual task analyses.

Langone et al. (2003) suggest individuals with disabilities require specialized instruction across numerous skill domains in order to successfully receive community-

based instruction. The research team developed a similar list of the following skill domains necessary for community-based programming: 1) community literacy skills, 2) mobility skills, 3) purchasing skills, 4) social skills, and 5) safety skills (Langone et al.). Research team members, in coordination with Belk's staff identified the following basic skills required for task completion on the research site: 1) receptive ability (e.g. able to follow one step directions), 2) simple identification skills (e.g. recognizing colors or items), 3) basic matching (e.g. able to match specific items with pictures), 4) motor planning ability (e.g. the ability to coordinate one's body as intended to complete a desired behavior), and 5) motor coordination (e.g. the ability to move one's body as needed to hang or stack items). The successful completion of all novel job tasks required these pre-requisite skills.

Table 2

Comparison of the Number of Steps Per Treatment Based Upon Individual Task Analyses

Task	Number of Steps	Type of Task
1	17	HH
2	18	SM
3	17	HH
4	16	SM
5	18	HH
6	18	SM
7	17	HH
8	16	HH
9	15	SM
10	15	SM
11	15	HH
12	15	SM
13	17	SM
14	18	HH
15	16	SM
16	15	HH
17	15	HH
18	15	SM

Note. Number of steps indicates the number of steps required to complete the designated task. HH = Hand-Held Computer intervention. SM = Staff Model intervention. Overall average number of steps for the HH was 16.44. Overall average number of steps for the SM was 16.11.

Data Collection

Two data collection instruments recorded the independent observations of the three raters, which were systematically evaluated to ensure adequate agreement (inter-observer reliability). In community-based settings, the first instrument collected frequency count data regarding the frequency participants made requests, exhibited problem behaviors, and required assistance in the completion of tasks. The second instrument gathered data to determine the percentage of accuracy calculations, with a separate collection form illustrating one task analysis per job.

Inter-rater Reliability

Observers included a classroom teacher, speech-language pathologist, and the primary investigator. Prior to data collection, all observers met and reviewed the following operational definitions of all behavior identified for event recording, percentage of accuracy analysis, standards for data collection, and specified observational procedures. To address the need for consistent and accurate data collection, the research team met for two, 2 ½ hour sessions at the selected school. During these meetings observers practiced using the observation and recording instruments and procedures while watching videotapes of the participants in actual community-based work settings. Team members reviewed video of each participant completing two different tasks in the community and recorded observational data using practice tapes

until the team achieved 80% inter-observer agreement over 20% of the total training observations.

To determine inter-rater reliability for all intervention data, an equation for event recording was employed. Independent raters gathered data during specified work sessions over three categorical areas of defined behavior, including the frequency participants made certain requests, exhibited problem behaviors, and required assistance to complete a task. Eight dependent variables were classified under the previously mentioned three categories by requests (requests for help and requests for feedback), stereotypic behavior, and levels of assistance (verbal prompts, gestural prompts, model prompts, partial physical prompts, and full physical prompts). An inter-rater equation was applied to three behavioral groupings for each of the eighteen novel job tasks. The smaller number of recorded instances was divided by the larger number of recorded instances and then multiplied by the coefficient 100 (Alberto & Troutman, 2003). Once this equation was used to tabulate reliability for the three identified categories, these percentages were averaged to determine the inter-rater reliability per task for each participant. For example, on task 1, for participant 1, the first rater recorded 27 overall prompts (levels of assistance), the second rater recorded 28 overall prompts for levels of assistance, and the third rater recorded 28 overall prompts for the levels of assistance. Checks for agreement were made among the three raters in the following manner - the smaller number (27) was divided by the larger number (28), which yielded a coefficient of .964. This coefficient was then multiplied by 100 to achieve an inter-rater agreement of 96%. For the same task and participant (task 1, participant 4), the three averages of the reliability checks for each behavioral grouping

were averaged in the following manner: Requests 83%, Stereotypic Behavior 100% and Levels of Assistance 96% were averaged - to achieve an overall reliability rating of 96% for participant 1, on task 1.

The overall inter-rater agreement between each of the three independent raters, for all eighteen tasks completed in the study was 93%. Table 3 displays each of the eighteen tasks and the individual percentages of inter-rater agreement.

Table 3

Overall Inter-rater Reliability for Eighteen Tasks

Task	Type	Participants					Task Agreement
		1	2	3	4	5	
1	HH	96%	92%	93%	88%	97%	93%
2	SM	93%	97%	94%	95%	95%	95%
3	HH	89%	99%	90%	82%	95%	91%
4	SM	92%	94%	75%	75%	91%	85%
5	HH	94%	100%	90%	100%	97%	96%
6	SM	93%	97%	81%	95%	96%	92%
7	HH	97%	93%	100%	96%	96%	96%
8	HH	97%	100%	85%	99%	100%	96%
9	SM	94%	100%	84%	90%	100%	94%
10	SM	97%	97%	82%	78%	100%	91%
11	HH	94%	100%	95%	99%	100%	98%
12	SM	89%	100%	80%	94%	94%	91%
13	SM	90%	100%	93%	93%	89%	93%
14	HH	94%	100%	87%	93%	100%	95%
15	SM	95%	94%	81%	94%	93%	91%
16	HH	92%	79%	90%	92%	98%	92%
17	HH	100%	100%	96%	94%	89%	96%
18	SM	98%	100%	92%	85%	100%	95%

Note. Task Agreement is the average of the participant's reliability scores per task. Total overall agreement between raters for the HH was 95% and the overall agreement between raters for the SM was 92%. Overall average agreement between raters for all tasks was 93%.

Fidelity of Treatment

Fidelity of Treatment measures were obtained to ensure intended experimental conditions were implemented. The research-team assessed Fidelity of Treatment measures videotaped prior to participant task completion. Research-staff were filmed during the introduction of every fifth task (i.e. Task 1, Task 5, Task 10, and Task 15) while providing scripted directions to each of the participants. Research team members were not informed they would be videotaped with this frequency and operated with the understanding they likely would be recorded during each task throughout the entire study. Following the taping of the introduction of specified tasks and scripted instructions, the entire research team reviewed the taped segments to determine the Fidelity of Treatment. Each rater completed one observation for four tasks, resulting in twelve total observations for the Fidelity of Treatment calculation. The overall average of correct staff intervention according to the prescribed intervention protocols was 100%.

Data Conversion

Frequency count data from event recording data sheets were entered into SPSS, and then copied into the SAS program in preparation for time series analysis. The time series techniques Proc Statespace and Proc Spectra were applied to eight dependent variables, and tabulated by three raters for each of the five participants. Proc Statespace is a method of modeling multivariate time series data sets, and is capable of

identifying various types of dependency that exist within closely related data. The state space procedures identify and isolate different types of dependency, creating a residual data set free of autocorrelation. Autocorrelation (also known as dependency) has been defined as a condition in which temporally adjacent observations demonstrate higher relationships than distally positioned observations. The Proc Statespace procedure fits an appropriate time series model, Autoregressive Integrated Moving Averages model (ARIMA) to data collected over an assigned interval (Kipps-Vaughn, 1999). The ARIMA model developed by Box and Jenkins (1976) provides an unbiased estimate of the error in the series of data. By default, Proc Statespace eliminates variables that do not contribute to the model, according to their degree of statistical significance (Fan et al., 2002). Results of 120 time series analyses of data gathered via event recording represent an array of ARIMA models, which are used to purify data. The specific ARIMA models for each analysis are not specified, though researchers knowledgeable with time series data analysis have expressed no need for concern regarding the specific format of the ARIMA models used to purify data (Box & Jenkins, 1976; Kipps-Vaughn, 1999; Kratochwill & Levin, 1992). Further, they suggest that any statistically adequate time series model is appropriate for data analysis.

The residuals from the time series analyses were separated into a HH group and a SM group so comparisons could be made regarding intervention effects on each of the eight dependent variables. The residuals for all analyses were statistically non-significant as indicated by Bartlett's Kolmogorov-Smirnov Statistics Test. Bartlett's test statistic is a white noise test, calculated as a covariance of the estimated autocorrelation and theoretical autocorrelation assumed to approximate zero (Box & Jenkins, 1976;

Kipps-Vaughn, 1999). Non-significance implies that the dependency among true scores and error scores has been removed from the data, and the remaining residuals represent white noise. The results from Bartlett's support the application of traditional inferential statistical procedures for the database of residuals.

Statistical Analysis

A 2 X 5 Analysis of Variance (ANOVA) and several Independent t-tests were applied to the database of residuals for the purpose of further investigating three of the five research questions.

Treatment Outcomes

Research Question 1

Did the use of a HH, compared to a SM for instructional purpose, increase a student's level of accuracy on an assigned novel work task in a community-based, vocational instructional setting? Table 4 illustrates the percentage of accuracy on all 18 tasks by each participant when each treatment effect was employed.

Table 4

Percentage of Accuracy During the use of the Hand-Held Computer Intervention and the Staff Model Intervention

Participants		1	2	3	4	5
Task	Type					
1	HH	100%	100%	94%	100%	100%
2	SM	100%	100%	94%	100%	100%
3	HH	100%	94%	100%	100%	100%
4	SM	100%	100%	100%	100%	100%
5	HH	100%	100%	100%	100%	100%
6	SM	100%	100%	100%	100%	100%
7	HH	94%	94%	94%	100%	100%
8	HH	100%	100%	100%	94%	100%
9	SM	100%	100%	100%	100%	100%
10	SM	100%	100%	100%	87%	100%
11	HH	93%	93%	93%	100%	100%
12	SM	100%	100%	100%	100%	100%
13	SM	100%	100%	100%	100%	100%
14	HH	100%	100%	89%	100%	100%
15	SM	100%	100%	100%	87%	100%
16	HH	100%	100%	100%	100%	100%
17	HH	100%	100%	100%	100%	100%
18	SM	100%	100%	100%	100%	100%

The majority of participants were *less* accurate when completing tasks with the HH intervention (*Student 1, Student 2, and Student 3*), though the differences in accuracy between the two treatments were minute. One student (*Student 4*) was more accurate with the HH intervention, demonstrating one additional error during the SM intervention and one student (*Student 5*) exhibited no difference in accuracy between the HH and the SM interventions. A marginal difference, not exceeding 2% for any of the participants, exists between the accuracy scores of novel job completions while engaged in either treatment. This small difference in the accuracy of novel job task completions by each of the students indicates both the HH and the SM interventions were highly effective instructional interventions for the accurate completion of novel jobs within a community-based setting.

Research Question 2

Did the use of a HH, compared to a SM for instructional purpose, decrease the amount of requests initiated by participants while completing a novel work task in a community-based, vocational instructional setting? Requests were divided into three categories: requests for help, requests for feedback, and requests for the termination of task. The definition of each type of request precedes the review of each dependent variable.

Help Requested

Help Requested was defined as a participant's request for assistance to intervention staff for the correct completion of a task. This included requests to physically or verbally assist the participant in completing a specific step or parts of a task. Requests could be verbal, physical, and gestural or a combination of these. Results from the ANOVA analysis, illustrated in Table 5, suggest an overall effect for interaction between the five participants and the two interventions on differences in requesting help per treatment as measured during each task with frequency counting. The ANOVA statistics revealed a statistically significant interaction effect between students and their use of the HH versus the SM F (4,260) =9.19, $p<.05$ indicating a statistically significant difference in the effect of the HH and the SM on the exhibition of requests for help among individual participants. No statistically significant difference between the group means for treatments and students' requests for help was found F (1, 160) =2.702, p = .101 revealing that overall there were no significant differences between student requests for help in either treatment. Furthermore, there was no statistically significant difference among the group means of the requests for help made by the five students F (4, 260) =.052, p=.995 revealing a fair amount of consistency across participants regarding their requests for help. Refer to Table 5 to view the univariate statistics for the dependent variable requests for help.

Table 5

Analysis of Variance for Dependent Variables Using Residuals

Dependent Variable Source	Eta Squared	SS Type III	F	p
Requests for Help	.124		4.412	.000*
Participants		.336	.052	.995
TX		4.323	2.702	.101
Participants *TX		58.867	9.199	.000*
Requests for Feedback	.012		1.104	.360
Participants		.372	.010	1.000
TX		62.666	6.786	.010*
Participants *TX		28.712	.777	.541
Verbal Prompts	.037		4.689	.000*
Participants		4.606	.030	.998
TX		1236.833	32.192	.000*
Participants *TX		379.841	2.472	.045*
Gestural Prompts	.020		.674	.732
Participants		.351	.007	1.000
TX		8.143	.647	.422
Participants *TX		67.850	1.348	.253
Model Prompts	.044		1.452	.166
Participants		.181	.039	.997
TX		1.054	.903	.343
Participants *TX		14.018	3.003	.019*
Partial Physical Prompts	.018		.831	.588
Participants		6.519E02	.016	1.000
TX		2.830	2.743	.099
Participants *TX		4.818	1.168	.326
Full Physical Prompts	.052		1.605	.114
Participants		1546E02	.045	.996
TX		2.977E02	.034	.853
Participants *TX		1.231	3.557	.008*
Stereotypic Behavior	.144		6.689	.000*
Participants		17.728	.110	.979
TX		645.913	15.960	.000*
Participants *TX		1772.766	10.951	.000*

Note. Participants represents the five participants in the study. TX represents the 2 treatments (HH and SM).

Significance indicated by * for meeting the criteria of alpha level = .05.

Because a statistically significant interaction was found between the HH and SM conditions, with respect to the requests for help made by the participants, independent t-tests are displayed in Table 6 for each student.

T-test results for *Student 1* indicated a statistically significant difference ($t=-2.3$, $df=52$, $p<.05$) between the requests for help by participant 1 when the HH or the SM intervention was used to model novel job tasks. Examination of the frequency count indicated a slightly higher average of the mean requests for help score during the use of the HH intervention, indicating he requested help from staff most often during the HH intervention.

Table 6

Analyses of T-tests for the Dependent Variables Requests for Help and Stereotypic Behavior, based upon findings of Significance within the ANOVA Analysis using Residuals

Participants				
1	2	3	4	5
Dependent Variables				
Requests for Help				
t=-2.26	t=3.28	t=-2.64	t=2.74	t=2.22
p=.028*	p=.002*	p=.011*	p=.008*	p=.031*
HH $\overline{X}$ =.33	HH $\overline{X}$ =.11	HH $\overline{X}$ =2.85	HH $\overline{X}$ =.22	HH $\overline{X}$ =.44
SM $\overline{X}$ =.26	SM $\overline{X}$ =1.63	SM $\overline{X}$ =1.26	SM $\overline{X}$ =.96	SM $\overline{X}$ =1.11
Stereotypic Behavior				
t=-.065		t=-1.524	t=-5.30	
p=.949		p=.134	p<.001*	
HH $\overline{X}$ =10.93	HH X=0	HH $\overline{X}$ =6.63	HH $\overline{X}$ =28.74	HH $\overline{X}$ =0
SM $\overline{X}$ =23.44	SM X=0	SM $\overline{X}$ =8.48	SM $\overline{X}$ =14.48	SM $\overline{X}$ =0

Note. HH $\overline{X}$ and SM $\overline{X}$ were derived from the Frequency Count Data and are the average of the mean exhibitions of specific (dependent variables) behavior. Significance indicated by * for meeting the criteria of an alpha level < .05.

T-test results for *Student 2*, as seen in Table 6, indicated a statistically significant difference (t=-3.3, df=52, p<.05) between the requests for help by the student when the HH intervention was used and the requests for help by the student when the SM intervention was used. Examination of the frequency count data reveal the average of the mean requests for help score for the student when the HH intervention was used was significantly lower than the average of the mean requests for help score for the

student when the SM intervention was used. These findings indicate she requested help from staff most often during the SM intervention.

Results for *Student 3* indicated there was a statistically significant difference (t=-2.6, df=52, p<.05) between the requests for help by the student when the HH intervention and the SM intervention were used. Examination of the frequency count data indicated this participant's average of the mean requests for help score during the use of the HH intervention was significantly higher than the SM average of the mean requests for help score. This participant requested help from staff most often during the use of the HH intervention. Table 6 illustrates the average number of requests for help per treatment for *Student 3*.

As seen in Table 6, results for *Student 4* revealed there was a statistically significant difference (t=2.7, df=52, p<.05) between the requests for help by the student when the HH intervention was used and the requests for help by the student when the SM intervention was used. Examination of the frequency count data revealed the average of the mean requests for help score for the student when the HH intervention was used was significantly lower than the average of the mean requests for help score for the student when the SM intervention was employed. These findings indicated participant 4 requested help from staff most often during the SM intervention.

Results for *Student 5* indicated there was a statistically significant difference (t=2.2, df=52, p<.05) between the requests for help when the HH or the SM intervention were used. Examination of the frequency count data revealed the average of the mean requests for help score for participant 5, when the HH intervention was used, was significantly lower than the average of the mean requests for help score for the student

when the SM intervention was used. These findings demonstrate this participant requested help most often during the use of the SM intervention. Table 6 examines the average number of requests for help per treatment for *Student 5*.

T-test results in Table 6 indicate there were statistically significant differences between the requests for help when the HH or SM interventions were used during the completion of novel job tasks. The majority of the participants (*Student 2, Student 4, and Student 5*) requested help from staff significantly *less* times during the HH intervention and two students (*Student 1 and Student 3*) requested help significantly *more* times during the HH intervention. These findings illustrate that both instructional interventions affected each of the five participants to a significant degree, but varied with respect to individual student needs for assistance in either treatment. Based upon individual results, the HH or the SM inconsistently affected the number of requests for help by participants. Consequently, generalizations regarding independence and intervention efficacy are difficult to summarize in relation to requests for help for the entire group with respect to treatment.

Feedback Requested

Feedback Requested was defined as a participant's request for staff feedback or acknowledgement on their progress and/or if a task was being completed correctly. Requests could be verbal, physical, and gestural or a combination of these. Staff did not assist or intervene in the completion of a step or task upon these requests; they were for verification purposes only (staff verification was verbal or gestural and recorded

under levels of assistance). Data collection of the frequency of feedback requested by participants was gathered by event recording. The findings suggested no overall interaction effect between the HH or SM conditions with respect to the requests for feedback made by each of the participants. No statistically significant interaction effect between students and their requests for feedback during the use of the HH or the SM was found F (4,260)=.777, p = .541, suggesting no differences existed in the mean amount of requests for feedback by any of the participants in either treatment. A statistically significant difference among the group means of the feedback requested during the HH intervention and the SM intervention was found F (1,260)=6.8, $p < .05$, revealing differences existed between the amount of feedback requested in each of the treatment effects. Further, no statistically significant difference among the group means of the feedback requests made by the five students was found F (4,260)=.010, p=1.00, indicating consistency across participants exhibition of overall feedback requests regardless of treatment.

Examination of the frequency count data in Table 7 reveals four participants (Student 1, Student 3, Student 4, and Student 5) requested feedback, on average, more often during the nine SM tasks. It should be noted that a very small difference exists between the average numbers of requests made by these participants during the use of either instructional model, indicating participants required a consistent amount of feedback from staff during the use of either treatment.

Table 7

Frequency Count Data for the Average Number of Requests for Feedback From Staff

Participants	Hand-Held Computer	Staff Model
1	.33	.63
2	.52	.48
3	8.52	9.70
4	2	3.78
5	2.22	2.85

Note. Hand-Held indicates the average number of feedback requests over nine tasks, during the use of the HH intervention. Staff Model indicates the average number of feedback requests over nine tasks, during the use of the SM intervention.

Examination of the frequency count data in Table 7 revealed *Student 2* requested feedback, on average, more often during the nine HH tasks. There is a slight difference between the average numbers of requests made by this participant during the use of either instructional model. Overall more students (*Student 1, Student 3, Student 4* and *Student 5*) requested *less* feedback during the HH intervention than the SM intervention. Only one student (*Student 2*) requested *more* feedback during the HH intervention than the SM intervention. The differences between the average number of requests for feedback made by the participants during either intervention were relatively small, demonstrating they required few overall requests for feedback during task completion. In addition, each instructional intervention necessitated similar levels of requests across participants and neither treatment required a significant amount of feedback for correct task completion.

Requests for Termination of Task

Requests for the Termination of Task were defined as a participant's voluntary request to stop a task in progress. This could have been accomplished verbally, using sign language, or through the use of picture supports for communication. Staff would acknowledge these requests and would prompt the participant to continue or resume the task at hand. Task termination by staff would only occur if a participant had eloped or engaged in some type of dangerous behavior. There were no incidences of a *Request for Termination of Task* by study participants.

Research Question 3

Did the use of a HH, compared to a SM for instructional purpose, reduce student's problem behaviors in a community-based, vocational instructional setting? Problem Behaviors consisted of five categories: aggression, disruption, elopement, self-injurious behavior, and stereotypic behavior. These five categories were recorded via frequency counting. The definition of each type of problem behavior precedes each dependent variable.

Aggression

Aggression was defined as hitting, kicking, biting, pushing, scratching, shoving, slapping, head butting, hair pulling or pinching another person, and any attempts to

engage in any of these behaviors. There were no occurrences of aggression by *Student 1, Student 2, Student 4*, and *Student 5* during the course of the study. S*tudent 3* exhibited two occurrences of aggression, one during task 13 and one during task 14. One incident occurred during the use of the HH intervention, and the other occurred during the use of the SM intervention. Both episodes of aggression manifested on the same day, and consisted of *Student 3* grabbing the hand of the primary investigator in a forceful and painful manner. *Student 3* exhibited this particular behavior during each treatment, indicating no correlation between the exhibition of aggression and either one of the intervention treatments.

Disruption

Disruption was defined as crying, yelling, screaming, loud vocalizations, throwing or attempting to destroy materials, forceful contact of the hand or feet with tables, walls, or floors, property destruction, or swiping objects off of surfaces or walls. Study participants did not demonstrate any occurrences of disruption while present on the research site.

Elopement

Elopement was defined as a participant leaving an assigned area without permission by walking, running, crawling, jumping, bouncing, etc., away from a task/staff by more than 5 yards. Elopement involves both purpose and the appearance

that a participant was making an effort to remove him or herself from a designated area or building. There were no occurrences of elopement during the course of the study.

Self-Injurious Behavior

Self-Injurious Behavior was defined as a participant engaging in head hitting, skin picking, forceful contact with the head, hands, or feet with hard surfaces (i.e., floor, walls, table, objects, or self), or behavior that had the potential to cause tissue damage (i.e., body slapping or slamming). There were no occurrences of self-injurious behavior by *Student 1, Student 2, Student 3*, and *Student 5*, during the completion of study-related tasks. *Student 4* exhibited three occurrences of self-injurious behavior. Each of the three incidents occurred during task 16, which was a SM intervention. Each of the incidents occurred on the same day, within the same novel job task situation, and consisted of *Student 4* flicking himself in the head with his fingers and hand with force. This apparently random display of self-injurious behavior did not appear to be linked to the administration of either treatment, suggesting no correlation between the exhibition of self-injurious behavior and either intervention treatment.

Stereotypic Behavior

Stereotypic Behavior was defined as a participant covering his/her ears with their hands, the waving of hands or fingers in a back and forth motion, opening and closing the hand with fingers touching the palm, rocking back and forth from one foot to

another, and hand or arm flapping. Table 5 displays the finding of a statistically significant interaction effect between the participant's exhibition of stereotypic behavior and their use of the HH intervention compared with the SM intervention F (4,260) =10.95, p<.05, indicating differences in participants' stereotypic behavior with regard to treatment. A statistically significant difference among the group means of the treatments and the student's exhibition of stereotypic behavior was found F (1,260)=15.96, p<.001, suggesting a difference in the exhibition levels of stereotypic behavior with respect to each of the two treatments. No statistically significant differences among the group means of the exhibitions of stereotypic behavior and the five students were found F (4, 260) =.110, p=.979, revealing consistent demonstrations of stereotypic behavior by participant's who exhibited this type of behavior independent of the specific treatments.

Because a statistically significant interaction was found between the HH and SM conditions, with respect to the exhibition of stereotypic behavior by three participants, independent t-tests were analyzed for these students to search for evidence of differences. Table 6 shows the results of the analysis.

T-test results for *Student 1* revealed no statistically significant difference (t=-2.3, df=52, p=.949) between the exhibition of stereotypic behavior when the HH intervention was used and the exhibition of stereotypic behavior by the student when the SM intervention was used. This result should be interpreted with great caution because an examination of the frequency count data revealed the average of the mean of the exhibitions of stereotypic behavior by the student when the HH intervention was used was dramatically higher than the average of the mean of the exhibitions of the

stereotypic behavior when the SM intervention was employed to complete tasks. These findings reveal he demonstrated an average of 12.51 *less* occurrences of stereotypic behavior during the HH intervention, nearly thirteen *less* occurrences of this behavior during the HH intervention. This finding appears significant when utilizing a basic visual inspection of Table 6.

T-test results revealed there was a statistically significant difference ($t=-5.3$, $df=52$, $p<.05$) for *Student 4* between the exhibition of stereotypic behavior by this participant when the HH or the SM intervention were used for novel job task completion. As seen in Table 6, examination of the frequency count data reveal a substantial difference in the average of the mean exhibitions of stereotypic behavior by the student when each of the treatments were utilized. In fact, he demonstrated a significantly higher average of occurrences of this behavior during the HH intervention.

Two students (*Student 1* and *Student 3*) demonstrated *fewer* occurrences of stereotypical behavior during the HH intervention, two students (*Student 2* and *Student 5*) demonstrated no stereotypic behavior in either intervention, and one student (*Student 4*) demonstrated significantly *more* stereotypical behavior during the HH intervention. These results illustrate differences in the behavioral response to each of the treatments, based upon individual participant profile. While two of the students demonstrated no stereotypic behavior during the completion of their tasks, two evidenced some type of effect based upon the application of specific instructional treatments. This behavior did not affect overall accuracy or participant's capacity to successfully engage in study-related activity, and did not appear to adversely affect the individuals who demonstrated elevated levels of stereotypic behavior.

Research Question 4

Did the use of a HH, compared to a SM for instructional purpose, reduce the amount of assistance (from staff) required by students for the successful completion of a novel work task in a community-based, vocational instructional setting? Levels of assistance were divided into five categories: verbal prompts, gestural prompts, model prompts, partial physical prompts, and full physical prompts. These five levels of assistance were recorded via frequency counting.

Review of the frequency count data for the average of the combined levels of assistance in Table 8, which included five levels of prompts, revealed all of the participants required *less* overall assistance from staff during the HH intervention. Notably, small differences exist between the overall average numbers of prompts required by participants to successfully complete tasks with each of the identified instructional models. Slight differences between the average levels of overall assistance did not exceed two prompts for any given student, indicating that each of the participants required similar levels of assistance in each of the two intervention treatments.

Table 8

Overall Average Levels of Assistance per Treatment Based on the Average of Five Levels of Prompts

Participant	Hand-Held Computer	Staff Model
1	3.54	5.15
2	1.55	2.20
3	5.73	8.03
4	1.98	2.61
5	2.32	2.60

Note. Hand-Held Computer indicates the average of the combined five levels of assistance during the nine HH tasks. Staff Model indicates the average of the combined five levels of assistance during the nine SM tasks.

Research Question 5

Did the use of a HH, compared to a SM for instructional purpose, reduce the different levels of assistance (from staff) required by students for the successful completion of a novel work task in a community-based, vocational instructional setting? Levels of assistance were divided into five categories: verbal prompts, gestural prompts, model prompts, partial physical prompts, and full physical prompts. These five levels of assistance were recorded via frequency counting. The definition of each type of prompt level precedes the analysis of each dependent variable.

Verbal Prompts

Verbal Prompts were defined as words or signs that informed a student how to respond when they were uncertain about how to proceed; these were matched to a student's level of comprehension. Table 5 shows findings of a statistically significant interaction effect between the verbal prompts students received from staff and their use of the HH intervention and SM intervention F (4,260) =2.47, $p < .05$, suggesting there were significant differences in the amount of verbal prompts individual students received (based upon need) while engaged in each of the intervention models. A statistically significant difference existed among the group means of the treatments and the provision verbal prompts by staff was found F (1,260)=32.19, $p < .05$, indicating there was a difference in the number of verbal prompts provided to students during each of the two treatment effects. No statistically significant difference among the group means of the verbal prompts made by staff to the five students was found F (4, 260) =1.152, p=.998, indicating the provision of verbal prompts by staff to the participants was consistent within both treatments.

Independent t-tests analysis displayed in Table 9 illustrate evidence of differences among the five individual participants.

Table 9

Analysis of T-tests for the Dependent Variables Verbal Prompts, Model Prompts, and Full Physical Prompts, based upon findings of Significance within the ANOVA Analysis using Residuals

Participants				
1	2	3	4	5
Dependent Variables				
Verbal Prompts				
t=.923 p=.360 HH $\overline{X}$ =8.19 SM $\overline{X}$ =15.55	t=3.47 p=.001* HH $\overline{X}$ =3.74 SM $\overline{X}$ =8.22	t=3.64 p=.001* HH $\overline{X}$ =6.74 SM $\overline{X}$ =19.96	t=2.96 p=.005* HH $\overline{X}$ =5.15 SM $\overline{X}$ =7.96	t=1.735 p=.089 HH $\overline{X}$ =6.37 SM $\overline{X}$ =9.18
Model Prompts				
t=2.22 p=.030* HH $\overline{X}$ =.80 SM $\overline{X}$ =1.70	t=1.472 p=.147 HH $\overline{X}$ =.33 SM $\overline{X}$ =.67	t=-1.34 p=.186 HH $\overline{X}$ =2.70 SM $\overline{X}$ =2.56	t=2.575 p=.013* HH $\overline{X}$ =.33 SM $\overline{X}$ =.89	t=-.842 p=.404 HH $\overline{X}$ =1.30 SM $\overline{X}$ =1.04
Full Physical Prompts				
t=-1.65 p=.105 HH $\overline{X}$ =.33 SM $\overline{X}$ =.11	HH $\overline{X}$ =.11 SM $\overline{X}$ =0	t=1.72 p=.091 HH $\overline{X}$ =.59 SM $\overline{X}$ =.11	HH $\overline{X}$ =0 SM $\overline{X}$ =0	HH $\overline{X}$ =0 SM $\overline{X}$ =0

Note. HH $\overline{X}$ and SM $\overline{X}$ were derived from the Frequency Count Data and are the average of the mean exhibitions of specific (dependent variables) behavior. Significance indicated by * for meeting the criteria of an alpha level < .05.

T-test results in Table 9 revealed a statistically significant difference (t=3.6, df=52, p<.05) for *Student 3* between the provision of verbal prompts provided by staff to the student when using the HH intervention compared with the SM intervention. An examination of the frequency count revealed the average of the mean verbal prompts score for the student when the HH intervention was used was very low in comparison to the average of the mean verbal prompts score for the student when the SM intervention was used to complete tasks. These results indicated he required, on average, *significantly less* verbal prompts to complete tasks during the HH intervention.

Displayed in Table 9, T-test results for *Student 4* indicated there was a statistically significant difference (t=2.9, df=52, p<.05) between the provision of verbal prompts provided by staff to the student when the HH or SM interventions were used. Examination of the frequency count data demonstrated a moderate difference between the average of the mean verbal prompts score for the student when the HH or SM interventions were in place for task completion. Results indicated *Student 4* required significantly *fewer* verbal prompts during the use of the HH intervention to successfully complete novel job tasks.

There were no significant differences in the provision of verbal prompts by staff when *Student 1*, *Student 2*, and *Student 5* employed the HH or SM interventions. According to a review of the frequency count data in Table 9, each of the participants required *less* verbal prompting by research staff during the completion of novel job tasks during the HH intervention. Of these five students, four demonstrated a statistically significant degree of difference between their need for verbal prompts during the

implementation of each of the individual treatment effects. All participants were consistent in their need for additional verbal prompts during the SM intervention.

Gestural Prompts

Gestural Prompts were defined as physical movements made to direct a person's attention to something relevant; for example, pointing toward a desired direction, tapping next to material, or pointing to necessary items. Staff made indications to students by physically pointing or motioning for participants to return to a task at hand or to needed material, and these prompts were recorded with frequency counting. According to results illustrated in Table 5, no statistically significant interaction effects between the reception of gestural prompts by students and their use of the HH versus the SM intervention were found F (4,260) =1.34, p=2.53, suggesting the two treatments did not affect the individual participant's need for this type of assistance across any of the eighteen tasks. No statistically significant difference between the group means for treatments and the student's reception of gestural prompts from staff was found, F (1,260)=.647, p=.422, indicating overall differences in the necessity of the provision of these prompts were consistent within each of the two treatments. Furthermore, no statistically significant difference existed between the group means of the gestural prompts provided by staff to the five students was found F (4,260)=.007, p=1.00, revealing the need for the provision of gestural prompts by staff, to the participants, was consistent across both treatments.

According to results shown in Table 10, an examination of the frequency count data reveal each participant *required more* gestural prompting during the use of the HH intervention; however, differences between the average of the mean scores of the two treatments were very small. Results indicate each participant required fewer gestrual prompts to successfully complete tasks while the SM intervention was in place and on average needed less than two more prompts to complete the HH tasks. While participants were consistent in their need for additional gestural prompts during the HH intervention, results reveal small differences in the need for this type of prompting in either treatment.

Table 10

Frequency Count Data for the Average Number of the Provision of Gestural Prompts During the Hand-Held Computer and Staff Model Interventions

Participant	Hand-Held Computer	Staff Model
1	7.63	6.22
2	3.22	2.11
3	15.30	13.56
4	4.44	4.19
5	3.80	2.78

Note. Hand-Held Computer indicates the average number of gestural prompts required for student's to successfully complete novel jobs during nine HH tasks. Staff Model indicates the average number of gestural prompts required for student's to successfully complete novel jobs during nine SM tasks.

Model Prompts

Model Prompts were defined as the demonstration of target behavior for a student to assist with the comprehension of specific expectations. Model prompts involved movements (e.g., showing a student how to place an item on a shelf), and could have been complete (e.g., show the placement of all items on a shelf) or a partial step (e.g., showing a student how to hold a sweater to be hung) and were recorded with frequency counting. As seen in Table 5, a statistically significant interaction effect existed between student's reception of model prompts and their use of the HH intervention and the SM intervention was found F (4,260) =3.00, $p<.05$, suggesting individual participants varied with respect to their need for model prompts by treatment. No statistically significant difference existed between the group means for treatments and the student's need for model prompts F (1, 160) =.903, $p = .343$, revealing there were no significant differences in the provision of model prompts while either treatment was in use to complete tasks. No statistically significant difference between the group means of the model prompts given to the five students was found F (4, 260) =.039, $p=.997$, indicating participants required similar numbers of model prompts for the successful completion of all jobs.

Results of independent t-tests analyses, displayed in Table 9, indicate there was a statistically significant difference ($t=2.2$, $df=52$, $p<.05$) for *Student 1* between the provision of model prompts provided to this participant by staff when using the HH or SM interventions. Interpretation of the frequency count data of the average of the mean model prompts score for the student when using the HH intervention was moderately

smaller than the average of the mean model prompts score while using the SM intervention. These results indicate he required *significantly less* model prompts during the completion of tasks with the HH intervention.

According to independent t-test results for *Student 4*, a statistically significant difference existed ($t=2.6$, $df=52$, $p<.05$) between the provision of model prompts when using the HH or the SM intervention to complete tasks as seen in Table 9. Interpretation of the frequency count data reveal a significant difference between the average of the mean model prompts score for the student when applying the HH and SM interventions, and that this participant required substantially more model prompts to complete tasks during the SM intervention.

Three participants required *less* model prompting during task completions with the HH intervention, two to a statistically significant degree. According to the frequency count data of these two participants, slightly more model prompting was required during the HH intervention. Results indicate the need for model prompts varied among participants and specific treatment.

Partial Physical Prompts

Partial Physical Prompts were defined as brief touching, tapping, nudging, or lightly pulling or pushing a student's hand, arm, leg, trunk, etc., in an attempt to guide. These prompts were recorded with frequency counting. Illustrated in Table 9, no statistically significant interaction effect between student's reception of partial physical prompts and their use of the HH intervention and the SM intervention was found F

(4,260) =1.12, p=.326, indicating each participant demonstrated similar needs for partial physical prompts in both treatments. No statistically significant difference between the group means for treatments and the student's need for partial physical prompts was found F (1,260)=2.74, p=.099, suggesting only small differences between the two treatments with respect to the provision of partial physical prompts. Furthermore, no statistically significant difference between the group means of the partial physical prompts issued by staff to the five students was found F (4,260)=.016, p=1.00, revealing no significant differences in the overall provision of partial physical prompts among students.

Overall, two of the participants required *less* partial physical prompting during the HH intervention, two required *more* partial physical prompting during the HH intervention, and one student did not require any partial physical prompting during either intervention. The differences in the average number of partial physical prompts between the HH and SM intervention are relatively small; in fact, few of these types of prompts were recorded for any of the students. These results indicate participants required little provision of partial physical prompts to successfully complete tasks in either treatment.

Full Physical Prompts

Full Physical Prompts were defined as full physical guidance through a behavior that involved hand-over-hand assistance by staff and were recorded with frequency counting. Table 5 shows statistically significant interaction effects between full physical

prompts provided to students and their use of the HH intervention and the SM intervention F (4,260) =3.55, p<.05, suggesting each of the two treatments influenced the provision of full physical prompts based upon individual student need. No statistically significant difference existed between the group means for treatments and the student's need for full physical prompting F (1, 160) =.034, p = .853, indicating no significant differences between the need for these types of prompts within either treatment. Furthermore, no statistically significant difference among the group means of the full physical prompts made by staff to the five students was found F (4, 260) =.045, p=.996, revealing, in general, that participants, demonstrated a limited need for full physical prompts.

Though a statistically significant interaction effect was found between the HH and SM conditions with ANOVA analyses, independent t-tests analyses revealed no significance differences between treatments for individual students. According to an analysis of the frequency count data, three of the participants required *more* full physical prompting during the HH intervention and two of the students did not require any full physical prompting during the HH intervention. These data indicated full physical prompts were seldom necessary for any of the participants, with respect to either treatment. Additionally, the provision of these prompts did not appear dependent upon a specific treatment model.

CHAPTER FIVE: DISCUSSION

Purpose and Procedures

This study determined which of two instructional interventions established greater efficacy when utilized for novel work tasks by individuals with autism and mental retardation, especially those students at the high school level who receive training and vocational instruction within community-based settings. This study sought to answer research questions concerning the use of a HH intervention compared to the use of a SM intervention regarding overall student accuracy, need for assistance, types of assistance, and exhibitions of stereotypic behavior. Comparison results of novel job accuracy levels were an important outcome of the study, however, findings related to levels of prompting and assistance by staff to each of the students illustrate the most significant findings. Ultimately, the intention was to identify and develop useful, data-driven information that could be used by school-based personnel to better prepare students with severe disabilities to work independently within a variety of community settings.

For individuals with pervasive disabilities, including those with autism and severe mental retardation, continued advances in instructional techniques and support models are necessary to ensure that an outcome of gainful employment may be realized by students exiting transition programs (Davies et al., 2003). Given this need, validated knowledge regarding the use of technology and how teachers might use specific devices with students with severe disabilities is essential. Because technology can

support people with cognitive and developmental impairments in the areas of independence, decision-making, and self-determination, it offers a socially validated method of indoctrination and support for students with severe disabilities within community-based settings (Davies et al.; Davies et al., 2002a; Riffel et. al, in press).

The empirical challenge of investigating efficacy in one instructional intervention compared to another, with a small number of subjects, was met with the application of a time series analysis to the original set of frequency count data. In addition to the analysis of frequency count data, statistical results were beneficial for indicating significant effects in student requests for assistance, the exhibition of stereotypic behavior, and specific levels of prompting by staff. Without the benefit of the statistical models, important information regarding the study and potential HH efficacy with respect to independence levels would have otherwise been unavailable. Five of the eight variables subjected to statistical analyses resulted in significant findings.

Summary and Implications

Research Question 1

Did the use of the HH, compared to a SM for vocational instructional purpose, increase a student's level of accuracy on an assigned novel work task in a community-based setting? In general, students demonstrated more accuracy with the SM intervention than with the HH intervention; however, this difference was minute. In summary, three students demonstrated more accuracy with the SM, one demonstrated

no difference in accuracy between the two interventions, and one student demonstrated more accuracy with the HH. The revelation that *either* instructional method was an efficient educational intervention for students with severe disabilities within the context of community-based settings was a substantial finding. Because such a small difference existed between the accuracy levels of the two interventions, not exceeding 2% for either method for any of the students, either method would provide acceptable vocational instruction for the accuracy of work-related activity. Accuracy, a requirement in all job settings, is frequently difficult and time-consuming to teach to students with severe disabilities (Grossi & Heward, 1998; Post & Storey, 2002). Study results support use of the HH and SM interventions and demonstrate the potential to advance the vocational instructional repertoire of high school personnel across the nation. It is critically important for instructional support staff that work with individuals with severe disabilities to implement validated instructional methods like those identified in the present study.

Due to intensive levels of staff support, participants demonstrated high accuracy rates during the completion of all eighteen tasks. This type of interaction typifies average support levels offered by job coaches to perspective employees with disabilities, as well as the routine instruction occurring for these particular students while learning new jobs within their school and community settings. All participants received community-based vocational instruction prior to study intervention and were consequently very familiar with school staff modeling to them for instructional purposes. This instructional history supports conclusive evidence indicating the SM intervention elicited greater accuracy from the majority of students.

Notably, three students made similar errors during the implementation of HH intervention tasks 7 and 11. Difficulty experienced during participant's completion of task 7 appears to have been linked to two separate variables: noise level and proximity issues. Task 7 required participants to place several different types of purses and make-up bags on three different shelves in a work area situated directly beneath a large speaker. Specifically, it was necessary for participants to spend the majority of task completion time working directly below a speaker playing music at an unusually loud level the day task 7 was completed. Videotape of participants during the completion of this task indicated clear physical discomfort as they worked directly beneath the speaker, and some students manifested higher levels of agitation by while standing or working in close proximity to the speaker.

An additional challenge during the completion of this task was the amount of space available to the research team and participants to work within. This particular task was situated within the accessory department of the store, which had received a large shipment of items the day before the task intervention commenced. Stock was stacked three and four boxes deep in each of the aisles surrounding the tables where students would need to place items for the completion of task 7. Consequently, limited space necessitated research staff functioning in very close proximity to participants for the purposes of assistance and videotaping. Like the speaker noise, review of videotape revealed participants exhibited higher levels of stereotypic behavior and visible agitation when staff needed to physically work in proximal positions. Because people with ASDs often demonstrate behavioral difficulty when others are within close physical proximity (Taber et al., 1999; Wert & Neisworth, 2003), job training and

development within locations frequented by the general public often present specific challenges in vocational site development.

Comparably, task 11 proved arduous for each of the participants, particularly three who made errors while using the HH. Task 11 required the placement of distinct toys and games within several designated areas (shelves and the floor, in a very specific manner. The explicit criteria for this job were onerous to illuminate with the presentation of the HH. After reviewing videotape, it was evident students who made errors on this task erroneously depressed the advance key on the HH, prior to being prepared for the next specified step. This mistake caused several students to miss a variety of steps during task 11. Staff prompting for the correct placement of particular items in designated areas (after the incorrect depression of the HH) was then met with non-compliance by each of three participants who made errors.

The remaining accuracy errors that occurred during the completion of seven other tasks appear to have no clear antecedent or correlation between measured behavior and the two treatments. These errors transpired during the application of both models, though no evidence of a clear pattern existed. Videotape review of these specified tasks by the research team revealed participants made errors when the following behavior occurred: non-compliance with staff direction, incorrect manipulation of the HH, or a combination of these two events. Clearly, inadequacy illustrating specific tasks with the HH contributed to the difficulties participants experienced when completing specific jobs.

Non-compliance to staff direction typically occurred when a participant appeared visibly agitated and was nearly finished with a specific job. There was no clear

antecedent for this type of behavior; though the research team hypothesized individual participant' were anxious to be finished with specific tasks. Furthermore, the possibility existed that participants did not like completing particular jobs, which may have contributed to episodic behavior leading to errors. Due to the severe communication limitations of the participants, it was impossible to determine work preferences with respect to individual tasks.

In every instance, incorrect manipulation of the HH consisted of an unintentional depression of the key that forwarded the task analysis. Some of the participants were unaware they had inadvertently scrolled through a necessary step, while others appeared to notice this occurrence and become agitated and/or demonstrated an increase in their stereotypic behavior exhibition. Participant inability to recognize missed items and multiple incorrect depressions of the advance key were directly correlated to errors during tasks.

Of particular interest, two participants independently discovered how to re-start task analyses on the HH when they made errors or were missing items that obviously needed to be placed within a specific area. All participants were taught to use the HH after research staff had initiated the designated task on the touch screen by double clicking the corresponding task icon. They were not taught to manipulate individual screens, programs, or icons on the HH. The revelation that individual participants were able to independently manipulate the HH in a purposeful manner, without any staff instruction for several specific functions, indicated they had the capacity to operate the HH with greater independence than had been originally assessed by the research team.

Research Question 2

Did the use of the HH, compared to a SM for vocational instructional purpose, decrease the amount of requests initiated by participants while completing a novel work task in a community-based setting? Requests consisted of three categories: requests for help, requests for feedback, and requests for termination of task.

Requests for Help

Evidence of prominent levels of significance in the study were found for the dependent variable requests for help, though elevated levels of requests varied by treatment and individual participant. The majority of participants requested help significantly *fewer* times during the HH intervention, indicating they required less staff assistance to successfully complete tasks during this model. Three students appeared able to capitalize on additional visual support provided by the HH when attempting to complete tasks, while others relied heavily upon staff direction consisting of verbal and visual prompts. Two students requested help significantly *more* times during the use of the HH intervention, indicating they required a reduced amount of staff assistance to successfully complete tasks with the SM intervention. Findings support the premise that each treatment effect inconsistently influenced participants to a significant degree. Correlations between specific levels of need were based upon participant's individual needs for assistance during a given treatment. Results further indicated neither treatment appeared to influence the perceived need for staff intervention or assistance.

Ascertaining the majority of students requested assistance more often during the SM is consistent with the availability of visual assistance provided in the form of picture during the HH intervention.

Requests for Feedback

With respect to specific treatments, data analysis revealed no significant findings in the area of feedback requests. Differences between the requests for feedback made by the participants during either intervention were minor, according to results from the frequency count data. Outcomes indicated students engaged in few overall requests for feedback and neither treatment required a significant amount of feedback for the correct completion of tasks. Overall, four students requested *less* feedback during use of the HH intervention and only one student requested *more* feedback during the HH intervention. These findings corroborated the requests for help data because they demonstrated the enhanced capacity of the HH to provide additional visual support to individuals attempting to complete specified work tasks. The ability of the HH to offer ongoing support during task completion versus a need for extensive staff intervention illustrates the benefit of technology use in community-based settings.

Requests for Termination of Task

There were no circumstances of participants requesting to terminate tasks during the course of the study. The absence of this behavior, which often occurs with

moderate frequency in other community-based learning environments, validates the premise that both treatments were effective for engaging participants in functional activities and the meaningful instruction of novel job tasks. This lack of participant desire to escape a novel job task indicates participants obtained the necessary supports and instruction for the successful completion of assigned jobs. In addition, the ability of the students to continue successful work through tasks and/or areas which appeared to cause discomfort, illustrates the efficiency of each distinct treatment effect.

Research Question 3

Did the use of a HH, compared to a SM for vocational instructional purpose reduce student's problem behaviors in a community-based setting? Problem Behaviors were divided into five categories: aggression, disruption, elopement, self-injurious behavior, and stereotypic behavior.

Aggression

Student 1, Student 2, Student 4, and *Student 5* demonstrated no occurrences of aggression during any of the eighteen tasks. *Student 3* engaged in two occurrences of aggression, one during task 13 and one during task 14. One instance of aggression occurred during the use of the HH intervention, and the other occurred during the use of the SM intervention. Both incidents occurred on the same day, and consisted of *Student 3* grabbing the hand of the primary investigator in a forceful and painful manner.

Review of these two episodes on videotape by the research team did not reveal any clear antecedent to this behavior. *Student 3* appeared to be angry (evidenced by his facial expression and guttural utterances) during each of the circumstances of aggression, but because this student was non-verbal, it was impossible for the team to recognize or understand what had upset or motivated him to engage in what appeared to be a communicative attempt of some type. The team theorized that he may have been ill and was feeling poorly during the completion of these tasks, because he missed the following three days of school due to illness. Overall, there was no evidence of any correlations between either of the two treatment effects and the exhibition of aggression.

Disruption and Elopement

There were no exhibitions of disruption or elopement by participants during the course of the study. The absence of these two serious maladaptive behavioral occurrences suggests there were no correlations between treatment effects and the exhibition of either behavior. The provision of appropriate levels of support and instruction for the successful completion of assigned jobs likely contributed to the absence of this behavior. Despite situations and settings that appeared to cause discomfort to participants, they all still engaged in and successfully completed specified tasks.

Self-Injurious Behavior

There were no occurrences of self-injurious behavior by *Student 1, Student 2, Student 3*, and *Student 5* during any of the eighteen tasks that necessitated frequency recording. Student 4 exhibited three incidents of self-injurious behavior, each occurring during task 16, a SM intervention. Each of these incidents occurred on the same day, within the same novel job task situation, and consisted of *Student 4* flicking himself in the head with his fingers and hand with force. Review of video by research team members revealed staff corrections appeared to be an antecedent for these exhibitions of self-injurious behavior. Following verbal corrections *Student 4* exhibited an occurrence of self-injurious behavior during the completion of task 16. Then he appeared to become agitated when staff attempted to console him after these corrections were made, and began to cry during the last three steps of task 16. The research team theorized *Student 4* did not care for receiving verbal correction from staff, and possibly did not like performing the actual steps of task 16. According to his teacher, *Student 4* possessed an extensive history of difficulty receiving staff feedback and corrections in all situations and settings. In general, there was no correlation between the demonstration of aggression and the application of a particular intervention.

Stereotypic Behavior

Two participants (*Student 1* and *Student 3*) demonstrated *fewer* occurrences of stereotypical behavior during the HH intervention than were witnessed during the SM intervention. Results from the statistical analyses (t-tests) revealed no statistically significant difference between the exhibition of stereotypic behavior by these participants when the HH or SM interventions were applied but an analysis of the frequency count data indicated a marked difference in the exhibitions of stereotypic behavior by *Student 1* during each of the treatments. In fact, he demonstrated, on average, nearly thirteen *less* occurrences of stereotypic behavior when he used the HH to complete tasks. This finding supports the conclusion the HH computer was a more effective instructional technique for *Student 1* with respect to a reduction of the exhibition of his stereotypic behavior within a community-based job setting.

Two of the participants (*Student 2* and *Student 5*) engaged in no stereotypic behavior during either intervention, which was not an unusual absence of behavior according to baseline data (gathered exclusively on behavior), and reporting by school staff and parents. The non-occurrence of this type of behavior by these two participants supports the position that outcome data were an accurate reflection of the average day-to-day performance of these two students.

Student 4 demonstrated significantly *more* stereotypical behavior during the use of the HH intervention. He demonstrated of an average of 14.26 *more* occurrences of stereotypic behavioral exhibitions during the nine HH tasks. Videotape review revealed staff corrections to *Student 4* (most often in the form of verbal prompts) appeared to

transpire with a greater degree of frequency during the occurrences of stereotypic behavior. Following verbal prompts (some in the form of a verbal correction) given to this participant during the completion of tasks with the HH, he specifically exhibited a higher frequency of vocalizations (stereotypic behavior). Furthermore, he appeared to become agitated when staff attempted to placate him after corrections or prompts were made. It appeared *Student 4* disliked receiving verbal corrections or multiple verbal prompts from staff, even though he appeared to enjoy using the HH to complete tasks. On several occasions he required prompting by staff, prior to task initiation, to put the HH down and/or to stop manipulating it when it was not going to be used for a task at hand. This student also asked for the HH on several occasions when a SM intervention was being introduced for task completion. For these reasons, it was unlikely the HH was the impetus for this participant's significant difference in stereotypic behavioral exhibitions during the implementation of the two intervention treatments. Rather, it appeared he harbored a strong aversion to corrective verbal prompting, which he often needed to assist in correct task completion and instruction. In summary, application of the treatment effects appeared causal in the demonstration of stereotypic behavior by two participants. Although specific intervention did not dictate the manifestation of this behavior, strategies associated with each treatment appear causal.

Research Question 4

Did the use of a HH, compared to a SM for vocational instructional purpose, reduce the amount of assistance (from staff) required by students for the successful

completion of a novel work task in a community-based setting? Levels of assistance consisted of five categories: verbal prompts, gestural prompts, model prompts, partial physical prompts, and full physical prompts.

According to the frequency count data, each of the participants required on average *less* overall staff assistance during the HH intervention. This finding should be interpreted with caution because differences in the number of average overall prompts for all five of the participants were extremely small given the possible opportunities available. Two students (*Student 1* – 1.61 and *Student 3* - 2.3) required, on average, nearly two more overall prompts to successfully complete tasks during the SM intervention. This finding was not surprising given the structure of the SM intervention, as opposed to the HH's proficiency in facilitating constant visual support to participants during task completion. The SM intervention often required additional prompts due to the absence of beneficial visual support for participants attempting to correctly and independently complete specified steps. The difference between overall prompts for the remaining three participants (*Student 2* -.65, *Student 4* - **.**63, and *Student 5* - **.**28) indicated they required nearly identical overall levels of assistance when engaged in either treatment. Differences in the number of combined prompts for each participant between treatments were small, indicating they required similar levels of staff intervention while engaged in either treatment for task completion.

Research Question 5

Did the use of a HH, compared to a SM for vocational instructional purpose, reduce the different levels of assistance (from staff) required by students for the successful completion of a novel work task in a community-based setting? Levels of assistance consisted of five categories: verbal prompts, gestural prompts, model prompts, partial physical prompts, and full physical prompts.

Verbal Prompts

According to analysis of frequency count data, all participants (*Student 1* – 7.36 less, *Student 2* – 4.48 less, *Student 3* – 13.22 less, *Student 4* - 2.81 less, and *Student 5* – 2.81 less) required, on average, *less* verbal prompting during the HH intervention. Three students required significantly *less* verbal prompting during the use of the HH intervention, and two others also required *less* verbal prompting, though not to a statistically significant degree. These findings can be attributed to the necessity of higher provisions of verbal prompts during the SM intervention due to a lack of sustained visual support for individual task completion. The HH provided students with verbal and visual support in the completion of tasks, while the SM relied solely upon verbal presentations of directions and instructions for participants. If students performed a step incorrectly, they had the potential to correct themselves while using the HH or to double check work previously completed. These features were unavailable during the application of the SM. This finding supports the employment of an

intervention allowing students with severe disabilities to engage in work related activity with the least intrusive intervention; in this case, the HH. The global reduction in verbal prompts suggests the efficacy of the HH as an instructional tool to support individuals who may require pervasive support needs within community-based job sites.

Gestural Prompts

All participants (*Student 1* – 1.41 more, *Student 2* – 1.11 more, *Student 3* – 1.74 more, *Student 4* - .25 more, and *Student 5* – 1.02 more) required *more* gestural prompting during the use of the HH intervention. No significance was established between the issue of these prompts based upon either instructional model. Analysis of the frequency count data revealed differences between the provisions of gestural prompts among the participants were only slightly higher during the HH intervention.

Because gestural prompts were the least restrictive type of prompt in the prompting hierarchy, these types of prompts were given more frequently to participants during the use of the HH. Consequently, staff could gesturally re-direct students back to the HH for assistance prior to engaging in the next level of prompting (verbal prompt) within the prompt hierarchy. During initial training the research team reviewed the prompt hierarchy, and all members agreed to explicitly adhere to a specified protocol of hierarchal delivery. The order of the prompt hierarchy, from least intrusive to most intrusive, is as follows: gestural prompt, verbal prompt, model prompt, partial physical prompt, and finally full physical prompt. This type of prompt hierarchy is commonly cited (Lee, Storey, & Anderson, 1997) and promoted as effective when working with

students with severe disabilities like autism and mental retardation. Because students utilized the HH as a visual support of sorts, staff logically should have gestured more frequently during the use of the HH. Hence, gestural prompts were higher for all participants during the use of the HH intervention. Conversely, during the SM intervention, the first line of prompting by necessity was verbal due to the need to illustrate a step or item in the absence of a visual support or cue.

Model Prompts

Three participants (*Student 1* – .9 less, *Student 2* – .34 less, and *Student 4* – .56 less) required *less* model prompting during the HH intervention and two (*Student 3* - .14 more and *Student 5* - .26 more) required *more*. In general, results indicated there was only a slight difference in the need for model prompts by any of the five participants during the employment of either treatment. Students appeared to require similar levels of model prompts during each intervention, which were small in total number across the board. These findings indicate each participant was capable of completing novel job tasks with little additional instruction or modeling, revealing that both the SM and HH interventions provided very effective instructive modalities for each participant. This was an important finding given the common need of pervasive support for individuals with severe disabilities.

Partial Physical Prompts

Two participants (*Student 1* – 1.41 less and *Student 3*– .63 less) required *less* partial physical prompting during the HH intervention, two (*Student 2* - .37 more and *Student 5* - .04 more) required more, and one (*Student 4*) did not require any partial prompting during this intervention. Overall, results revealed very little difference in the need for partial physical prompts for any of the five participants. Students appeared to require similar assistance during each of the interventions, which on average were small in number.

Full Physical Prompts

Three participants (*Student 1* – .22 more, *Student 2* - .11 more, and *Student 3*– .59 more) required *more* full physical prompting during the HH intervention and two (*Student 4* and *Student 5*) did not require any full physical prompting. Results indicated very little difference in the need for full physical prompts for any of the five participants in either treatment. Very few of these types of prompts were necessary to any of the students for task completion.

Summary of Findings

Overall Intervention Effects

Results of the study divest each participant required a unique instance of staff intervention based upon specific treatment, as well as significant differences associated with various levels of assistance. While the individual need of two dependent variables, verbal prompts and gestural prompts, was infrequent, it was consistent across the HH and SM tasks. Across treatments, evidence of the sporadic occurrence of six other dependent variables with respect to individuals illustrates the challenge educators face when attempting to determine relevant instruction for individuals with autism and mental retardation. Four of these dependent variables manifested at low proportionate rates of the average number of exhibitions in both treatments of: requests for feedback, model prompts, partial physical prompts, and full physical prompts. Two more dependent variables, requests for help and occurrences of stereotypic behavior, illustrate evidence of prominent degrees of significant difference among participant's displays of behavior in relation to a specific treatment effect. Please refer to Table 11 for the overall intervention effects for the participants.

Table 11

Overall Intervention Effects for Participants

Participant	1	2	3	4	5
Dependent Variable					
Request for Help	HH*	SM*	HH*	SM*	SM*
Request for Feedback	SM	HH	SM	SM	SM
Verbal Prompt	SM	SM*	SM*	SM*	SM
Gestural Prompt	HH	HH	HH	HH	HH
Model Prompt	SM	SM	HH	SM	HH
Partial Physical	SM	HH	SM	0	HH
Full Physical Prompt	HH	HH	HH	0	0
Stereotypic Behavior	SM	0	SM	HH*	0

Note. HH indicates the Hand-Held Computer intervention. SM indicates the Staff Model intervention. Listed intervention indicates a higher frequency of the occurrence of demonstrated behavior based upon treatment, for the listed dependent variable. * indicates a statistically significant interaction effect.

Although *Participant 1* demonstrated a significantly higher need for help while the HH intervention was in place, all other outcome data indicate he experienced the greatest success during the use of the HH intervention. The need for greater overall prompts and elevated levels of stereotypic behavioral expressions during task completion while the SM intervention was in effect lend empirical support to this conclusion. Moreover, this student appeared to genuinely enjoy using the HH and made frequent requests for its use during tasks completed with the SM intervention. While Student 1 exhibited some inconsistency with respect to expected behavioral outcomes for either treatment, he was overall most successful with the HH intervention.

Participant 2 exemplifies a model HH candidate. She required significantly less help and input during the use of the HH, as well as a decreased overall reliance on staff prompting for task completion. On numerous occasions this student verbally expressed her desire to use the HH, and often verbally communicated this preference to research staff. Even though Student 2 exhibited some mild inconsistency in terms of her need for help or prompts to complete tasks, based upon frequency count data she was overall most successful during the use of the HH intervention when completing tasks. Findings depicting significant differences in the area of requests for help and verbal prompts during the use of the SM intervention corroborate the conclusion this student was able to complete novel job tasks with greater success while operating the HH.

Overall, results for *Participant 3* regarding specific instructional intervention should be made with caution. He required significantly more help from staff during the application of the HH intervention. In addition, he required more overall prompting during the use of the HH for task completion. Interestingly, within the parameter of the

five levels of assistance (prompts) this young man required significantly more verbal prompting during the SM intervention; however the number of overall prompts required to help him successfully complete tasks was more frequent during the HH intervention. *Student 3* demonstrated higher levels of stereotypic behavior, on average, during the employment of the SM intervention; though the difference between the average of the scores from the two treatments is too small to draw a sound conclusion regarding a possible correlation based upon treatment. Review of his global performance indicates the SM intervention was the most effective instructional intervention for this participant.

Findings for *Student 4* encompass the most inconsistent profile in the study. Based upon his need for larger amounts of help and assistance during the use of the SM, a logical conclusion would purport use of the HH intervention as a superior intervention for this student. However, this participant demonstrated a significantly higher level of stereotypic behavior during the employment of the HH intervention. Had the exhibition of this behavior been such that the store (research site) personnel or community members would have complained about *Student 4's* specific idiosyncratic behaviors, these manifestations would have been deemed unacceptable based upon study criteria. Because there were no complaints about *Student 4's* stereotypic behavior, he was more accurate with the HH, and required less assistance during its use; a logical conclusion supports the notion the HH was a more effective intervention.

Differences in the average levels of necessary assistance for *Student 5* between the two treatments were small, but did indicate his performance during the HH intervention surpassed that of the SM. Exhibition of 100% accuracy in both treatments was a noteworthy finding, despite requiring higher levels of gestural, model, and partial

physical prompts during the use of the HH intervention. The necessity of these three levels of prompts was extremely low for *Student 5*, lending support to the conclusion that he excelled while using the HH.

Four of the five participants demonstrated an elevated level of efficacy during novel task completions while the HH intervention was employed. General comparisons can be made regarding the two interventions; however, a direct comparison between specific participants was not possible or recommended.

Limitations

The study investigated the use of instructional technology compared with a staff intensive model within a community-based setting. Specifically, whether or not students with both autism and mental retardation could learn novel jobs, the accuracy with which they were able to acquire and complete these jobs with two specific interventions. Accuracy, support levels, and the effect divergent treatments had on student's behaviors were studied. Several limitations were addressed prior to, as well as during the course of the study: selection difficulty, experimenter effects, attrition, design issues, hand-held training issues, time constraints, and holiday occurrence issues.

Selection Difficulty

Five participants were selected from a potential pool of 12 identified students with the dual diagnosis of autism and mental retardation. The differential selection of subjects posed a threat to internal validity due to the non-random nature of participant selection. Measurement of a relatively small sample size of five students made any references to replication and/or generalization difficult. Because there were so few participants, generalizations regarding the overall findings of this study should be made with caution.

During the development of the study, a review of the county (participating school system) records revealed only 12 possible study candidates who met specified research criteria. Participants were in high school and had autism and mental retardation designations for their school-based, categorical program label. The selection of six students who attended the same school was made for several reasons, however the lack of availability of several other students for study participation illustrates the difficulty in recruiting students from low incidence populations. Therefore, the modest number of students with autism and mental retardation who participated in the study warrants caution when stating expected results for other students with or without similar profiles.

Autism is considered a *low incidence* population and one that encompasses a great deal of variation among individuals who represent the same diagnostic profile (Simpson & Smith-Myles, 1998). For this reason meaningful direct comparison between individuals with pervasive developmental disorders, on any level, is nearly impossible. Moreover, people who evidence a co-morbidity of mental retardation and autism only

constitute 25% of the general population diagnosed with a pervasive developmental disorder (Chakrabarti & Fombone, 2001). This tapering of an already low incidence population significantly limits the ability of researchers attempting to identify potential research candidates within any given community.

Experimenter Effect

Individuals with autism and mental retardation typically display difficulty adapting appropriately to new environments or to people who are unfamiliar. To combat a threat to the ecological validity, namely experimenter effect, two familiar staff members from the school setting, as well as the primary investigator provided all instruction with the HHs, and all intervention on the research site. Though other staff presented some tasks, the primary investigator presented the predominant number of intervention tasks on the research site. This attempt to control for ecological validity raises an issue with respect to the generalizability of the results, and the possibility of replication. It is highly probable the intervention of people, other than those who were known to the participants, had provided intervention on the research site; an overall difference in student behavior and job performance would have existed. Furthermore, there is no doubt inherent variations existed among members of the research team, and these individual differences altered students' performance to some degree. An attempt to control for experimenter effect was made by operationally defining how the SM intervention was to be presented during every occurrence (by each team member) as

well as the explicit scripting of the introduction and instruction for each of the eighteen tasks.

Attrition

Attrition, a threat to internal validity, is common in single-subject research (Gall et al., 1999; Richards et al., 1999). Because there are so few participants in such studies, the possibility of losing one or more of the participants due to a myriad of circumstances is reasonably high. A hindrance to this investigation of two instructional treatments was the necessary elimination of one of the original six participants due to severe maladaptive behavior. This reduced the opportunity to implement treatment to another participant who met study criteria, as well as reducing the overall number of participants, observations, and treatment data available via overall outcome data. Despite this limitation, the statistical approach taken with the time series analyses addressed problems inherent when assessing the efficacy of two intervention approaches with only five subjects.

Design Issues

In an alternating treatments design it is critical to carefully counterbalance each treatment across different conditions of its administration. This is necessary to separate the effects of specific treatments from effects of the administrative variables. In an attempt to minimize this particular threat, a comprehensive schedule was developed by

the research team to identify the exact dates each treatment would be presented on the research site. Multiple considerations of school-related constraints complicated schedule development for each participant during the course of the study. School-based scheduling considerations with limited flexibility included, but were not limited to the following requirements affecting individual student availability: various therapy schedules (i.e. speech, occupational therapy, etc.), school-wide activity schedules (i.e. physical education, music, etc.), assigned lunch times, designated medication reception times, a pre-existing off-site work schedule, the school's scheduled use of two vans for their entire exceptional education department (including 4 classes of students participating in off-campus instruction), and staff availability to maintain county standards of supervision for all students. These constraints complicated scheduling attempts for the research team, however, contributed to a great deal of uncertainty for participants with respect to anticipating when (during a given day) they would be going to the research site. Although scheduling was extremely challenging, this difficulty contributed to the unpredictability students experienced when informed they would be participating on the research site. The designation of days to engage in research activities was set at the beginning of the study, though a great deal of flexibility was required by the participants, school-based personnel, and research team in terms of which students would go to the site, and in what order. Additionally, the primary researcher, who consistently set-up tasks on the research site was often unaware of which participants school staff would transport during any given session.

In keeping with the research design, two alternating treatments given during each session were randomly assigned to specific novel job tasks on the research site. The

selection of jobs was completed solely by the store manager and then communicated to the primary investigator. A coin was flipped to determine which treatment (HH or SM) would be assigned to each of the two jobs specified for weekly intervention sessions. All selected tasks were jobs typical employees were required to complete during any given day at the department store. To determine which of the two treatments would be administered first during concurrent intervention sessions, a coin was flipped to select which of the two identified jobs participants would complete first.

Hand-Held Training

In preparation for the study, staff created electronic representations of each task on the HHs with individual task icons. Reaching the icon capable of initiating an individual work task required the manipulation of three different operating systems. Prior to intervention the research team decided staff would manipulate the HHs through the selection of the icon for each individual task. This decision was made due to legitimate concerns over time prohibitive skills instruction which had the potential to have become too time consuming for the proposed study. Furthermore, initial uncertainty existed as to whether several of the students would have been able to correctly manipulate the screens as needed to reach the individual task icons. This assumption proved incorrect, when two of the five participants independently discerned how to *re-start* the system and scroll through necessary tasks when they had missed steps. There is a high probability each participant was capable of exercising increased independence and control over the independent operation of the HHs. The

demonstration of this behavior by two participants indicated several other students possessed the capacity to do so, despite any formal training to manipulate the computer system in this manner.

There are several different programming options with the HH, with respect to the *Visual Assistant*. For this study, tasks were programmed to display a *play* button at the bottom of the screen, which would forward a task analysis to the next sequential picture and verbal prompt after being manually depressed. The *Visual Assistant* program includes an option to program a task analysis with a *play* and a *finish* button at the bottom of the screen. These would have allowed participants to depress a *play* icon to retrieve a picture of the step or item and its verbal cue, and then depress a *finish* button once they had completed the necessary step in a task analysis. This *finish* button would have then recalled the next screen (with a verbal and visual cue) in the sequence. Had the implementation of the *finish* button been employed during the study, there likely would have been fewer errors caused by the accidental scrolling past individual steps or items. This inclusion would have altered the study in many ways, specifically, it may have reduced the requests for assistance and the provision of specific levels of prompts students required. Further, for students adversely affected by staff corrections, this type of programming could potentially have decreased the exhibitions of stereotypic behavior due to staff prompts and/or corrections.

Time Constraints

On average, over 2 hours of effort by the research team was required for the development of each individual task. This amount of time was consistently required to complete the following steps necessary for job development: the primary investigator meeting with the store manager to review the selected job and job criterion (30 minutes), taking several digital pictures of the job steps and items for task analysis development (30 minutes), the primary investigator meeting with the team to determine specific steps for the task analysis to be followed and which pictures to utilize (30 minutes) for each step, programming of the device using the *Visual Assistant* program (30 minutes), the creation of the data collection/task analysis script (15 minutes), and travel to and from the research site to the school. Derer et al. (1996) report that limitations of time, in relation to training issues, is often identified as a problematic issue when considering interventions for individuals with severe disabilities. Because task development is extremely time consuming, typical school personnel would be unable to devote the amount of time employed in the study to engage in similar preparation for vocational instruction within school or community-based settings. In addition, instructional personnel could develop an entire job in far less time, and would likely be developing a job for an individual that could be completed during more than one session. A hindrance to this study was the necessity of copious amounts of time necessary to create tasks and work with various pieces of technology. As a result, replication of this study or related activities could prove prohibitive for teachers and school personnel if applied similar to the outlined study protocols.

Holiday Overflow

Two major holidays (Thanksgiving and Christmas) occurred during the final phase of the study contributing to autocorrelation within the data. This limitation was impossible to avoid or control and resulted in an increase in the volume of items within the store and the number of shoppers that gradually increased as the holidays drew near. The change in store volume began to increase during the second week in November, with workspace systematically becoming smaller in each of the aisles due to the level of goods received prior to Christmas. In several instances, participants had difficultly moving within the confines of the store due to stacks of boxes and items that were piled in all available spaces. Videotape clearly demonstrated participants were more likely to become agitated when space was limited and staff had to work in close physical proximity to them. Inconsistency existed in the flow of people that came through the store to shop on any given day, though generally the numbers of shoppers increased as the day wore on. Numbers of people coming through the store to shop increased dramatically during the last week of November, and continued to grow steadily until the study concluded during the second week in December. It is unclear if this change in number had any impact on the participants, though it is certain the increase in people coming through the store posed a significant challenge to the research team while filming participants performing tasks. There were several incidents of store patrons approaching members of the research team, who they had mistaken for store employees. Fortunately, intervention staff members were never interrupted in this manner while working directly with a participant in a study related task. However,

research team members operating video equipment suffered several interruptions and were frequently approached while filming. The occurrence of these two limitations is part of a normal environmental situation within a retail work atmosphere, and would equally affect anyone desiring to work or provide training in a similar setting. This particular limitation would also pose a considerable challenge to those interested in a replication study.

Results of this study support the continued implementation of vocational instructional models for students with severe disabilities within community-based settings. Outcome data suggested students with severe disabilities can be successful in the completion of novel job tasks with two clearly delineated instructional models. This study adds to an existing body of research supporting vocational instruction within community work sites, specifically studies reporting similar results with respect to a decrease in overall prompts and staff assistance (Davies et al., 2003; Riffel et al., in press). Furthermore, supportive data was obtained suggesting high degrees of independence were possible for students who used HHs to complete novel job tasks, versus more traditional staff-intensive approaches.

Recommendations for Future Practice

Independence

Research, including the present study, indicates individuals with mental retardation and autism are capable of independently operating fairly complicated

equipment within various community settings (Davies et al., 2002a; Furniss et al, 1998; McDonnell et al., 1993). These findings represent elevated levels of independent functioning capability, which logically translate as individuals better prepared for challenging work experiences. Empirical knowledge regarding the efficacy of specialized technology is readily available for school and community personnel, and should be implemented with students who will benefit from pervasive visual and auditory supports. Results from previous research, as well as the present study indicate individual participants with severe disabilities appeared to require less staff intervention while using portable technology (Furniss et al., 2001; Riffel et al., in press) to complete vocational tasks. Some study participants were able to troubleshoot problems with specific system equipment as needed. This ability to independently problem solve with a palm-top computer signifies the vast potential students with severe disabilities possess with respect to independent function on community-based sites. Given these findings, it is imperative for practitioners to foster increased levels of student independence with the implementation of specialized technology within community work settings. Unified recognition by instructional staff that such technology, like HHs, holds great promise for the independence of individuals with severe disabilities (Parette, 1991) and can enable professionals to pursue various possibilities within the realm of portable audio and visual prompting devices. Because the maximum possible level of independence within job settings is critical to the success of individuals with severe disabilities (Parette, 1991; Wehman & Kregel, 1998) review of the utility of such devices on skills of independence for students with severe disabilities is necessary. This need to provide specialized types of support systems to individuals offers to revolutionize the

way instructional staff provide vocational instruction and support to students in high school transition programs.

Decreasing prompt dependency, commonly exhibited by individuals with severe disabilities, is crucial to their ability to maintain independent or quasi-independent jobs (Mank et al., 2003). Prompt dependency has been well documented in research literature, and is considered one of the most problematic areas for staff to address while working on job sites (Post & Story, 2002) with individuals who experience severe impairments. In the present study, the provision of technology to provide automated visual and verbal prompts demonstrated a capacity to reduce the level and frequency of overall prompts required by staff within various areas of a vocational setting. These findings are promising because they illustrate the potential to reduce required numbers of staff on vocational sites, as well as the intensity with which staff are often required to engage consumers. The ability of people to work at any job with minimal prompting and staff proximity is desirable on many levels, particularly the ability of an individual to increase their level of independence using technology.

Multiple Settings

Use of these types of portable technology within various settings has great potential to impact the lives of many people with severe disabilities. HHs are compact and easy for students to manipulate, which makes them easily transportable from one site to another, or within single job sites that may require significant amounts of movement between designated areas. The applied use of palm-top computers is

convenient for students and staff due to their minimal size and durability; therefore, people who may experience physical difficulty completing tasks, as well as those who find it cumbersome to carry large numbers of items or bulky equipment can easily transport them. Students can independently carry HHs or affix them to their person, with a variety of modes as seen in typical settings of all kinds. School-based personnel could allow students to engage in increased responsibility regarding the use of designated equipment, further reinforcing the idea of independence and productivity for each student. For very detailed jobs, devices could be placed on a cart or table (which occurred in the present study) for students to manipulate, as needed. Or, when space is limited within retail settings (as it was in the present study), students would be able to move with convenience and relative ease to operate equipment, versus a more traditional approach of moving a portion of a job and then placing it back to its original area upon completion.

The versatility of technology, like HHs, should be capitalized upon to determine which types of specific job locations lend themselves to identified pieces of equipment. Limitless potential within sundry retail establishments exists, and could be easily employed in stores like: Wal-Mart, Target, hardware stores, convenience stores, offices, schools, etc. Equipment can be programmed for job training as well as supported employment types of tasks, and staff in various establishments could potentially be taught to program and prepare devices to support students or individuals with severe disabilities.

Palm-top computers used within multiple job settings should be used to support various sub-sets of skills and instructional formats. Due to poor generalization skills, it

is important to teach functional skills that will be utilized in community-based settings (Gaylord-Ross et al., 1987). Because research has demonstrated HHs have been successfully used to teach functional skills (Taber et al., 1999) within a variety of settings, instructional personnel need to identify which types of skills might easily be acquired with assistive technology devices. The present study reviewed the application of devices for novel job skill acquisition, solidifying the ability of such specialized technology in presenting skills for acquisition. It would be useful to employ the devices to assist in the instruction of other stages of learning, specifically fluency, maintenance, and generalization. To this end, instructional staff will need to offer the HH within a myriad of vocational options, with the intention of providing skill instruction over many facets.

Student Choice

Browder & Minarovic (2000) report students with severe disabilities appear to enjoy exercising control over their instruction, much like average workers in a plethora of settings. A phenomena witnessed with great regularity during the present study, and reported in numerous others, was the capacity with which participants appeared to genuinely enjoy using the HHs to complete vocationally oriented tasks (Davies et al., 2002a and Davies et al., 2002b). There was evidence of this preference in consistent verbal requests to use the device, as well as physical attempts to search for the HH when intervention preparation was underway. Several participants chose to voluntarily

manipulate available devices before, in between, and after task presentations; and demonstrated pleasure in handling the HH.

Though the majority of the participants in the present study had difficulty communicating their desire to use HHs, staff relied upon known verbal behavior students had demonstrated in the past and body language with relation to choice and proximity. When asked, some participants functionally communicated their affinity for the HH. Two of the students responded positively in an echolalic manner, and two were able to verbally tell staff they did in fact enjoy the use of the devices. Each of the participants requested the HH for use when the SM intervention had been indicated for intervention. The ability to provide a range of instructional modalities for students with severe disabilities is highly recommended, and was repeatedly identified in studies reviewing multiple treatment effects. Allowing students to wield pieces of technology they enjoy manipulating, and are of their choosing, is in the best interest of all support personnel.

According to Post and Story (2002) social validation is, “An area of importance that is missing from this (technology and its use with people with severe disabilities) literature” (p. 325). Findings from this study contribute to a base of knowledge indicating instructional technology is an effective instructional intervention for students with mental retardation and autism. Despite the limitations of software currently available, use of the HHs demonstrates an appropriate and socially validated method of reducing dependence among students with severe disabilities. Continued support and use of this specific technology should be made available to students, allowing them the

choice to select instructional models of their choosing, and those that have been empirically proven successful.

Implications for Individuals with Autism

Although commonly sighted in research literature as *best practice*, the use of visual supports for people with autism does not occur with great regularity (Wert & Neisworth, 2003). Common sense and good practice indicate people with pervasive developmental disorders often display a superior performance when instruction employs the use of visual supports (Dettmer, Simpson, Myles, & Ganz, 2000; Sherer et al., 2001). Additionally, research demonstrates a perceived craving by individuals with autism to engage in repetitive and predictable routines when ever possible (Sherer et al.; MacDuff et al., 1993; Melching & Gast, 1997). The provision of instructional strategies that can positively enhance behavior generally considered inappropriate could assist these students in the development of skills of independence and the likelihood they could engage in meaningful vocational instruction within community settings.

A general dislike of overt human contact during instruction and interaction has been well documented (Wert & Neisworth, 2003) regarding individuals with ASDs. Taber et al. (1999) illustrate the need for intervention that will address the social difficulties of students with autism "Aberrant and off-task behaviors negatively affect the social, vocational, and community adjustment of functioning persons with disabilities who engage in such behaviors" (p. 159). Findings from this study support the practice

of specialized technology use by individuals with autism, in an effort to reduce the amount of staff contact during instruction. The revelation in the present study that staff contact and close physical proximity to others was often very uncomfortable for participants, and often increased the exhibition of their stereotypic behavior, indicate instructional staff should provide various types of similar technology in a systematic fashion.

Literature exists suggesting the use of consistent voice output devices for increasing the likelihood students with autism will understand and learn tasks (Mirenda et al., 2000) with increased ease and accuracy. These findings were based upon intense repetitions of the same verbal prompt, with the same voice, on a voice output device. This delivery model was similar to the provision of verbal and visual prompts by the HH intervention in the present study. The use of HHs would greatly benefit students with ASDs in the area of transition and community-based instruction because these students appear to desire similarity and devices could easily sustain programming from a single staff member.

Recommendations for Future Study

Participant Variation

A critical focus in future research studies of a similar nature should be the inclusion of a large number of students with autism and mental retardation (Mitchell et al., 2000; Post & Story, 2002). Due to the small sample size in the present study,

generalizations over many areas are difficult, lending support to the call for larger studies with similar students. In addition, to prevent such limitations, it will be necessary to include students from several different schools and/or multiple counties in a large-scale study employing implementation techniques and technology used during the present study.

Future studies should be replicated with additional students, across various categorizations. In order to determine which specific skills may be best suited for different types of technology intervention, it would be useful to include students with other types or combinations of severe disabilities. In an effort to determine which equipment would be most advantageous for students with similar types of diagnostic profiles. Because clear evidence exists about the benefits of the *Visual Assistant* program and its use on the HHs for people with mental retardation (Davies et al., 2002b) and autism (present study), the potential exists to personalize training and community support experience for each student. This individualization could provide students with meaningful community-based supports and address the complicated process of individualizing instruction (Todis, 1996) for each student.

Setting Variation

While this study was conducted within an average department store, it would be useful to conduct studies that compared the use of the HHs in various community-based settings. It is possible the HH devices may be less effective or useful in particular work settings. For instance, the devices cannot be used near water, or any other types of

liquid, or near extreme heat or cold. This prohibits their use in kitchens or food preparation areas, near cleaning supplies, and outside in direct sunlight or inclement weather. Analysis of different types of instructional provisions within various settings is needed to determine which devices and instructional methods may work best in a variety of community-based settings.

Chadsey-Rusch & Gonzalez (1996) have suggested that learning within school-based settings differs from learning that occurs across other settings. The present study demonstrated elevated levels of learning within the context of community-based instruction, but research outlining best practices within a variety of settings is needed. It will be important to note whether specific technology is more or less effective in identified work settings. This contention further illustrates the critical need for students to be trained within environments they are likely to work (Neubert et al., 2002) and advances the premise that increased community instruction utilizing assistive technology is essential.

Research is needed to identify which pieces of equipment could provide the most effective support for various jobs throughout a variety of community settings. A review of specific jobs best suited to assistive technology use should be compiled in order to determine which establishments could assist individuals with severe disabilities exercise greater independence in work-related activity.

Application Variation

This study indicates several students benefited from the use of a HH programmed to illustrate a novel job task. Participants were taught to push a *play* button, and the screen would automatically advance to the next step in the task. This programming feature was one of a handful of options available within the *Visual Assistant* program, which is designed to create task analyses of jobs. Single digital pictures illustrated the novel job tasks and identified items necessary to complete each step - versus a picture of a completed step of a job task at hand. It would be useful to study different types of programming methods to search for efficacy among various program options for this particular population. There is reason to believe the provision of a finished button would enhance a student's ability to perform tasks with greater independence. Additionally, it would be useful to study differences between devices that are programmed with pictures representing specific items to be manipulated (method used in this study) versus pictures of a completed step in a job. Students may exercise greater success with different types of support systems, and there is a need for a universally accepted methodology. Furthermore, students may have demonstrated greater success in the present study if the HHs had been programmed in an alternative format. It is plausible students could respond more independently with a HH if specific jobs are represented in a complete fashion (finished step), versus a picture-by-picture modality (picture of needed item). The possibility of implementing video-streaming (small clips) specific steps may be most beneficial to students attempting to learn or complete tasks that are unfamiliar to them. Research comparing numerous operating

capabilities of the HH devices used in the present study would lend substantial support to a growing body of literature recommending the use of technology for students with severe disabilities.

Development of the task analyses used in the study was comprehensive and tedious for the research team. Future research should focus on different types of task analyses available for the creation of jobs, which could be illustrated on devices similar to those used in the study. Because there are various types of task analyses, it would be useful to review their development and application to various types of jobs in similar settings.

Review of an optimum number, length, and optimal choice of language for prompts (Post & Storey, 2002) necessary for students to complete tasks within community-based settings would advance the field enormously. It would be useful to understand the optimum number of steps for student success, as well as concrete time frames for single use of the device within community-based work sites. It is possible too many or too few instructions for job completion could aversely affect the outcome of job accuracy, as well as the need for staff assistance. In addition, length of prompts delivered (i.e. how long a verbal prompt is sustained) begs review due to frequent attention deficits, sensory issues, and inconsistent abilities of students with mental retardation and ASDs. It is assumed students with ASDs may demonstrate higher levels of stereotypic behavior in the presence of lengthy verbal prompts by a device during job completion. Research reviewing prompt length would provide useful information in terms of actual length, and would assist researchers in identifying which types of language may provide optimal support for students with severe disabilities.

Formal language, usually filled with detailed descriptions and multiple inferences poses functional difficulty when programming for HH implementation. Review of basic commands, with one or two-step directions may provide succinct and understandable directions for students.

Instructional Application

This study demonstrated efficacy of HH use by students with autism and mental retardation when completing novel job tasks in community settings. Future research identifying which types of tasks might be best suited to similar systematic instruction would be helpful (Post & Story, 2002). Perhaps the device is more successful in providing support for the development of acquisition skills versus those at the fluency or maintenance levels of learning. It would be helpful to understand the impact of technology use over the five levels of learning, since this study (along with others) demonstrated the ability of students with severe disabilities to acquire skills at the acquisition phase of learning. Studies have demonstrated that individuals with mental retardation were able to successfully use the device to complete repetitive or fluency-related tasks, as well as new or acquisition-type skills. Knowledge regarding which levels of learning may be best suited to the implementation of the device would benfit school-based personnel as well as community support providers. Systematic research into ways of enhancing the durability of the skills (LeGrice & Blampied, 1994) taught by the HH would assist educators during the development of community-based vocational instruction.

Conclusion

High school students with severe disabilities urgently need preparation for transition and potential employment opportunities. This urgency is compounded by the fact that many transition activities do not occur with regularity or success. Students must be afforded opportunities to engage in vocational preparatory activities with the use of socially and empirically validated methodologies. It is vital for students with severe impairments to receive sound instructional programming that will adequately prepare them to successfully work and function within their communities.

Specialized technology holds great promise for individuals with autism and mental retardation who desire full inclusion within their community. The ability to successfully operate and manipulate a palm-top computer for the purpose of managing a schedule, completing job tasks, or self-monitoring behavior can assist individuals with severe disabilities in the realization of desired life goals. In addition, these types of skills have the potential to provide support to individuals who benefit from pervasive support systems for successful community integration and functioning.

This study contributes to an existing body of knowledge illustrating the vast potential specialized technology holds for individuals with autism and mental retardation. Furthermore, it demonstrates the tremendous capability people with severe disabilities possess when provided access to appropriate support equipment. For individuals who have traditionally experienced segregation in all aspects of their lives, palm-top computers present teachers, parents, and community providers with a legitimate option for the provision of ongoing support to work and participate within their

communities. This type of technology purports a dignified support option for people who may otherwise be unable to complete work within community-based settings.

Thirty years ago Brown and York (1974) addressed the need for systems change and the community integration of individuals with severe disabilities, "…however, it seems that we now have an opportunity to create humane, tolerant, developmentally sound, and existentially relevant social and emotional environments that can replace oppressive, rejecting, undignifying, and intolerant systems so long in operation" (p. 10). These words exemplify a modern need to change systems that continue to relegate individuals with severe disabilities to segregated settings. Moreover, they lend credence to a belief system that encourages the inclusion of all individuals within a community and offer hope to those wishing to conduct their lives in a dignified and meaningful manner. This study intended to provide viable information regarding appropriate support options for people with autism and mental retardation, and demonstrates potential options to assist these individuals realize this vision.

APPENDIX A: CATEGORICAL DESIGNATIONS

A.1 High School Students Identified Under the School-Based Label of *Autism* in Florida
2003 - 2004

Districts in Florida 2002 – 2003 school year	Number of Students grades 9-12
Alachua	10
Bay	14
Bradford	1
Brevard	19
Broward	181
Charlotte	8
Citrus	5
Clay	10
Collier	3
Dade	213
Dixie	1
Duval	61
Escambia	20
Flagler	2
Gadsden	2
Hendry	1
Hernando	2
Highlands	1
Hillsborough	39
Indian River	12
Jackson	1
Lake	4
Lee	26
Leon	9
Manatee	7
Marion	12
Martin	1
Monroe	1
Nassau	2
Okaloosa	8
Okeechobee	4
Orange	43
Osceola	14
Palm Beach	62
Pasco	23
Pinellas	59

Districts in Florida 2002 – 2003 school year	Number of Students grades 9-12
Polk	11
Putnam	1
St. Johns	5
St. Lucie	8
Santa Rosa	4
Sarasota	11
Seminole	22
Suwannee	1
Taylor	3
Volusia	25
Wakulla	1
Total	**973**

20 districts reported serving no high school students under the categorical label of autism during the 2002 – 2003 school year: Baker, Calhoun, Columbia, DeSoto, Franklin, Gilchrist, Glades, Gulf, Hamilton, Hardee, Holmes, Jefferson, Lafayette, Levy, Liberty, Madison, Sumter, Union, Walton, and Washington.

A.2 Excerpt from the Florida State Board Of Education Rules Pertaining to Special Programs: Special Programs for Students who are Mentally Handicapped

(1) Mentally Handicapped. A mental handicap is defined as significantly sub-average general intellectual functioning existing concurrently with deficits in adaptive behavior and manifested during the developmental period. Mentally handicapped students shall be classified as:
    (a) Educable mentally handicapped. An educable mentally handicapped student is a student who is mildly impaired in intellectual and adaptive behavior and whose development reflects a reduced rate of learning. The measured intelligence of an educable mentally handicapped student generally falls between two (2) and three (3) standard deviations below the mean and the assessed adaptive behavior falls below that of other students of the same age and socio-cultural group.
    (b) Trainably mentally handicapped. A trainable mentally handicapped student is a student who is moderately or severely impaired in intellectual and adaptive behavior and whose development reflects a reduced rate of learning. The measured intelligence of a trainable mentally handicapped student generally falls between three (3) and five (5) standard deviations below the mean and the assessed adaptive behavior falls below that of other students of the same age and socio-cultural group.
    (c) Profoundly mentally handicapped. A profoundly mentally handicapped student is a student who is profoundly impaired in intellectual and adaptive behavior and whose development reflects a reduced rate of learning. The measured intelligence of a profoundly mentally handicapped student generally falls below five (5) standard deviations below the mean and the assessed adaptive behavior falls below the mean and the assessed adaptive behavior falls below that of other students of the same age and socio-cultural group.
(2) Criteria for eligibility. A student is eligible for a special program for the mentally handicapped if there is evidence that the student meets all of the following criteria:
    (a) The measured level of general intellectual functioning, is two (2) or more standard deviations below the mean. The standard error of measurement may be a considered in individual cases. The profile of intellectual functioning shows consistent sub-average performance in a majority of areas to be evaluated;
    (b) The assessed level of adaptive behavior is below that of other students of the same age and socio-cultural group; and
    (c) The demonstrated level of performance in academic, preacademic, or developmental achievement is subaverage.

(3) Procedures for Referral. Prior to referral for student evaluation, screenings, for vision, hearing, speech and language functioning shall be required for all students with referral for complete evaluations where the need is indicated. In addition, prior to referral of a student who has been enrolled in basic education programs for more than six (6) weeks, the student's learning problem shall be addressed at the school level through the following minimum procedures:
    (a) Two (2) or more conferences concerning the student's specific problem which shall include the parents or guardian and administrative personnel, teaching personnel or student services personnel;
    (b) Annecdotal records or behavioral observations made by more that one (1) person and in more that one (1) situation which cite the specific behaviors indicating the need for the referral;
    (c) A minimum of two (2) interventions or adjustments have been tried with the student. These interventions may include: change in student's class schedule or teacher; change in student's curriculum; change in techniques of instruction; interventions provided by student services personnel; or state or community agency intervention;
    (d) Review of social, psychological, medical and achievement data in the student's education records; and
    (e) Review of attendance records, and where appropriate, investigation of reasons for excessive absenteeism.
(4) Procedures for student evaluation.
    (a) The minimum evaluation for determining eligibility shall include the following
        1. A standardized individual test of intellectual functioning individually administered by a qualified professional.
        2. A standardized assessment of adaptive behavior;
        3. An individually administered standardized test of academic or preacademic achievement. A standardized developmental scale shall be used when a student's level of functioning cannot be measured by an academic or preacademic test; and
        4. A social-developmental history which has been compiled directly from the parent, guardian, or primary caregiver.
    (b) For students being considered for eligibility in the program for profoundly mentally handicapped, a report of a medical evaluation by a licensed physician may be required by the school district

Taken from the *Florida Statues and State Board of Education Rules*, 2000.

A.3 Excerpt from the Florida State Board Of Education Rules Pertaining to Special Programs: Special Programs for Students who are Autistic

Autistic***.***

(1) ***Autistic.*** One who has a disability reflected in severe disorders of communication, behavior socialization and academic skills, and whose disability was evident in the early developmental stages of childhood. The autistic child appears to suffer primarily from a pervasive impairment of cognitive and perceptual functioning, the consequences of which are manifested by limited ability to understand, communicate, learn, and participate in social relationships.

(2) Criteria for eligibility. The following criteria, consistent with the definition, shall be used to determine each student's eligibility for a special program:
   (a) Evidence of onset of disorder at birth or during the first three (3) years of life;
   (b) Evidence of severely delayed or absent speech and language skills;
   (c) Evidence of impaired or complete lack of emotional/social relationships;
   (d) Evidence of abnormal responses to stimuli which may involve any or all of the sensory modalities; and
   (e) Evidence of a severe functional retardation which may be accompanied by normal or superior abilities in some areas.

(3) Procedures for student evaluation. The minimum evaluation for determining eligibility shall include the following:
   (a) Documented and dated anecdotal records of behavioral observations, if required by the district program administrator, based on criteria specified in the district procedures document;
   (b) Documented evidence that a social and developmental history has been compiled directly from the parent or guardian;
   (c) A comprehensive psychological evaluation conducted by a certified school psychologist, licensed psychologist or psychiatrist, which shall include an individual evaluation of intellectual ability and potential, behavioral observations and an educational evaluation, if appropriate;
   (d) A physical evaluation which will include a neurological evaluation if deemed necessary by the examining physician or psychologist;
   (e) An evaluation of sensory functioning including vision and hearing; and
   (f) An evaluation of speech and language development.

Taken from the Florida Statues and State Board of Education Rules, 2000.

APPENDIX B: UCFIRB

B.1 Procedure for Submitting Proposals to the UCFIRB

All Institutional Review Board (IRB) information can be obtained via the Internet or from Chris Grayson at the Office of Research. Please submit to the following address:

Address:
Office of Research (Attn: Chris Grayson)
12443 Research Parkway - Suite 207
Orlando, FL 32826

Contact:
Phone: 407-823-2901
Fax: 407-823-3299
E-mail: cgrayson@mail.ucf.edu

The UCFIRB website address is: www.research.ucf.edu

Once you have accessed the website, look to the menu panel on the left and click on "Compliance." This will bring up all the necessary IRB information.

UCFIRB Submission Checklist:

The completed IRB packet must be submitted by the 1st business day of the month for consideration at the monthly IRB meeting.

__X__ UCFIRB Form [page 24]
__X__ Consent Form (Parent, Educator, Administrator)
__X__ Assent Form [if participants are between 7-17 years of age]
__X__ School/Class Approval [if using students as participants]
__N/A__ Copies of Surveys, Tests, Questionnaires, etc. [if applicable]
__X__ Detailed Research Methodology [at least one page minimum]
__N/A__ Physical or Medical Contingency Plan [if applicable]
__X__ All Department Chairs'/Directors' Signatures [approvals from all involved departments are required]
__X__ Dates of Proposed Research have not Already Expired [see page 6, A-4 for more details]
__X__ Current Mailing Address Provided

Principal Investigator __Kim Carper_____ Date ____September 1, 2003
Principal Investigator Address: 4235 Wood Haven Drive, Melbourne, FL 32935

B.2 UCFIRB Form

The complete IRB packet must be submitted by the 1st business day of the month for consideration at that monthly IRB meeting. Please see page 6 of this manual for detailed instructions on completing this form.

1. Title of Project: An Investigation Of The Proficiency Level Of High School Students With Autism and Mental Retardation Within Community-Based Job Settings: The Relationship Between The Use Of A Hand-Held Computer Versus Staff Modeling For Accurate Novel Job Skill Acquisition And Student Learning.

2. Principal Investigator:

Signature: _____
Name: Ms. Kim Carper, M.A.
Degree: Varying Exceptionalities, M.A.
Title: Coordinator of Ed./Training Exceptional Ed.
Department: Center for Autism Education - UCF
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Home Telephone: 321-253-0046

3. Supervisor:

Signature: _____
Name: Dr. Dan Ezell, PhD
Degree: Doctor of Education
Title: Coordinator
Department: Exceptional
College: Education – Brevard Campus
E-Mail: dezell@mail.ucf.edu
Telephone: 321-632-1111, ex. 65574
Facsimile: 321-632-1111, ex. 65539
Home Telephone: _____

4. Dates of Proposed Project (cannot be retroactive): From: September 2003 To: December 2003

5. Source of Funding for the Project: (project title, agency, and account number) none

6. Scientific Purpose of the Investigation: To determine if the use of a hand-held computer, versus the use of Staff Modeling, for instructional purposes, will increase the level of accuracy in novel work task completion, in high school students with autism and mental retardation, in community-based, vocational situations.

7. Describe the Research Methodology in Non-Technical Language: (the UCFIRB needs to know what will be done with or to the research participants) Please see the attached *Methodology*

8. Potential Benefits and Anticipated Risks. (Risks include physical, psychological, or economic harm. Describe the steps taken to protect participant. There are no anticipated risks to the participants.

9. Describe how participants will be recruited, the number and age of the participants, and proposed compensation (if any): Please see the attached *Methodology* and the attached *Consent Letters*.

10. Describe the informed consent process: (include a copy of the informed consent document)

Please see the attached Child Assent Script and Consent Letters.

I approve this protocol for submission to the UCFIRB. _____ /_____

Department Chair/Director Date

APPENDIX C: CONSENT AND EXPERTS

C.1 Parent Consent Letter

September 4, 2003

Dear Parent,

I am a graduate student at the University of Central Florida, currently working on my PhD. I am under the supervision of a faculty member, Dr. Dan Ezell, and am conducting research on an instructional intervention for community-based, vocational settings for students with autism spectrum disorders (ASDs) and mental retardation. The purpose of this study is to find out how well two specific teaching strategies might increase the accuracy of a novel job completion, for students with ASDs and mental retardation.

The results of this study may assist teachers, schools, and districts in designing and implementing effective instructional practices for students with ASDs and mental retardation in the area of community-based, vocational instruction. It is anticipated that students who participate in the study will benefit from the instructional interventions provided. Be assured this study will benefit many students now, and in the future, who are served in a variety of settings.

Participants in the study will be individually instructed in one of two instructional interventions (Staff Modeling or a Hand-Held Computer) while on a job site. They will then be asked to complete a novel work task, and will be measured on their percentage of accuracy on that novel job completion. Prior to the intervention phases of the study, participants will be taught to use the Hand-Held Computers within the classroom and community-based work settings. In addition to the measurement of the percentage of accurate novel job completion, participants will also be observed to determine the level or amount of prompts necessary for job completion, requests for help, and problem behaviors during the baseline and intervention phases of the study.

With your permission, your child will be videotaped during the baseline and intervention phases of the study. The video will be accessible only to the research team for verification purposes. If you choose, at the end of the study, the tape(s) will be erased. Though children will be addressed by their first name on the video, their identity will be kept confidential to the extent provided by the law. For note-taking and/or documentation purposes, your child's name will be replaced with a code number. Results will be reported in the form of a manuscript, which will be reviewed by my faculty advisor and my Dissertation Committee. Further, I intend to attempt to publish the results of this study. In the manuscript for my Committee, and any subsequent manuscript sent for publication, your child's identity will remain confidential.

You and your child have the right to withdraw consent for your child's participation at any time without consequence. There are no known risks to the participants, and no compensation is offered for participation in this study. However, it is anticipated that the study participants will benefit from the increased staff and research team interaction, instruction, and use of technology.

Please sign this consent letter. A second copy of this consent letter has been provided for your personal records- the copy is marked at the top of the page.

If you have any questions about this research project, please contact me at (407) 737-2566. My faculty supervisor is Dr. Dan Ezell and he can be reached at (321) 632-1111, ex. 65575. Questions or concerns about research participants' rights may be directed to the UCFIRB office, University of Central Florida Office of Research, Orlando Tech Center, 12443 Research Parkway, Suite 207, Orlando, Florida 32826. The phone number is (407) 823-2901.

Sincerely,

Kim Carper

_____ I have read the project/procedure described above.

_____ I voluntarily give my consent for my child, _____, to participate in Kim Carper's study on instructional interventions in community-based, vocational settings.

_____ I met with Kim Carper in my home or community-setting to review this consent letter and the proposed research project.

_____ I wish for any tapes or pictures taken of my child for the purpose of the study, be erased or destroyed at the conclusion of the study.

_____ I give Kim Carper permission to maintain the tapes and pictures of my child at the conclusion of the study.

_____/_____

Parent or Guardian Date

C.2 Administrative Consent Letter

August 4, 2003

Dear Administrator,

I am a graduate student at the University of Central Florida, currently working on my PhD. In partial fulfillment of the requirements for the degree of Doctor of Education – Exceptional Education Track, I wish to conduct a study with students with an autism spectrum disorder (ASD) and mental retardation. The purpose of this research is to gather information on effective instructional interventions for students with ASDs and mental retardation within community-based, vocational settings.

I am asking administrators like you to support the proposed research project, because you have been identified as a highly successful and supportive school-based team member. Your input, cooperation, and support of the research project will provide valuable information and insight of the selected participants, as well as the perceived necessity for effective instructional interventions for community-based, vocational settings for students with ASDs and mental retardation.

The research project will measure the efficacy of two specific instructional interventions, specifically targeting the areas of skill and task acquisition. The results of which may improve the quality of community-based, vocational instruction for students with ASDs and mental retardation. Your identity will be kept confidential, and will not be revealed to any participating agencies or within the final manuscript of my PhD Dissertation. There are no anticipated risks, compensation or other direct benefits to you for your support of this research study.

You are free to withdraw your consent allowing the participation of students at your school or within your district any time; and may discontinue the participation of school and staff assisting with this study at any time without consequence.

If you have any questions about this research project, please contact me at (407) 737-2566. My faculty supervisor is Dr. Dan Ezell and he can be reached at (321) 632-1111, ex. 65575. Questions or concerns about research participants' rights may be directed to the UCFIRB office, University of Central Florida Office of Research, Orlando Tech Center, 12443 Research Parkway, Suite 207, Orlando, Florida 32826. The phone number is (407) 823-2901.

Please sign the enclosed copy of this consent letter. A second copy of this consent letter has been provided for your personal records- the copy is marked at the top of the page. By signing this letter, you give me permission to share and report your participation anonymously with my faculty advisor, and within the final manuscript of my PhD Dissertation.

Sincerely,

Kim Carper

_____ I have read the project described above.
_____ I voluntarily agree to support the project

_____/_____

Administrator date

C.3 Educator Consent Letter

September 2003

Dear Educator,

I am a graduate student at the University of Central Florida, currently working on my PhD. In partial fulfillment of the requirements for the degree of Doctor of Education – Exceptional Education Track, I wish to conduct a study with students with an autism spectrum disorder (ASD) and mental retardation. The purpose of this research is to gather information on effective instructional interventions for students with ASDs and mental retardation within community-based, vocational settings.

I am asking educators like you to support the proposed research project, because you have been identified as a highly successful and supportive school-based team member. Your input, cooperation, and support of the research project will provide valuable information and insight of the selected participants, as well as the perceived necessity for effective instructional interventions for community-based, vocational settings for students with ASDs and mental retardation.

The research project will measure the efficacy of two specific instructional interventions, specifically targeting the areas of skill and task acquisition. The results of which may improve the quality of community-based, vocational instruction for students with ASDs and mental retardation. Your identity will be kept confidential, and will not be revealed to any participating agencies or within the final manuscript of my PhD Dissertation. There are no anticipated risks, compensation or other direct benefits to you for your support of this research study. You are free to withdraw your consent to support this research study at any time.

If you have any questions about this research project, please contact me at (407) 737-2566. My faculty supervisor is Dr. Dan Ezell and he can be reached at (321) 632-1111, ex. 65575. Questions or concerns about research participants' rights may be directed to the UCFIRB office, University of Central Florida Office of Research, Orlando Tech Center, 12443 Research Parkway, Suite 207, Orlando, Florida 32826. The phone number is (407) 823-2901.

I realize this research project will take some of your valuable time. Your will be asked to participate in training for conducting observations, conduct student observations, and assist with the job/task development. Rest assured the result will be well worth your effort and support. Please sign the enclosed copy of this consent letter. A second copy of this consent letter has been provided for your personal records- the copy is marked at the top of the page.

By signing this letter, you give me permission to share and report your participation anonymously with my faculty advisor, and within the final manuscript of my PhD Dissertation.

Sincerely,

Kim Carper

_____ I have read the project described above.
_____ I voluntarily agree to support the project

_____/_____

Educator date

C.4 Child Assent Script

Hi (<u>student's name</u>). It is nice to see you again. I am a student at UCF (show a digital picture of UCF***), and I am working on a project. I would like you to work with me on this project.***

I would like you (point to the student and wait for verification they are attending to you***) to learn how to use this computer (***show the student the hand-held computer***) to help you with your work (***show a digital picture of the student working at an off-site location***).***

I would like to make a videotape of you working with the computer (show the hand-held computer***) and without the computer (***show a digital picture of the student working at an off-site location***).***

You may stop (show a digital picture of a stop sign***) at any time. Repeat this directive with the visual aid.***

If you feel upset, mad, confused (show corresponding visual pictures of emotions***) you may stop (***show a digital picture of a stop sign***) at any time.***

Would you like to do this?

_____ Child acknowledged with a verbal or augmented "yes"
_____ Child appeared to acknowledge the request in a positive manner
_____ Child gave favorable indicators to all questions
_____ Child appears comfortable with this investigator

Student's Name: _____
Student's Code Number: _____
Date consent was procured: _____
Consent was procured by: _____
Witness Present: _____

C.5 Specialty Committee of Experts

Patrick J. Hartwick, Ed.D.
Education Department Chairman
Associate Professor of Education
Daemen College – Amherst, New York

Dr. Hartwick has been the Chair of the Daemen College Education Department for the past 11 years. Research areas include Learning Disabilities and Learning Strategies, Cognitive Strategies, and Autism Spectrum Disorders.
With his assistance, Daemen has received funding from the Department of Education to conduct a five-year research project/program on after-school programs in high -need urban school districts. Dr. Hartwick also serves as a consultant for other special projects in the Western New York area to assist with reducing the drop-out rates of students with disabilities. Degrees include: a
B.S. in Elementary Education and Special Education from Buffalo State College, an M.S. in Elementary Education and Special Education from Buffalo State College, and an Ed.D.in Special education, with a minor in Education Administration from West Virginia University.

William Marsh, M.S., CBA
Behavior Analyst Brevard County Public Schools
Certified Behavior Analyst

Mr. Marsh is a Board Certified Behavior Analyst and Behavior Analysis Educator. He is currently employed by Brevard County Public Schools. Bill received his Master of Science degree in psychology from Brigham Young University where he specialized in Behavior Analysis and Learning Theory. He is an author of several research publications and presentations on the functional assessment of behavior in applied settings. Bill is also a State of Florida Certified Trainer of Certified Associate Behavior Analyst candidates. He also has been a consultant providing in-home, residential, and school behavior analysis services and continues to conduct research in the field of Applied Behavior Analysis.

Chad Nye, Ph.D.
Executive Director – Center for Autism & Related Disabilities
University of Central Florida – Orlando, Florida
Professor – Department of Communicative Disorders
University of Central Florida – Orlando, Florida

Dr. Nye is the Executive Director of the University of Central Florida Center for Autism & Related Disabilities and a professor in the Department of Communicative Disorders. He received his Ph.D. from the University of California, Riverside, in the area of Special Education. He has more than 20 years experience in university administration, training and education of speech language pathologists. In 1995 he was appointed a Senior Research Fulbright Scholar to the country of Jordan where he worked to develop a parent survey to screen language, social, and cognitive development in Arabic speaking children, He is currently working with an international network of scholars to develop research methodologies that will guide future development of educational research and public policy in education and health related interventions. Dr. Nye's research interests over the years have included speech and language test development for Navajo children, the development systematic reviews and meta-analyses in the area treatment for childhood speech and language disorders, stroke, voice disorders, and autism. He has published and presented his research in national and internationally recognized conferences and colloquiums.

James R. Patton, Ed.D.
Adjunct Associate Professor – Department of Special Education
University of Texas – Austin, Texas
Independent Consultant Pro.ed Publishing – Austin, Texas

Dr. Patton is currently an independent consultant and Adjunct Associate Professor in the Department of Special Education at the University of Texas at Austin. He formerly was a special education teacher, having taught students with special needs at the elementary, secondary, and postsecondary levels of schooling. He has written books, chapters, articles, and tests in the area of special education. Dr. Patton's current areas of professional interest are the assessment of the transition strengths and needs of students, the infusion of real-life content into existing curricula, study skills instruction, behavioral intervention planning, and the accommodation of students with special needs in inclusive settings.

Tom E.C. Smith, Ed.D

Professor & Chairperson – Department of Curriculum and Instruction
University of Arkansas
Executive Director – Division on Developmental Disabilities of the Council for Exceptional Children

Dr. Tom E.C. Smith is currently Professor and Chairperson, Department of Curriculum and Instruction, University of Arkansas. Prior to coming to the university, Dr. Smith was on the faculties at the University of Arkansas for Medical Sciences campus, University of Alabama at Birmingham, and University of Arkansas at Little Rock. He served three terms on the President's Committee on Mental Retardation and has been the Executive Director of the Division on Developmental Disabilities of the Council for Exceptional Children since 1995. Dr. Smith has authored or co-authored 18 college and more than 40 articles in professional journals; he has made more than 200 presentations at national and state meetings, frequently emphasizing legal issues and special education. Dr. Smith consults regularly with schools on Section 504 and IDEA and teaches graduate classes in legal issues and disabilities.

APPENDIX D: PARTICIPANT TRAINING PROTOCOL

D.1 Participant Training Protocol

Step 1:

Once a training task is ready to be completed, introduce the PDA and explain its use to the student with the following script:

O.K. **(student's name)**, I am going to show you how to do a job with this device **(show the student the PDA).**

First, I am going to use this device **(show the student the PDA)** to show me **(point to self)** how to do the job while you **(point to the student)** watch me do the job.

Then, you **(point to the student)** are going to do the job with this device **(show the student the device)** while I help you **(point to the student)**.

O.K.? **(Check with the student for their comprehension and agreement).**

Demonstrate the use of the PDA to complete the designated task according to its corresponding task analysis (see designated task analysis).

While demonstrating the job, stop and review each individual step of the designated task analysis - be sure to show the student how to scroll through the Visual Assistant program with each step. Provide a clear view of what you are doing, and explain to the student what you are doing.

{Reset the job}

Step 2:

Now prompt the student to complete the job with the PDA:
O.K. **(student's name)***, it's your turn* **(point to the student)** *to do the job with the device* **(show the device)***, while I* **(point to self)** *help you.*

O.K. ? **(Check with the student for their comprehension and agreement).**
After the student agrees/acknowledges, hand them the PDA:

O.K. **(student's name)***, here is the device* **(hand the student the PDA)***. I want you to do this job* **(indicate the job at hand)***, using this device* **(indicate the PDA, now in the student's hand)** *to help you.*

I am going to help you do the job with the device now. **(Prompt the student to complete the job at hand – make sure to explain each step of the corresponding task analysis as the student is completing them/going through them)***.*

When the job is successfully completed provide the student with verbal praise for successfully completing the job and using the device to help them complete the job; and a positive reinforcer if necessary.

{Reset the job}

Step 3:

Prompt the student to complete the job again, using the PDA:

Now you **(student's name)** *are going to do the job by yourself, and I* **(point to self)** *will be right here to help you if you need help with the job or the device.*

Prompt the student to complete the job with the device. Prompt or help them as needed while they are completing the task with the PDA; making every effort to allow them to complete the task as independently as possible. Make every effort to move slightly away from the student while they complete the task.

Document the percentage of accurate task completion for each additional completion of the job.

Step 4:

Complete Step 3 with the student until they are able to complete the entire task with 100% accuracy (percent correct according to the specified task analysis), using the PDA.

Document the percentage of accurate task completion for each additional completion of the job.

APPENDIX E: DATA COLLECTION INSTRUMENTS

E.1 Novel Job Tasks (1 – 18)

Task 1:	Slipper Wall	HH	HH 1
Task 2:	Hanging Sweaters/Jackets	SM	SM 1
Task 3:	Folded Sweaters on Table	HH	HH 2
Task 4:	Bathrobe Wall	SM	SM 2
Task 5:	Stuffed Toys	HH	HH 3
Task 6:	Baby Items	SM	SM 3
Task 7:	Purses/Makeup Bags on Table	HH	HH 4
Task 8:	Hot Water Bottles	HH	HH 5
Task 9:	Belts, Ties, & Dress Socks	SM	SM 4
Task 10:	PJs, Boxers, & Backpacks	SM	SM 5
Task 11:	Toy World	HH	HH 6
Task 12:	Christmas Cards, X-mas Mats, Animal Pillows	SM	SM 6
Task 13:	Plastic Christmas Gift Bags	SM	SM 7
Task 14:	Fuzzy Gloves	HH	HH 7
Task 15:	Men's Sweatshirts, Jackets	SM	SM 8
Task 16:	Men's T-Shirts	HH	HH 8
Task 17:	Christmas Ornaments	HH	HH 9
Task 18:	Towel Wall	SM	SM 9

Key:
HH = Hand-Held Computer Treatment
SM = Staff Model Treatment
HH (1 – 9) = Hand-Held Computer Treatments
SM (1 – 9) = Staff Model Computer Treatments

E.2 Baseline Data Collection
Template

Date:_____ Participant:_____
Observer:_____
Location:_____
Total Time of Observation:_____

REQUESTS:	***ANECDOTAL NOTES:***
Help Requested (HR):	
Feedback Requested (FR):	
Request for Termination of Task (RT):	

Problem Behaviors: Duration Recording	***ANECDOTAL NOTES:***
Disruption (D):	
Stereotypic Behavior (SB):	

Problem Behaviors: Frequency Recording	***ANECDOTAL NOTES:***
Aggression (A):	
Disruption (D):	
Elopement (E):	
Self-Injurious Behavior (SIB):	
Stereotypic Behavior (SB):	

LEVELS OF ASSISTANCE:	***ANECDOTAL NOTES:***
Verbal Prompt (VP):	
Gestural Prompt (GP):	
Model Prompt (MP):	
Partial-Physical Prompt (PPP):	
Full-Physical Prompt (FPP):	

E.3 Intervention Data Collection
Tasks (1 – 18) Template

Date:_____ Participant:_____
Observer:_____
Location:_____
Total Time of Observation:_____

REQUESTS:	***ANECDOTAL NOTES:***
Help Requested (HR):	
Feedback Requested (FR):	
Request for Termination of Task (RT):	

Problem Behaviors: Duration Recording	***ANECDOTAL NOTES:***
Disruption (D):	
Stereotypic Behavior (SB):	

Problem Behaviors: Frequency Recording	***ANECDOTAL NOTES:***
Aggression (A):	
Disruption (D):	
Elopement (E):	
Self-Injurious Behavior (SIB):	
Stereotypic Behavior (SB):	

LEVELS OF ASSISTANCE:	***ANECDOTAL NOTES:***
Verbal Prompt (VP):	
Gestural Prompt (GP):	
Model Prompt (MP):	
Partial-Physical Prompt (PPP):	
Full-Physical Prompt (FPP):	

E.4 Intervention Data Collection Sheet
Tasks (1 – 18) Template

Date:_____
Participant:_____
Observer:_____
Intervention Employed:_____
Location:_____
Total Time of Observation: _____

Steps in Task Analysis	Task Completion
1.	yes___ no___
2.	yes___ no___
3.	yes___ no___
4.	yes___ no___
5.	yes___ no___
6.	yes___ no___
7.	yes___ no___
8.	yes___ no___
9.	yes___ no___
10.	yes___ no___
11.	yes___ no___
12.	yes___ no___
13.	yes___ no___
14.	yes___ no___
15.	yes___ no___

Total number of opportunities: 15
Total number correct (yes) _____
_____ % task completion accuracy

Form adapted from ***Single Subject Research*** by Richards et al. 1999

E.5 Slipper Wall Task# 1 – PDA

Steps in Task Analysis	**Task Completion**
1. Place the cream slippers on a peg on wall 1	yes___ no__
2. Place the cream slippers on a peg on wall 1	yes___ no___
3. Place the leopard slippers on a peg on wall 1	yes___ no___
4. Place the red slippers on a peg on wall 1	yes___ no___
5. Place the red slippers on a peg on wall 1	yes___ no___
6. Place the pink, cat slippers on a peg on wall 2	yes___ no___
7. Place the cream, woman & dog slippers on a peg on wall 2	yes___ no___
8. Place the green, dragonfly slippers on a peg on wall 2	yes___ no___
9. Place the cream, woman on a couch slippers on a peg on wall 2	yes___ no___
10. Place the cream, cool cat slippers on a peg on wall 2	yes___ no___
11. Place the red, woman & dog slippers on a peg on wall 2	yes___ no___
12. Place the red, woman on a couch slippers on a peg on wall 2	yes___ no__
13. Place the black, woman on a couch slippers on a peg on wall 2	yes___ no___
14. Place the black, woman & dog slippers on a peg on wall 2	yes___ no___
15. Place the purple, fuzzy slippers on a peg on wall 3	yes___ no___
16. Place the black, fuzzy slippers on a peg on wall 3	yes___ no___
17. Place the leopard, fuzzy slippers on a peg on wall 3	yes___ no___

Total Number of Opportunities: 17
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

Each pair of slippers should be hung properly on a peg. Like types of slippers should be placed on designated pegs; and should not be mixed with other types of slippers.
Slippers should hang in a straight row; and look neat.
Types of slippers should be hung on their designated walls (example: wall 1, wall 2, or wall 3).

Anecdotal Notes:

_____
_____
_____
_____
_____
_____

E.6 Hanging Jackets/Sweaters Task #2 - SM

Steps in Task Analysis	**Task Completion**
1. Place the furry, brown sweater with zipper on Rack 1	yes___ no__
2. Place the furry, tan, sleeveless sweater-vest on Rack 2	yes___ no___
3. Place the furry, black, sleeveless sweater-vest on Rack 2	yes___ no___
4. Place the pink, velvet, button-up jacket on Rack 3	yes___ no___
5. Place the purple, velvet, button-up jacket on Rack 4	yes___ no___
6. Place the tan, gray, black, and burgundy sweater with stitching on Rack 5	yes___ no___
7. Place the jean jacket with furry trim on Rack 6	yes___ no___
8. Place the jean jacket with furry trim on Rack 7	yes___ no___
9. Place the brown, tan, and cream stitched sweater on Rack 8	yes___ no___
10. Place the brown, tan, and black stitched sweater on Rack 8	yes___ no___
11. Place green, velvet, button-up jacket on Rack 9	yes___ no___
12. Place the red, velvet, button-up jacket on Rack 9	yes___ no__
13. Place the brown, velvet, button-up jacket on Rack 10	yes___ no___
14. Place the black, velvet, button-up jacket on Rack 10	yes___ no___
15. Place the leopard-print, fuzzy vests on Rack 11	yes___ no___
16. Place the zebra-print, fuzzy vests on Rack 11	yes___ no___
17. Place the fuzzy, tan, zip-up sweaters on Rack 11	yes___ no___
18. Place the fuzzy, black, zip-up sweaters on Rack 11	yes___ no___

Total Number of Opportunities: 18
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be hung neatly on each rack (straight; not bunched) by their hangers. All items should be with like colors; and in like groups – on their designated racks. Each like group of items should be placed on its designated rack (Rack 1, Rack 2, Rack 3, etc.).

Anecdotal Notes:

_____
_____
_____
_____
_____
_____

E.7 Folded Sweaters on a Table Task #3 – PDA

Steps in Task Analysis	**Task Completion**
1. Place the white sweaters on Table 1	yes___ no__
2. Place the red sweaters on Table 1	yes___ no___
3. Place the blue sweaters on Table 1	yes___ no___
4. Place the blue sweaters on Table 1	yes___ no___
5. Place the tan and cream sweaters on Table 2	yes___ no___
6. Place the blue and black sweaters on Table 2	yes___ no___
7. Place the red and black sweaters on Table 2	yes___ no___
8. Place the red and black sweaters on Table 2	yes___ no___
9. Place the turquoise sweaters on Table 3	yes___ no___
10. Place the royal blue sweaters on Table 3	yes___ no___
11. Place the white sweaters on Table 3	yes___ no___
12. Place the black sweaters on Table 3	yes___ no__
13. Place the white sweaters with buttons on Table 4	yes___ no___
14. Place the hot pink sweaters with buttons on Table 4	yes___ no___
15. Place the red crew sweaters on Table 4	yes___ no___
16. Place the brown sweaters with buttons on Table 4	yes___ no___
17. Place the black sweaters with buttons on Table 4	yes___ no___

Total Number of Opportunities: 17
Total Number of Correct: ____
_____% task completion accuracy

Criterion:
All items should be placed upon each table (straight; not bunched; still folded neatly).
All items should be with like colors; and in like groups – on their designated tables.
Each like group of items should be placed on its designated Table (Table 1, Table 2, Table 3, and Table 4).

Anecdotal Notes:

_____
_____
_____
_____
_____
_____

E.8 Bathrobes on the Wall Task # 4 – SM

Steps in Task Analysis	**Task Completion**
1. Place the white terry cloth robes on Rack 1	yes___ no__
2. Place the white terry cloth robes on Rack 2	yes___ no___
3. Place the pink terry cloth robes on Rack 3	yes___ no___
4. Place the pink terry cloth robes on Rack 4	yes___ no___
5. Place the green terry cloth robes on Rack 5	yes___ no___
6. Place the green terry cloth robes on Rack 6	yes___ no___
7. Place the blue terry cloth robes on Rack 7	yes___ no___
8. Place the purple terry cloth robes on Rack 8	yes___ no___
9. Place the pink robes with flowers and sash on Rack 9	yes___ no___
10. Place the white robes with flowers and a zipper on Rack 10	yes___ no___
11. Place the pink robes with flowers and a zipper on Rack 11	yes___ no___
12. Place the cream robes with lace and flowers on Rack 12	yes___ no__
13. Place the pink robes with lace and flowers on Rack 13	yes___ no___
14. Place the yellow robes with pink flowers & blue lace on Rack 14	yes___ no___
15. Place the pink robes with lace and small flowers on Rack 15	yes___ no___
16. Place the royal blue robes with lace and flowers on Rack 16	yes___ no___

Total Number of Opportunities: 16
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be hung neatly on each rack (straight; not bunched; aligned on the hanger) by their hangers.
All items should be with like colors; and in like groups – on their designated racks.
Each like group of items should be placed on its designated rack (Rack 1, Rack 2, Rack 3, etc.).

Anecdotal Notes:

_____
_____
_____
_____
_____
_____

E.9 Stuffed Toy Shelf Task # 5 – PDA

Steps in Task Analysis	**Task Completion**
1. Place the Santa Claus slippers in section 1	yes___ no__
2. Place the reindeer slippers in section 1	yes___ no___
3. Place the blue teddy bears in section 1	yes___ no___
4. Place the blue dogs in section 1	yes___ no___
5. Place the tan bears with a blanket in section 1	yes___ no___
6. Place the brown and tan lambs in section 1	yes___ no___
7. Place the pink God Bless baby dolls in section 1	yes___ no___
8. Place the blue God Bless baby dolls in section 1	yes___ no___
9. Place the yellow big birds in section 2	yes___ no___
10. Place the blue cookie monsters in section 2	yes___ no___
11. Place the red Elmos in section 2	yes___ no___
12. Place the blue Grovers with a pink nose in section 2	yes___ no___
13. Place the yellow giraffes in section 3	yes___ no___
14. Place the tan lambs with blanket in section 3	yes___ no___
15. Place the plastic bags with 3 dogs in section 3	yes___ no___
16. Place the plastic bags with 3 cats in section 3	yes___ no___
17. Place the pink bears in section 3	yes___ no___
18. Place the pink & yellow baby dolls in section 3	yes___ no___

Total Number of Opportunities: 18
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be neatly placed in bins; and not crammed or shoved in loosely.
All items should be with like colors; and in like groups.
Each like group of items should be placed in its designated bin (section 1, section 2, or section 3).

Anecdotal Notes:

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E.10 Baby Items on Wall Task# 6 – SM

Steps in Task Analysis	**Task Completion**
1. Place the pink baby dresses with lace on Rack 1	yes___ no__
2. Place the flowery baby outfits with pink flowers on Rack 2	yes___ no___
3. Place the pink baby jacket/sweaters w/zipper on Rack 3	yes___ no___
4. Place the blue, checked baby outfits with a train on Rack 4	yes___ no___
5. Place the blue baby outfits with a white collar & animals & a hat on Rack 5	yes___ no___
6. Place the blue, checked baby outfit with lace & a blue ribbon on Rack 6	yes___ no___
7. Place the white christening outfit with hat and a cross on Rack 7	yes___ no___
8. Place the white christening dress w/blanket & hat on Rack 8	yes___ no___
9. Place the white baby bib w/stitched cross & lace on Rack 9	yes___ no___
10. Place the burp cloth w/a blue boat & stars on Rack 10	yes___ no___
11. Place the package of burp pads w/green, yellow, & blue pads on Rack 11	yes___ no___
12. Place the packaged white baby pillowcases on Rack 12	yes___ no__
13. Place the blue, checked hippo & bird bib on Rack 13	yes___ no___
14. Place the terry cloth white & red Christmas bibs on Rack 14	yes___ no___
15. Place the terry cloth white w/checked trim & I love grandma on Rack 15	yes___ no___
16. Place the terry cloth white w/checked trim & I love grandpa on Rack 16	yes___ no___
17. Place the pink, terry cloth 'Thank Heaven for Little Girls' on Rack 17	yes___ no___
18. Place the pink, terry cloth 'Thank Heaven for Little Boys' on Rack 18	yes___ no___

Total Number of Opportunities: 18
Total Number of Correct: ____
_____% task completion accuracy

Criterion:
All items should be hung neatly on each rack (straight; not bunched) by their hangers.
All items should be with like colors; and in like groups – on their designated racks.
Each like group of items should be placed on its designated rack (Rack 1, Rack 2, Rack 3, etc.).

Anecdotal Notes:

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E.11 Purse/Makeup Bags on Table Task #7 – PDA

Steps in Task Analysis	**Task Completion**
1. Place the New York, canvas make-up bag with sequins on ***Table 1***	yes___ no__
2. Place the bikini-ladies, canvas make-up bag with sequins on ***Table 1***	yes___ no___
3. Place the boardwalk, canvas makeup bag with sequins on ***Table 1***	yes___ no___
4. Place the New York, canvas make-up bag with sequins on Table 2	yes___ no___
5. Place the bikini-ladies, canvas make-up bag with sequins on Table 2	yes___ no___
6. Place the boardwalk, canvas makeup bag with sequins on Table 2	yes___ no___
7. Place the tan, canvas purses on Table 2	yes___ no___
8. Place the brown, canvas purses on Table 2	yes___ no___
9. Place the clear - lips, lipstick, & compact make-up bag on Table 2	yes___ no___
10. Place the large, brown, leather purse on Table 2	yes___ no___
11. Place the large, paisley purse on Table 2	yes___ no___
12. Place the black, lips, lipsticks, & compacts make-up bags w/ black ribbon on ***Table 3***	yes___ no__
13. Place the small, square countries, make-up bags w/white ribbon on ***Table 3***	yes___ no___
14. Place the New York, canvas make-up bag with sequins on ***Table 3***	yes___ no___
15. Place the boardwalk, canvas makeup bag with sequins on ***Table 3***	yes___ no___
16. Place the medium, square, countries, small make-up bags w/white ribbon on ***Table 3***	yes___ no___
17. Place the large, medium, & small countries make-up bags w/white ribbon on ***Table 3***	yes___ no___

Total Number of Opportunities: 17
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All bags, make-up bags, and purses should be placed upon their bottom, so that both sides are facing either direction.
All bags, make-up bags, and purses should be placed on their designated table.
All bags, make-up bags, and purses should be placed in like groups, and with like colors.

Anecdotal Notes:

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E.12 Hot Water Bottles Task #8 – PDA

Steps in Task Analysis	**Task Completion**
1. Place the red, heart water bottles on Wall 1	yes___ no__
2. Place the blue, w/white snowflakes water bottles on Wall 1	yes___ no___
3. Place the multi-colored, stripped water bottles on Wall 1	yes___ no___
4. Place the hot pink, light pink, & orange w/hearts water bottles on Wall 1	yes___ no___
5. Place the brown, w/white snowflakes water bottles on Wall 1	yes___ no___
6. Place the yellow, light blue, turquoise w/purple stars water bottles on Wall 1	yes___ no___
7. Place the pink, w/white snowflakes water bottles on ***Wall 2***	yes___ no___
8. Place the cream, burgundy, & black w/ brown snowflakes water bottles on ***Wall 2***	yes___ no___
9. Place the blue, with white snowman water bottles on ***Wall 2***	yes___ no___
10. Place the turquoise, w/ letter water bottles on ***Wall 2***	yes___ no___
11. Place the purple w/ letter water bottles on ***Wall 2***	yes___ no___
12. Place the red w/ letter water bottles on ***Wall 2***	yes___ no__
13. Place the brown w/ letter water bottles on Wall 3	yes___ no___
14. Place the black w/ letter water bottles on Wall 3	yes___ no___
15. Place the gray w/ letter water bottles on Wall 3	yes___ no___
16. Place the tan w/ penguin water bottles on Wall 3	yes___ no___

Total Number of Opportunities: 16
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be hung neatly on each rack (straight; not bunched) by their hangers. All items should be with like colors; and in like groups – on their designated walls. Each like group of items should be placed on its designated wall (Wall 1, Wall 2, & Wall 3).

Anecdotal Notes:

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E.13 Belts, Ties, & Dress Socks Task #9 – SM – (11-6-03)

Steps in Task Analysis	**Task Completion**
1. Place the brown leather belts on Rack 1	yes___ no__
2. Place the black (XL) leather belts on Rack 2	yes___ no___
3. Place the brown and black (L) leather belts on Rack 3	yes___ no___
4. Place the textured brown leather belts on Rack 4	yes___ no___
5. Place the Men's neckties on Rack 5	yes___ no___
6. Place the Children's neckties on Rack 6	yes___ no___
7. Place the packets of boys, navy-blue dress socks on Rack 7	yes___ no___
8. Place the packets of boys, navy-blue dress socks on Rack 8	yes___ no___
9. Place the packets of boys, navy-blue dress socks on Rack 9	yes___ no___
10. Place the packets of boys, black dress socks on Rack 10	yes___ no___
11. Place the packets of boys, black dress socks on Rack 11	yes___ no___
12. Place the packets of boys, black dress socks on Rack 12	yes___ no__
13. Place the packets of boys, navy-blue dress socks on Rack 13	yes___ no___
14. Place the packets of boys, navy-blue dress socks on Rack 14	yes___ no___
15. Place the packets of boys, navy-blue dress socks on Rack 15	yes___ no___

Total Number of Opportunities: 15
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be hung neatly on each rack (straight; not bunched; not twisted) by their hangers.
All items should be with like colors; and in like groups – on their designated racks.
Each like group of items should be placed on its designated rack (rack 1, rack 2, & rack 3, etc.).

Anecdotal Notes:

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E.14 PJs, Boxers, & Backpacks Task #10 – SM – (11-6-03)

Steps in Task Analysis	**Task Completion**
1. Place the boys, checked pajama bottoms on Rack 1	yes___ no__
2. Place the boys, pajama bottoms with footballs and whistles on Rack 2	yes___ no___
3. Place the boys, pajamas with dinosaurs on Rack 3	yes___ no___
4. Place the Spiderman Backpack/Blanket on Rack 4	yes___ no___
5. Place the red w/ blue & white polka dotted boxers on Rack 5	yes___ no___
6. Place the navy-blue w/red, white, & green polka dotted boxers on Rack 6	yes___ no___
7. Place the brown dress shirts in a bag on Rack 7	yes___ no___
8. Place the red & white checked boxer shorts on Rack 8	yes___ no___
9. Place the red & black checked boxer shorts on Rack 9	yes___ no___
10. Place the packets of blue dress shirts w/tie on Rack 10	yes___ no___
11. Place the Incredible Hulk Backpack/Blanket on Rack 11	yes___ no___
12. Place the yellow w/ white floral print boxers on Rack 12	yes___ no__
13. Place the blue & white checked boxers on Rack 13	yes___ no___
14. Place the yellow w/ white floral print boxers on Rack 14	yes___ no___
15. Place the red & black checked boxers on Rack 15	yes___ no___

Total Number of Opportunities: 15
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be hung neatly on each rack (straight; not bunched; not twisted) by their hangers.
All items should be with like colors; and in like groups – on their designated racks.
Each like group of items should be placed on its designated rack (rack 1, rack 2, & rack 3, etc.).

Anecdotal Notes:

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E.15 Toy World Task # 11 – PDA – (11-18-03)

Steps in Task Analysis	**Task Completion**
1. Place the Construction Floor Puzzle on shelf 1	yes___ no__
2. Place the Alphabet Train Floor Puzzle on shelf 1	yes___ no___
3. Place the Noah's Arc Floor Puzzle on shelf 1	yes___ no___
4. Place the United States of America Floor Puzzle on shelf 1	yes___ no___
5. Place the Alphabet Wooden Blocks on shelf 2	yes___ no___
6. Place the Wooden Dog Floor Puzzle on shelf 2	yes___ no___
7. Place the Wooden Toy Tool Kit on shelf 2	yes___ no___
8. Place the Thomas & Friends Conductors Figure 8 Set on shelf 2	yes___ no___
9. Place the Sweet Stuff Meowing Kitties holder on shelf 3	yes___ no___
10. Place the Silly Sounds Sound Toys (pig, cat, dogs, etc.) on shelf 3	yes___ no___
11. Place the Silly Sounds Toys (frogs, monkeys, etc.) on shelf 3	yes___ no___
12. Place the Wooden Rainbow Stacker on shelf 3	yes___ no__
13. Place the yellow, Newborn Wonder Play Baby on shelf 4	yes___ no___
14. Place the green, Newborn Wonder Play Baby on shelf 4	yes___ no___
15. Place the Band in a Box on shelf 4	yes___ no___

Total Number of Opportunities: 15
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be placed upon their designated shelf (upright, facing out, and stacked neatly).
All items should be with like items; and in like groups – on their designated shelves.

Anecdotal Notes:

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E.16 Christmas Cards/X-Mas Mats/Animal Pillows Task # 12 – SM – (11-18-03)

Steps in Task Analysis	**Task Completion**
1. Place the Christmas Card Boxes on Table 1	yes___ no__
2. Place the Christmas Card Boxes on Table 2	yes___ no___
3. Place the black, Christmas cats w/red background mats on Rack 1	yes___ no___
4. Place the snowman w/blue background & snow mats on Rack 1	yes___ no___
5. Place the Santa w/blue background mats on Rack 2	yes___ no___
6. Place the Christmas reindeer w/blue background on Rack 2	yes___ no___
7. Place the tan raccoon pillows on Table 3	yes___ no___
8. Place the pink pig pillows on Table 3	yes___ no___
9. Place the orange hippo pillows on Table 3	yes___ no___
10. Place the green hippo pillows on Table 3	yes___ no___
11. Place the blue w/pink dog pillows on Table 3	yes___ no___
12. Place the black & white skunk pillows on Table 3	yes___ no__
13. Place the tan cat pillows on Table 3	yes___ no___
14. Place the pink w/purple cat pillows on Table 3	yes___ no___
15. Place the tan, fuzzy poodle-dog pillows on Table 3	yes___ no___

Total Number of Opportunities: 15
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be placed upon their designated table or rack (upright, facing out, and/or stacked neatly) on table 1, table 2, table 3, and rack 1, and rack 2.
All items should be with like items; and in like groups – on their designated shelves.

Anecdotal Notes:

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E.17 Plastic Christmas Gift Bags Task # 13 – SM – (11-20-03)

Steps in Task Analysis	**Task Completion**
1. Place the candy-cane & mistletoe bags on Wall 1 – Row 1	yes___ no__
2. Place the Santa & Christmas Tree bags on Wall 1 – Row 1	yes___ no___
3. Place the kissing penguins & snowflakes bags on Wall 1 – Row 1	yes___ no___
4. Place the candy-cane & mistletoe bags on Wall 1 – Row 2	yes___ no___
5. Place the Santa & Christmas Tree bags on Wall 1 – Row 2	yes___ no___
6. Place the kissing penguins & snowflakes bags on Wall 1 – Row 2	yes___ no___
7. Place the Santa & Christmas Tree bags on Wall 1 – Row 3	yes___ no___
8. Place the candy-cane & mistletoe bags on Wall 1 – Row 3	yes___ no___
9. Place the red w/ tree & orange fruit on Wall 2 – Row 1	yes___ no___
10. Place the 2 snowmen/"Be Jolly" bags on Wall 2 – Row 1	yes___ no___
11. Place the Christmas wreath on orange bags on Wall 2 – Row 1	yes___ no___
12. Place the red w/ tree & orange fruit on Wall 2 – Row 2	yes___ no__
13. Place the 2 snowmen/"Be Jolly" bags on Wall 2 – Row 2	yes___ no___
14. Place the Christmas wreath on orange bags on Wall 2 – Row 2	yes___ no___
15. Place the red w/ tree & orange fruit on Wall 2 – Row 3	yes___ no___
16. Place the 2 snowmen/"Be Jolly" bags on Wall 2 – Row 3	yes___ no___
17. Place the kissing penguins & snowflakes bags on Wall 2 – Row 3	yes___ no___

Total Number of Opportunities: 17
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be placed upon their wall (wall 1 or wall 2); and their designated rows (rows 1, 2, & 3).
All items should be hung neatly, and aligned within their rows.
All items should be with like items; and in like color groups – on their designated racks.

Anecdotal Notes:

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E.18 Fuzzy Gloves Task # 14 – PDA – (11-20-03)

Steps in Task Analysis	**Task Completion**
1. Place the black fuzzy gloves on Wall 1 – Row 1	yes___ no__
2. Place the pink fuzzy gloves on Wall 1 – Row 1	yes___ no___
3. Place the purple fuzzy gloves on Wall 1 – Row 1	yes___ no___
4. Place the lime green fuzzy gloves on Wall 1 – Row 2	yes___ no___
5. Place the burgundy fuzzy gloves on Wall 1 – Row 2	yes___ no___
6. Place the black fuzzy gloves on Wall 1 – Row 2	yes___ no___
7. Place the white fuzzy gloves on Wall 2 – Row 1	yes___ no___
8. Place the turquoise fuzzy gloves on Wall 2 – Row 1	yes___ no___
9. Place the tan fuzzy gloves on Wall 2 – Row 1	yes___ no___
10. Place the black fuzzy gloves on Wall 2 – Row 2	yes___ no___
11. Place the pink fuzzy gloves on Wall 2 – Row 2	yes___ no___
12. Place the burgundy fuzzy gloves on Wall 2 – Row 2	yes___ no__
13. Place the black fuzzy gloves on Wall 3 – Row 1	yes___ no___
14. Place the burgundy fuzzy gloves on Wall 3 – Row 1	yes___ no___
15. Place the turquoise fuzzy gloves on Wall 3 – Row 1	yes___ no___
16. Place the lime green fuzzy gloves on Wall 3 – Row 2	yes___ no___
17. Place the purple fuzzy gloves on Wall 3 – Row 2	yes___ no___
18. Place the pink fuzzy gloves on Wall 3 – Row 2	yes___ no___

Total Number of Opportunities: 18
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be placed upon their wall (wall 1, 2, or 3); and upon their designated rows (rows 1 or 2).
All items should be hung neatly, and aligned within their rows.
All items should be with like items; and in like color groups – on their designated racks.

Anecdotal Notes:

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E.19 Men's Sweatshirts & Jackets Task # 15 – SM – (11-25-03)

Steps in Task Analysis	**Task Completion**
1. Place the black w/red lettering, Chaps – Ralph Lauren Sweatshirts on Rack 1	yes___ no__
2. Place the navy blue, w/ red & white lettering, Chaps - Ralph Lauren Sweatshirts on Rack 1	yes___ no___
3. Place the tan, Chaps – Ralph Lauren jacket w/zipper on Rack 2	yes___ no___
4. Place the black w/white lettering, Chaps – Ralph Lauren Sweatshirts on Rack 3	yes___ no___
5. Place the orange w/black lettering, Chaps – Ralph Lauren Sweatshirts on Rack 4	yes___ no___
6. Place the black w/red lettering, Chaps – Ralph Lauren Sweatshirts on Rack 5	yes___ no___
7. Place the gray w/black lettering, Chaps – Ralph Lauren Sweatshirts on Rack 5	yes___ no___
8. Place the red w/black lettering, Chaps – Ralph Lauren Sweatshirts on Rack 6	yes___ no___
9. Place the black Chaps – Ralph Lauren jacket w/zipper on Rack 7	yes___ no___
10. Place the orange w/white lettering and stripes, Chaps Ralph Lauren jackets w/zipper on Rack 7	yes___ no___
11. Place the yellow w/black lettering and stripes, Chaps Ralph Lauren jackets w/zipper on Rack 8	yes___ no___
12. Place the gray w/white navy print, chaps – Ralph Lauren Sweatshirts on Rack 8	yes___ no__
13. Place the gray w/white navy print, chaps – Ralph Lauren Sweatshirts on Rack 9	yes___ no___
14. Place the black w/red lettering, Chaps – Ralph Lauren Sweatshirts on Rack 10	yes___ no___
15. Place the red w/white and navy lettering, Chaps – Ralph Lauren Sweatshirts on Rack 11	yes___ no___
16. Place the gray w/collar & black print Chaps – Ralph Lauren Sweatshirts on Rack 12	yes___ no___

Total Number of Opportunities: 16
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be placed upon their designated racks (Racks 1 - 12).
All items should be hung neatly, and aligned within their rows/columns.
All items should be with like items; and in like color groups – on their designated racks.
All items should be facing out/forward so that the writing and/or lettering on them is clearly visable.

Anecdotal Notes:

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E.20 Men's T-Shirts Task # 16 – PDA – (11-25-03)

Steps in Task Analysis	**Task Completion**
1. Place the red t-shirts on Rack 1	yes___ no___
2. Place the white t-shirt w/Orange County Choppers New York on Rack 2	yes___ no___
3. Place the red t-shirt w/Orange County Choppers on Rack 3	yes___ no___
4. Place the black t-shirt w/Orange County Choppers on Rack 3	yes___ no___
5. Place the navy blue t-shirt w/Orange County Choppers on Rack 4	yes___ no___
6. Place the gray t-shirt w/blue skulls – D Lab on Rack 4	yes___ no___
7. Place the navy blue t-shirt w/American Choppers on Rack 5	yes___ no___
8. Place the green, long-sleeved, Sick Rick's Elf Tossing shirts on Rack 6	yes___ no___
9. Place the red, long-sleeved, 3 things I like about the holidays shirts on Rack 7	yes___ no___
10. Place the white Orange County Choppers t-shirts on Rack 8	yes___ no___
11. Place the green Gary's Grease Monkey Auto Services t-shirts on Rack 9	yes___ no___
12. Place the blue Birdbrain U Marauding Magpies t-shirts on Rack 9	yes___ no___
13. Place the black American Choppers t-shirts on Rack 10	yes___ no___
14. Place the black Orange County Choppers (silver) on Rack 10	yes___ no___
15. Place the white American Choppers t-shirt on Rack 11	yes___ no___

Total Number of Opportunities: 15
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be placed upon their designated racks (Racks 1 - 11).
All items should be hung neatly, and aligned within their rows/columns.
All items should be with like items; and in like color groups – on their designated racks.
All items should be facing out/forward so that the writing and/or lettering on them is clearly visible.

Anecdotal Notes:

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E.21 Christmas Ornament Task # 17 – PDA – (12-9-03)

Steps in Task Analysis	**Task Completion**
1. Place the silver, snowflake ornaments w/Christmas figure on hook 1	yes___ no___
2. Place the blue, snowflake ornaments w/Christmas figure on hook 1	yes___ no___
3. Place the Santa-face ornaments w/Christmas figure on hook 2	yes___ no___
4. Place the green ornaments w/Christmas figure on hook 3	yes___ no___
5. Place the snowman ornaments w/Christmas figure on hook 4	yes___ no___
6. Place the green, Christmas tree ornaments w/ Christmas figure on hook 5	yes___ no___
7. Place the snowman ornaments w/Christmas figure on hook 5	yes___ no___
8. Place the silver, bell ornaments w/Christmas figure on hook 6	yes___ no___
9. Place the white, dove ornaments w/Christmas figure on hook 7	yes___ no___
10. Place the silver, bell ornaments w/Christmas figure on hook 8	yes___ no___
11. Place the silver, star ornaments w/Christmas figure on hook 8	yes___ no___
12. Place the snowman ornaments w/Christmas figure on hook 9	yes___ no___
13. Place the red & green stocking ornaments w/Christmas figure on hook 9	yes___ no___
14. Place the white, angel ornaments w/Christmas figure on hook 10	yes___ no___
15. Place the Santa-face ornaments w/Christmas figure on hook 10	yes___ no___

Total Number of Opportunities: 15
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be placed upon their designated hooks (Racks 1 - 10).
All items should be hung neatly, and aligned within their rows.
All items should be with like items; and in like color groups – on their designated hooks.
All items should be facing out/forward so that they are clearly visible.

Anecdotal Notes:

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E.22 Towel Wall Task # 18 – SM – (12-9-03)

Steps in Task Analysis	**Task Completion**
1. Place the pink wash cloths on Row 3, Bin 1	yes___ no___
2. Place the lime green wash cloths on Row 3, Bin 2	yes___ no___
3. Place the blue wash cloths on Row 3, Bin 3	yes___ no___
4. Place the mauve wash cloths on Row 3, Bin 4	yes___ no___
5. Place the yellow wash cloths on Row 3, Bin 5	yes___ no___
6. Place the cream towels on Row 4, Bin 1	yes___ no___
7. Place the yellow towels on Row 4, Bin 2	yes___ no___
8. Place the white towels on Row 4, Bin 3	yes___ no___
9. Place the brown towels on Row 4, Bin 4	yes___ no___
10. Place the yellow towels on Row 4, Bin 5	yes___ no___
11. Place the cream towels on Row 5, Bin 1	yes___ no___
12. Place the yellow towels on Row 5, Bin 2	yes___ no___
13. Place the white towels on Row 5, Bin 3	yes___ no___
14. Place the brown towels on Row 5, Bin 4	yes___ no___
15. Place the yellow towels on Row 5, Bin 5	yes___ no___

Total Number of Opportunities: 15
Total Number of Correct: ____
_____% task completion accuracy

Criterion:

All items should be placed inside their designated Bins (Bins 1 - 5).
All items should be placed upon their designated rows (Rows 3-5).
All items should be with like items; and in like color groups – in their designated area.
All items should be folded neatly; and stacked neatly; the piles should be uniform.

Anecdotal Notes:

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