

DADD Online Journal

Research to Practice

Focusing on individuals with
autism, intellectual disability and other developmental disabilities

Volume 1 Number 1

DADD

December 2014

DADD ONLINE JOURNAL

*Journal of the Division on Autism and Developmental Disabilities
Council for Exceptional Children*

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The *DADD Online Journal* integrates research and practice, reflecting the need for evidence-based and practice informed strategies and interventions within this diverse field. Topics include: Autism Spectrum Disorder, Assistive & Adaptive Technology, Early Childhood, Intellectual Disability, Mental Health, Multiple Disabilities, Paraprofessionals, Employment, Post-Secondary, and Transitions.

DADD Online Journal (ISSN 2377-3677), Volume 1, Number 1, December 2014, Copyright 2014 by the Division on Autism and Developmental Disabilities, The Council for Exceptional Children, 2900 Crystal Drive, Suite 1000, Arlington, VA 22202-3557.

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VOLUME 1

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Research to Practice in Autism, Intellectual Disability, and Developmental Disabilities

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On January 21 – 23, 2014, the Council for Exceptional Children Division on Autism and Developmental Disabilities (DADD) sponsored its Fifteenth International Conference: Research to Practice in Autism, Intellectual Disability and Developmental Disabilities. The conference was held at the Sheraton Sand Key Resort in Clearwater, Florida. The DADD Board of Directors decided to devote this issue of the *DADD Online Journal* to conference papers. The conference brought together educators from school and college classrooms from all over the world. The conference included pre-conference training institutes and strands on assistive and adaptive technology, autism spectrum disorder, intellectual disability, mental health, paraprofessionals, parental engagement, post-secondary transitions, and multiple disabilities. The conference provided many parents, teacher educators, researchers, teachers, and other practitioners an opportunity to gather to learn the most current information related to providing services for individuals with autism, intellectual disability, and developmental disabilities.

This issue of the *DADD Online Journal* can enable those who attended the conference to see expanded papers, prepared by presenters, and also give those who were unable to attend an opportunity to benefit from the thoughtful

work done by conference participants. Presenters were asked to submit papers based on their conference presentations. Papers submitted went under a blind review process by the Guest Editors who selected the papers for publication. We think the selection of papers represents an interesting assortment of topics and formats ranging from discussion papers to data based research to descriptions of classroom techniques. The papers selected do not necessarily represent all the topics covered at the conference but they do give a good idea of the variety and quality of the presentations. We would like to thank those authors who submitted papers for their efforts in making this issue of the *DADD Online Journal* possible.

As the number of students identified with Autism Spectrum Disorders (ASD) increases, researchers are working on identifying the most effective practices. In the first article, Elizabeth A. West, Lisa Liberty, Angi Stone-MacDonald, and Pei-Yu Chen note in, “An Examination of Participant Characteristics in Empirical Studies used to Classify Naturalistic Intervention as an Evidence-Based Practice for Learners with Autism Spectrum Disorders,” that in the past decade, there has been a strong focus on implementing evidence-based practices (EBP) to address the diverse needs of learners with

ASD. While there has not been complete alignment with regard to which specific practices are universally considered to be evidence-based, a general consensus has been reached for the majority of common practices used when supporting students with ASD. Naturalistic intervention (NI) is a frequently used practice for learners with ASD; NI includes such practices as environmental arrangement, interaction techniques, and strategies based on applied behavior analysis principles. These practices are designed to encourage specific target behaviors based on learners' interests by building more complex skills that are naturally reinforcing and appropriate to the interaction. NI occurs within typical settings, activities, and/or routines in which the learner participates. Naturalistic intervention meets the evidence-base criteria with 10 single case design studies, demonstrating its effectiveness for promoting communication and social skills for learners with disabilities. However, the research approach to establishing EBPs does not contain adequate samples of ethnic and cultural minorities. The authors maintain there is a need to ensure culturally and linguistically diverse (CLD) participants are involved in research studies and certain characteristics (i.e., language, culture, immigration status, level of acculturation) are sufficiently described. In this article, the authors highlight culturally responsive teaching elements that can be used as a guide when selecting and implementing interventions for CLD students. The article concludes with a description of the role that qualitative research can provide in establishing evidence-based practices.

Recent research supports the premise that students with severe disabilities can increase their understanding of science and the process

of learning beyond basic vocabulary and daily living skills through an inquiry-based instructional approach. In the next article, Leah Wood and Caryn Allison present a research-based, 14-step task analysis for teaching inquiry-based science in, "Teaching Science Comprehension to Students with Severe Disabilities." The article describes how the TA can allow teachers to provide students with severe disabilities the supports necessary to engage with science content while promoting students' ability to wonder. In addition to learning vocabulary and concepts, students can also engage in the scientific process by asking questions, making predictions, and evaluating results. The authors report that systematic instruction such as constant time delay and a system of least prompts can be used to teach comprehension of science texts; and technology can be used as a comprehension tool, and a means of increasing access to science content.

This next study fills a gap in the literature on the simultaneous teaching of both functional life skills and academics. In the article "Teaching Literacy with Functional Skills to Students with Significant Intellectual Disability," Karena Cooper-Duffy, Glenda Hyer, and Phil Sisk point out that many teachers of students with intellectual disability are currently struggling with what to teach. States and other lawmakers and administrators are pushing them to teach the Common Core, while parents, the community, and other educators continue to push for instruction in functional life skills. The authors asked the question, "How can special educators meet the true educational needs of students with significant intellectual disability, both the need for functional skills and access to the CCSS?" Can we blend what

we know works to teach both?” In the study, three children, ages 6-8 with significant intellectual disability were simultaneously taught literacy skills as well as hand washing skills using a system of least prompts and time delay. A multiple baseline across subjects was used to demonstrate a functional relation between the dependent variables of following the task analysis for both the story and hand washing and the intervention using three books about hand washing. Results demonstrated improvement for all three children, though only two were able to demonstrate increased independent following of the task analysis for both story and hand washing across all three books. The authors suggest that teachers who are being asked to focus their instruction primarily on academics, may be able to teach functional skills within the context of those academics. They also note several areas of exploration beyond the current study, and make suggestions for future research in the area of combined functional and academic instruction for students with intellectual disability.

Many studies on effective interventions in ASD have centered on video modeling (VM) and video self-modeling (VSM) to teach a variety of skills. While considerable literature exists on VM/VSM to address the social communication, functional, vocational, and behavioral needs of this population, studies targeting academic skills in general education classrooms, where students with ASD are often educated, have only recently emerged. In their article titled, “Video Self-Modeling Via iPad Minis to Promote Sustained Attention of a Student with High-Functioning Autism in General Education,” Juliet E. Hart Barnett, Cean R. Colcord, and Stanley H. Zucker present the findings of a study that examined the impact of VSM, delivered using

video iPad minis, on the sustained attention of a student with high-functioning ASD during general classroom instruction. The authors report that results indicated positive treatment effects, with the participant increasing attending and on-task behaviors during the VSM intervention and maintaining these behaviors.

Video-based instruction is emerging as an effective instructional technique. Video modeling is an instructional approach that involves having learners view videos of an entire skill sequence or situation prior to engaging in the demonstrated skill or activity. It has been used effectively for improving vocational skills of individuals with Autism Spectrum Disorders and/or Developmental Disabilities in employment settings. In the next article, “Comparison of Video Modeling and Video Feedback to Increase Employment-Related Social Skills of Learners with Developmental Disabilities,” authors Toni Van Laarhoven, Danielle Kos, Kim Pehlke, Jesse W. Johnson, and Ximena Burgin compared the effectiveness of video modeling and video feedback on independent correct responding of vocational tasks and use of appropriate employment-related social skills of four young adults with autism and/or developmental disabilities. The video modeling condition involved showing positive examples of the complete task with embedded appropriate social skills on an iPad prior to work. The video feedback condition involved video recording learners with an iPad while they worked and asking them to evaluate their own performance by reviewing the videos. All participants had an in-school job of delivering passes to teachers throughout the building. Data were analyzed within the context of a multiple treatments with reversal design and results indicated that

although both conditions resulted in improved independent correct responding and use of targeted social skills, three of the four participants demonstrated more substantial gains with the video feedback condition while the fourth demonstrated similar results across conditions and improved performance with video feedback only after the video modeling condition was presented. Thus, video modeling and video feedback appeared to be effective for improving task-related skills and social skills associated with the school-based job of delivering passes.

In the article, “Using a Photographic Electronic Activity Schedule to Decrease Latency in Transition Time for a Nine-Year-Old Girl with Autism Spectrum Disorder,” Carmen Hall, Kimberly Maich, and Aislynn Hatt capitalized on the increased and popular use of iPad applications with children with autism by examining the effects of the app, Routinely, for transitions. The authors note that use of iPads, while a growing trend in education, is in its infancy in terms of research. The goal of the current study was to decrease latency, decrease prompts, and increase independent following the transition schedule of a nine year old girl with autism spectrum disorder, in Ontario Canada. An ABAB design was used to demonstrate a functional relation between the use of the iPad app and the dependent variables. Though latency and prompt level failed to reverse following the removal of baseline, both demonstrated a decrease over the course of the study. The child’s independent following of the transition schedule increased across the study and demonstrated a reversal with the removal of the intervention, returning again after it was reintroduced. The study authors recognize that much of the literature on the use of specific iPad apps is limited to case

study and anecdote, and that more research in this area is necessary. This study provides a nice addition to this limited literature base by demonstrating the potential use of an iPad app as a visual schedule for a child with autism spectrum disorder.

The development of a short, standardized benchmark assessment tool is one strategy that may improve the implementation of EPB practice for students with ASD. In this article, “Development of a Standardized Benchmark Assessment Tool to Facilitate EBP for Students with ASD,” the authors describe the development of the Evidence Based Practice Classroom Checklist (EBP CC) to support administrators, school leaders, and educators in collaborative implementation of evidence-based practices for students with autism spectrum disorder (ASD). Authors Christina R. Carnahan, K. Alisa Lowrey, and Kate Snyder describe a series of studies related to the EBP CC that occurred in three phases across two states. Results indicated the EBP CC was a valid tool that represented the foundational practices necessary for students with ASD and also indicated reliability in measuring evidence based practices used in classrooms. Additionally, administrators found such a tool important and necessary.

Increasingly, young adults with autism spectrum disorders (ASD) are applying and being admitted to colleges and universities; the literature suggests that this is due to a variety of factors, including an increase in diagnosis, implementation of early interventions, inclusion-based classrooms and legislative mandates. In their article, “Evaluation of a Biofeedback Intervention in College Students Diagnosed with an Autism Spectrum Disorder,” Kathleen M. McCoy,

Garret Westlake, Stanley H. Zucker, and Samuel A. DiGangi state that colleges and universities are faced with multiple challenges when attempting to design accommodations for individuals with autism. In addition to unique sensory, organizational and social challenges, students with ASD are at an increased risk for comorbid conditions such as depression and anxiety. Individuals with ASD are therefore at greater risk for anxiety and are more vulnerable to the stresses associated with college life than the general population; additionally many individuals with ASD have poor psychological resilience. Biofeedback has become increasingly popular as a means of reducing stress; biofeedback has proven successful as an operant conditioning intervention with young children and adolescents. The purpose of this study was to determine if biofeedback could be used as a possible accommodation for individuals with autism who are attending an institution of higher education (IHE). Of interest is that this study revealed several trends that provide a basis for continued research in the area of biofeedback as a means of accommodation for individuals with autism in postsecondary IHE settings. The authors conclude with a discussion on how this information relates to new insights in guidance and treatment options for educators and professionals who provide accommodations for individuals with autism in postsecondary education institutions.

The needs of families of children with intellectual disability, while changing over time, reflect their overall quality of life, and are dependent on family participation in available services. In the next article, “Effectiveness of Online Information and Support Services on the Education of Parents

of Children with Intellectual Disability,” Atilla Cavkaytar, Esra Ceyhan, Oktay C. Adiguzel, and Hakan Uysal endeavored to determine if an online method of providing specialist support would improve specific areas of family well-being. The specific areas targeted were knowledge levels about the disability, personal self-efficacy, perception of information support, perceptions of quality of family life, and perceived social support. The authors developed the online Family Information and Support Education Program (E-FISEP) to address the needs of families of children with intellectual disability in Turkey. Forty-five parents participated in the experimental group, and another 45 parents served as the control group. The researchers used a pre-post test method to determine if significant differences existed between the two groups following treatment (for the experimental group only), which involved instruction through the E-FISEP program. Results from the ANOVA analysis demonstrated significant differences in parents’ knowledge levels about the disability, their perceptions of self-efficacy, and their perceptions about information support. However, no significant differences were found for perception of quality of family life, perceptions of social support, or satisfaction from perceived social support. The authors note that the study demonstrates promise in the use of online instruction to meet the needs of families with children with intellectual disability, and make recommendations for future research as well as future online instructional modules.

Functional life skills and/or general education curriculum? In the current literature and in the classroom there is a lively discussion occurring regarding functional life skills curriculum development for students with

moderate and severe developmental disabilities who are accessing the general education curriculum. In their article, “The Revised Life Centered Career Education Curriculum Program for Students with Autism Spectrum Disorders and Developmental Disabilities,” Robert Loyd and Rachel Angus provide an historical review of special education curriculum development for individuals with moderate to severe developmental disabilities and argue a case for blending functional life skills with general standards-based curricula. Additionally, the authors discuss how the Life Centered Career Education Curriculum Program for Students with Autism Spectrum Disorders and Developmental Disabilities, originally developed in 1996 and revised in 2014, can be blended into the general education curriculum. The article includes a detailed section on the LCCE ASD & DD Curriculum Guide and how practitioners may use the life skills curriculum framework. The authors note that this functional life skills curriculum fully supports federal legislation that requires students with significant disabilities to be a part of the systemic accountability measures of the No Child Left Behind as well as to be involved in the general education curriculum.

In the final article, “Creating Circles of Natural Social Supports: Impact on Adult with Autism Spectrum Disorder’s Quality of Life,” L. Lynn Stansberry Brusnahan discusses the importance of planning and providing for supports of individuals with autism spectrum disorders (ASD), throughout the life span. Social intervention and support

is necessary as ASD is a complex neurodevelopmental disability and this becomes a crucial consideration as students with ASD become young adults. One means through which social participation and quality of life for adults with ASD appear to be facilitated is through informal support from social networks. This article presents the findings of a retrospective case study investigation into the frequency and maintenance of natural social supports and participation in a Circle of Supports created in childhood for an individual with ASD. Findings indicated that the implementation of a Circle of Supports increased the levels and number of social relationships in childhood giving the subject increased access to opportunities for social participation and the development of social skills. Even after the subject completed school, the social relationships that were developed in childhood and the levels of natural supports were maintained while the number of paid supports decreased. It is suggested that natural social supports can contribute to the development of effective interventions targeting quality of life for individuals with ASD.

The conference provided researchers and educators with the opportunity to explore current research, topical issues, and best practices relating to autism, intellectual disability, and development disabilities. We hope readers of this research to practice issue of the *DADD Online Journal* find the information valuable and timely.

An Examination of Participant Characteristics in Empirical Studies used to Classify Naturalistic Intervention as an Evidence-Based Practice for Learners with Autism Spectrum Disorders

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Abstract: Naturalistic intervention meets the evidence-base criteria with 10 single case design studies, demonstrating its effectiveness for promoting communication and social skills for learners with disabilities. The research approach to establishing EBPs does not contain adequate samples of ethnic and cultural minorities. There are obvious methodological and practical limitations to the solution of conducting research with all diverse groups. As a consequence, the findings of these studies may not be applicable to diverse groups who are not included as participants in the studies. There is a need to ensure CLD participants are involved in research studies and certain characteristics (i.e., language, culture, immigration status, level of acculturation) are sufficiently described. Given the rising numbers of CLD students in our classrooms there is a critical need for teachers to select interventions that are a good match for these students and their families. We highlight culturally responsive teaching elements that can be used as a guide when selecting and implementing interventions for CLD students. Last, we detail the role that qualitative research can provide in establishing evidence-based practices.

In the past decade, there has been a strong focus on implementing evidence-based practices (EBP) to address the needs of learners with Autism Spectrum Disorders (ASD). The continued increase in number of students identified with ASD necessitates that researchers work to identify the most effective practices. The term evidence-based practice has been adopted to refer to specific practices that have been shown to be effective through rigorous and replicated research studies (Odom et al., 2005). While there has not been complete alignment with regard to which specific practices are universally considered to be evidence-based, a general consensus has been reached for the majority

of common practices used when supporting students with ASD (Council for Exceptional Children, 2008; National Autism Center, 2009; Wong et al., 2013). However, a gap persists between practices research has demonstrated to be effective and those being implemented regularly in special education contexts across the country (Cook & Odom, 2013; Cook, Tankersley, Cook, & Landrum, 2008; Greenwood & Abbott, 2001; Klingner & Boardman, 2011; Smith, Schmidt, Edelen-Smith, & Cook, 2013).

One barrier that may contribute to the current gap between research and practice in the field of special education can be identified in the

highly variable population of students with special needs. One area of variability can be related to the cultural and linguistic diversity of students and research has yet to properly address these differences, instead practices are disseminated as a “one size fits all” approach (Klingner & Boardman, 2011). It is common for researchers to make overgeneralizations with regard to their findings by suggesting that their research applies to students who were not represented by the pool of participants. Artiles, Trent and Kuan (1997) conducted a comprehensive review of 22 years of special education research and found few published articles that addressed the issue of diversity among students and the ways in which these differences might impact student outcomes.

Naturalistic intervention (NI) is a frequently used practice for learners with ASD and the National Professional Development Center on Autism Spectrum Disorders (NPDC) includes NI as one of the 27 EBPs. NI includes such practices as environmental arrangement, interaction techniques, and strategies based on applied behavior analysis principles. These practices are designed to encourage specific target behaviors based on learners’ interests by building more complex skills that are naturally reinforcing and appropriate to the interaction. Naturalistic intervention occurs within typical settings, activities, and/or routines in which the learner participates. NI meets the evidence-based criteria with 10 single case design studies and has been effective for toddlers (0-2 years) to elementary school-age learners (6-15 years) diagnosed with ASD. NI has been used effectively to address social, communication, behavior, joint attention, play, and academic skills (Wong et al., 2013).

The extent to which NI has been applied to and adapted for individuals who are culturally and linguistically diverse (CLD) has not been thoroughly researched. As a consequence, the findings of these studies may not be applicable to ethnic and cultural groups who are not included as participants in the studies. Thus, the question still remains, “what works” and “for whom” (Cunningham & Fitzgerald, 1996). Answering this and related questions will only lead to generating effective interventions for those who historically have been marginalized in many ways, especially students with ASD who are also CLD.

Cultural and Linguistic Diversity

To address the needs of CLD students with disabilities, we must first understand the definition of CLD. CLD refers to “behavioral, value, linguistic, and other differences ascribed to people’s cultural backgrounds. Cultural diversity almost invariably includes some level of diversity in how language is understood and used... {the terms} cultural diversity and cultural linguistic diversity {are often used} synonymously” (Barrera, Corso, & Macpherson, 2003). The challenges of accessing interventions can be heightened for CLD families that have recently arrived to the United States given the additional psychological, social and economic costs of immigration (Welterlin & LaRue, 2007). This impact can be significant for those diverse families who also have a child with an ASD diagnosis.

The National Research Council (2001) has acknowledged the limited amount of research focused on the experiences of immigrant families who have children with the label of ASD and for CLD families who have resided in the United States for a longer time. The

elements of effective intervention programs related to EBPs for learners with ASD and for learners who are CLD seem to have different focuses. For learners with ASD, the intervention programs are individualized to meet the unique needs of each student with ASD. For learners who are CLD, the intervention programs address components related to English Language Learning (ELL) and multicultural education.

CLD students are generally considered to be a minority group, however, research has shown that students identified as CLD represent an ever increasing percentage of the U.S. student population, with English Language Learners (ELLs) comprising the fastest growing subgroup (Genesee, Lindholm-Leary, Saunders, & Christian, 2006). Because the number of ethnic and racial children now constitutes the numeric majority (U.S. Census, 2012), there is an urgency to increase our efforts at identifying interventions that work for these populations. For the first time in its history, half (49.9%) of American children under the age of five are of a non-White racial or ethnic minority group, according to the 2012 U.S. Census Bureau estimates. In addition to the increasing percentage of CLD learners, the diversity issues in education become more complicated as a result of different levels of acculturation among CLD learners. These data highlight the importance of developing and providing services that are appropriate for CLD students who will likely comprise most of student population in the near future. However, little

is known about how CLD families access services and whether these services are responsive to different cultures (Artiles & Ortiz, 2002; Welterlin & LaRue, 2007).

Participant Characteristics of Studies Used to Classify NI as an EBP

In 2010, the NPDC conducted a review of the literature (from 1997-2007) and identified 24 EBPs. The center has completed an expanded and updated review, which yielded a total of 27 practices (Wong et al., 2013). In 2010, NI was identified to have established evidence as an EBP with eight single-subject and two randomized group design studies meeting criteria. The most recent update in 2014 identifies ten single-subject studies that meet criteria as an EBP. One study from the 2010 review (Koegel, Camarata, Koegel, Ben-Tall, & Smith, 1998) met criteria as an EBP in 2014. Participant characteristics from both NPDC reviews (2010 and 2014) were analyzed which resulted in 20 studies. Specifics on these studies are provided below.

Participants. A total of 110 children participated in these studies. The 2010 review identified 37 males and 2 females. The 2014 review identified 30 males and 5 females. One study (Yoder & Stone, 2006) did not report the gender of their participants ($n = 36$). Table 1 provides an overview of the characteristics of participants from the 2010 and 2014 Reports.

Table 1. Review of EBP Participant Characteristics

	2010 Review	2014 Review
Gender		
Male	37	30
Female	2	5
Not Reported	36	--
Total	75	35
Age		
Mean	6.61	4.3
Standard Deviation (SD)	2.59	1.1
Range	2.10 to 15	1.8 to 4.5
Diagnosis		
Autism	75	35
Pervasive Developmental Disorder	--	10
Severe Delay & Expressive Language	3	--
Mental Retardation	1	--
Ethnicity		
Caucasian	25	3
European American	4	4
Asian	1	1
African American	8	--
Other	3	--

Age. The mean age range of participants from the 2010 EBP review was $x = 6.61$, $SD = 2.59$, with a range of 2.10 to 15 years. One study (Yoder & Stone, 2006) reported only the mean age ($x = 33.6$) and standard deviation ($SD = 8.4$) of participants, ages ranged from 1.8 to 4.5 years. The mean age range of participants from the 2014 EBP review was $x = 4.3$, $SD = 1.1$, with a range in age from 2.4 to 7.6 years. One study, (Seiverling, Pantelides, Ruiz, & Sturmey, 2010) reported only the age range of their participants (40 to 49 months).

Diagnosis. All participants had a primary diagnosis of ASD. The 2014 report identified 10 children as having a diagnosis of either Pervasive Developmental Disorder (PDD) or Autism; however they did not specify the exact number of children with either diagnosis. McGee, Krantz, and McClannahan (1985) reported 3 children as having a primary diagnosis of Autism and a secondary diagnosis of severe language delay. Hamilton and Snell (1993) reported on one child who had a primary diagnosis of Autism and intellectual disability.

Outcomes. Researchers primarily focused on outcomes associated with the core symptoms of ASD: social, communication, and challenging behaviors. Additionally a few studies focused on joint attention, play, and academics. Table 2 provides the outcome data for all studies. The majority of the studies had

more the one outcome measure included in their studies. However, it is important to note that the number of outcomes included in each intervention is not associated with the potency of the interventions.

Table 2. Number of Studies by Outcome Measures

Number of studies by outcome						
Age	Social	Communication	Behavior	Joint Attention	Play	Academic
0 to 4 yrs	2	9	1	1		
5 to 10 yrs	1	8		1	1	1
10 to 15 yrs		4				

Ethnicity. Three studies (Koegel et al., 1998; Olive et al., 2007; Yoder et al., 2006) reported the ethnicity or language of their participants. In the Koegel et al study (1998) four participants were European American and one participant was Asian and all spoke English. Yoder and colleagues (2006) also included the ethnicity of their participants, reporting that 25 children were Caucasian, eight children were African American, and three children were ‘other.’ The researchers reported participants were excluded if their primary language was not English. This study was included in the 2010 EBP report; however, it did not qualify for the 2014 report. The study conducted by Olive et al., (2007) reported three of the participants as being Caucasian.

In summary, only 15% of the studies (3 of the 20) used to classify NI as an EBP included

information related to participants’ race/ethnicity. In addition, 45% of all participants had race/ethnicity identified (49 of the 110). Of those studies that did cite race/ethnicity 36 reported Caucasian or European American and only 13 identified as being Asian, African American or other. Furthermore, children were excluded from one study if their primary language was not English.

Clearly, there is a need to include diverse participants and to report on the race/ethnicity of participants in research. Additionally, researchers must consider culturally responsive interventions for CLD learners with ASD as most research has been conducted with White (i.e., Caucasian or European American) participants, which may not be the best intervention for CLD students with ASD.

A framework is provided below for conducting research on CLD students diagnosed with ASD to ensure that EBPs include factors that are thought to be culturally responsive. This incorporates the role of qualitative research.

Culturally Responsive Considerations for CLD Students with ASD

To date, critical intervention elements for learners with ASD are identified from empirical studies that document various aspects of effective interventions. The common core elements of an intervention program for learners with ASD include: (a) involving families in their child's education, (b) providing a structured environment and systematic instruction, and (c) treating all aspects of ASD, especially focusing on communication and social training (Dawson & Osterling, 1997; Hurth et al., 1999; NRC, 2001; Iovannone, Dunlap, Huber, & Kincaid, 2003; Schwartz & Davis, 2008). Additional program elements, such as program intensity, staff training, and opportunities for integration are addressed to various extents by researchers. While cultural and linguistic variations are not directly addressed in these elements, the wide range of program elements indicates that no single method or one composition of program components could exclusively meet the various needs of all learners with ASD. As proposed by Heflin and Simpson (1998), "the most effective programs for autism are those that incorporate a variety of best practices, including careful evaluation of the effects of various methods" (p. 207). Hence, the cultural contexts of learners with ASD should be a key aspect to consider as researchers establish EBP's. Best practices for CLD learners are not only determined by the effect of the

interventions but also by the extent to which the intervention is culturally responsive.

Evidence-based practices must be promoted and adopted that rely on culturally responsive practices which are tailored to specific cultural contexts. This would require researchers to adopt a framework where EBP for learners with ASD are examined in light of their cultural context. To accomplish this task, we have adapted the elements discussed by Wilder, Dyches, Obiakor, and Algozzine (2004) and propose a framework to ensure that EBPs are examined relevant to factors that are thought to be culturally responsive.

This framework contains five culturally responsive teaching elements (see Table 3) and serves as a guide for researchers to examine the extent to which established EBPs are culturally responsive for those learners who are CLD and also have an ASD diagnosis. According to Gay (2002), culturally responsive teaching for CLD students includes "developing a knowledge base about cultural diversity, including ethnic and cultural diversity content in the curriculum, demonstrating caring and building learning communities, communicating with ethnically diverse students, and responding to ethnic diversity in the delivery of instruction" (p.106). Researchers can use these elements and associated indicators to attend to and incorporate participants' cultural characteristics and experiences while establishing interventions that are EBPs. This framework is in its infancy but holds promise for researchers as an approach to consider when selecting and implementing interventions.

Table 3. Culturally Responsive Teaching Elements for CLD Learners with ASD

Elements	Definition	Reference
Involving Family	<ol style="list-style-type: none"> (1) Supporting families to implement interventions at home to ensure maintenance and generalization of learned skills (2) Considering contextual and cultural characteristics of the family (3) Providing families who have learners with ASD socio-emotional supports (4) Exploring best ways to communicate with families (e.g., letters in parents' native language or including translator during conference) (5) Incorporating families to help identify important language and skills as educational goals and objectives 	<p>Handleman & Harris (2008); Powers (1992); Jamieson (2004)</p> <p>Iovannone et al. (2003); Schwartz & Davis (2008)</p> <p>Westlake & Kaiser (1991)</p> <p>Vaughn et al. (2011)</p> <p>Wilder et al. (2004)</p>
Arranging Structured Environment	<ol style="list-style-type: none"> (1) Providing predictable and comprehensible activities for learners with ASD (2) Facilitating individualized learning and preventing problem behaviors (e.g., clearly defining learning areas in a classroom) (3) Providing visual support (e.g., classwide and individual schedules) 	<p>Iovannone et al. (2003)</p> <p>Schwartz & Davis (2008)</p>
Providing Systematic Instruction	<ol style="list-style-type: none"> (1) Involving a cycle of assessment, teaching, reassessment, modification, and teaching (2) Incorporating students' interests into instruction (3) Designing various activities (4) Providing supports based on individual ability (5) Applying instructional strategies that address individual needs (6) Integrating students' native language and dialect, culture, and community into classroom or instructional session 	<p>Grisham-Brown et al. (2005); Dawson & Osterling (1997);</p> <p>Handleman & Harris (2008); Iovannone et al. (2003); Schwartz et al. (1998); Vaughn et al. (2011); Wilder et al. (2004)</p>
Treating All Aspects of ASD	<ol style="list-style-type: none"> (1) Applying proactive positive behavioral supports to manage behaviors (2) Teaching and applying multiple communication strategies, including functional and cultural-specific language (3) Enhancing social competence (4) Providing ESL services if necessary and interventions that improve communication 	<p>NRC (2001); Schwartz & Davis (2008)</p> <p>Dawson & Osterling (1997); Iovannone et al. (2003); Wilder et al. (2004); Handleman & Harris (2008); Vaughn et al. (2011); Wilder et al. (2004)</p>

Setting Up High Expectations	(1) Using curriculum and teaching strategies that promote coherence, relevance, progression, and continuity	Wilder et al. (2004)
	(2) Teaching higher-order thinking	Vaughn et al. (2011)

Another approach to consider is the role of qualitative research in establishing the evidence-base of a practice for learners who are CLD and have been diagnosed with ASD.

The Role of Qualitative Research in Evidence-Based Practices

Qualitative research methods have been embraced in other fields such as medicine, nursing, mental health, and social work to help bridge the gap between scientific evidence and clinical practice (Anthony, Rogers, & Farkas, 2003; Goldberg, 2006; Green & Britten, 1998; Lundgren, Amodeo, Cohen, Chassler, & Horowitz, 2011; Melnyk & Fineout-Overholt, 2011).

Odom et al. (2005) promotes the use of qualitative research to (a) substantiate promising practices, (b) understand the implementation of evidence-based practices, and (c) determine how and why evidence-based practices work for certain children or groups and not well for others. Narratives and stories are helpful methods that can be used to disseminate and diffuse research findings (Steiner, 2007). Such tools provide support and promote the trustworthiness and effectiveness of EBPs (Steiner). It is clear that qualitative research methods can provide a picture of the intervention experience of children and families with ASD from CLD backgrounds and contributes to our understanding around the daily life experiences for teachers and CLD families with ASD. Using these methods allows

researchers to understand why interventions are successful or unsuccessful across implementers, participants, situations, cultures, and time.

Researchers suggest data gathered from qualitative research methods can be used to support and explain the implementation of EBPs (Cook, Cook, & Landrum; 2013). Such data allows us to look at the student and context from a holistic perspective using narrative stories in order to understand the real life contexts and factors that impact the CLD students with ASD. Green and Britten (1998) offer some guidance around how to use qualitative methods to understand the implementation of EBPs. Thus, we provide some examples of questions that include elements of culturally responsive teaching that researchers might ask families to establish whether an EBP is effective for a CLD student with ASD:

1. How does the intervention support families' implementation of the intervention at home to ensure maintenance and generalization of learned skills?
2. How do teachers, parents, and students incorporate students' interests into instruction?
3. How does the teacher apply multiple communication strategies, including functional and cultural-specific language throughout the intervention?

4. How does the interventionist provide predictable and comprehensible activities for learners with ASD?
5. How does the EBP look different in more natural contexts, with children or families from different cultures, or when implemented in another language or when the language of the teacher and the student do not match?

Upon gathering such information a family would provide about the EBP, researchers could use qualitative research methods to analyze the effectiveness of an EBP for the present population. Having narrative data would document specific aspects of the intervention that worked for this population of students and the extent to which the intervention is culturally responsive to the individual family. Furthermore, researchers would be able to understand (a) the involvement of CLD families with their child's education, (b) types of environments/instruction that provided positive outcomes for CLD students with ASD, and (c) specific cultural and communication language strategies for CLD students with ASD. Using a culturally responsive framework that incorporates qualitative research methods has the potential to move the field forward when determining which evidence-based practices are applicable to ethnic and cultural groups who are currently not included as participants in EBP research.

Discussion

This review of research has implications for our work with diverse populations and for how we design and conduct research. Too often we pay attention to the disability of ASD without any thought to the cultural

context within which it occurs. We must use science to improve education for ALL children; not just for some of the children. Different methodologies are important for addressing different questions. Clearly, research on ASD and CLD is in its infancy and pilot work is emerging. We must progress to the next step and begin to focus on the development of experiments to prove effectiveness of an intervention in naturalistic settings. As we focus on finding evidence for "what works" it is critical to find out what works with whom (Cunningham & Fitzgerald, 1996).

There are many sociocultural and language implications of autism, especially given the symptoms of autism include difficulties with social interactions and problems in language development and understanding. These characteristics, coupled with a cultural and linguistic profile, which differs from the mainstream, may marginalize those learners who are CLD and have an ASD diagnosis. Additionally, sociocultural factors are important for learning and teaching methods must be used that meet the needs of CLD students with autism.

To meet the needs of an increasingly heterogeneous society, it is imperative that professionals be prepared to respond effectively to families and children from varying cultural and linguistic backgrounds. If service providers and related professionals fail to understand the role that culture plays on the construction of disability and social development, the risk of impeding the success of children from cultural orientations different from our own remains.

Current school practices and the normative curriculum are responsive to the dominant

culture in society, yet they are generally not responsive to communities whose cultural practices differ from mainstream culture (Ladson & Billings, 1995). Cultural issues require us to adopt the “posture of cultural reciprocity” as suggested by Kalyanpur and Harry (1997). Using this posture suggests that both parties involved in the interactions respect, listen, and learn about each other’s cultural identity and model. The result can be successful outcomes that are valued by all and mirror family values in culturally responsive ways. Using the process presented in this article for evaluating the effectiveness of an intervention for CLD learners with ASD may be a start.

Conclusion

Professionals who work with learners who have the label of ASD and are also CLD should be very concerned about the paucity of research around EBP. The typical research approach to establishing EBPs does not report containing adequate samples of ethnic and cultural minorities. There are obvious methodological and practical limitations to the solution of conducting research with all ethnically and culturally diverse groups. A compromise between reliance on the general applicability of an EBP across diverse ethnic and cultural groups and promotion of culturally specific practices will need to be reached. CLD children with autism are challenged on many levels and must receive equitable services and culturally responsive resources at every stage – from identification to assessment and intervention. Confidence in

the effectiveness of an EBP assumes that the practice is being used to achieve outcomes for which the practice was designed, and with individuals who are similar to those who were participants in the practice’s effectiveness research. Cultural and linguistic differences between the research sample and other groups may jeopardize the effectiveness of practice.

We present a framework and a process to assist in examining EBPs across culturally responsive teaching elements for CLD learners with ASD. It is our belief that attention to this will improve outcomes for those learners who are CLD and have a label of ASD, a growing population.

A first step toward EBP is creating awareness of what the best available research says. It is no longer enough to use what we believe works, we must consider what we know works in order to close the gap between science and practice, utilize limited resources wisely, and best serve CLD children who have ASD. Clearly, research for this population is still at the “what we believe works” stage. The goal of multicultural education is to change the structure of schools so that students, including those diagnosed with ASD from different cultural groups have an equal chance to achieve success in schools. It is imperative that we generate a solid evidence-base of interventions to positively influence outcomes for these individuals.

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Teaching Science Comprehension to Students with Severe Disabilities

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Abstract: Students with severe disabilities can increase their understanding of science and the process of learning beyond basic vocabulary and daily living skills through an inquiry-based instructional approach. A research-based, 14-step task analysis for teaching inquiry-based science can allow teachers to provide students with severe disabilities the supports necessary to engage with science content while promoting students' ability to wonder. Through this approach, students are taught to actively consider the world around them. In addition to learning vocabulary and concepts, students can also engage in the scientific process by asking questions, making predictions, and evaluating results. Additionally, research suggests that systematic instruction such as constant time delay and a system of least prompts can be used to teach comprehension of science texts. Technology can be used as a comprehension tool, and also a means of increasing access to science content. Through this approach, teachers can promote students' understanding of the scientific world while simultaneously promoting active engagement in the learning process.

When *A Nation at Risk* was published by the National Commission on Excellence in Education in 1983, an educational shift occurred that emphasized the importance of science education. Since then, the field has sought further understanding of both the content and processes necessary for fostering scientific skills in educational contexts. Recently, the Committee on a Conceptual Framework for New K-12 Science Education Standards comprised a framework that articulates the scientific skills and processes that are intended to: (a) promote appreciation for scientific content, (b) teach essential job skills, (c) build understanding of the field of science across scientific domains, and (d) help students become critical consumers of

scientific information (National Research Council, 2013).

The three primary dimensions of scientific learning, as defined by the Committee on a Conceptual Framework for New K-12 Science Education Standards, include (a) scientific and engineering practices (i.e., “practices”); (b) scientific concepts that are applicable across other fields (i.e., “crosscutting concepts”); and (c) core knowledge across scientific content areas (i.e., “content”). The eight identified practices include skills such as asking scientific questions, analyzing and interpreting data, and communicating information. Examples of the seven crosscutting concepts include patterns, cause and effect, and stability and change. The target scientific content areas

include physical sciences, life sciences, earth and space sciences, and engineering, technology, and application of sciences. The Next Generation Science Standards (NGSS) are a set of performance standards that were derived from this framework and are intended to teach students the application of scientific knowledge beyond the basic recall of science facts. Additionally, the NGSS coordinate with the Common Core State Standards (CCSS, 2010) in both English / language arts and mathematics.

Teaching students scientific content (e.g., information about the natural world) and scientific processes (e.g., posing questions) can provide students with a full educational opportunity (Courtade, Spooner, Browder, & Jimenez, 2012). Despite the benefits, students with severe disabilities (i.e., students with severe disabilities in intellectual, physical, or social functioning, including some students with autism and students with moderate or severe intellectual disability; Heward, 2003) historically have not received instruction across the three dimensions typified by the NGSS. Spooner, Knight, Browder, Jimenez, and DiBiase (2011) examined the literature and discovered the most frequent types of science content taught to students with severe disabilities included science vocabulary (matching a science term to a science definition) or daily living or health skills that related to a scientific principle (e.g., preparing food). Students with severe disabilities may benefit from explicit instruction in scientific vocabulary words and definitions, but students in these studies were not taught to apply this knowledge in a manner that would promote the learning of scientific processes, such as asking questions or determining causal relationships.

The National Research Council (NRC, 1996) defined inquiry as multiple modes of asking questions about the world. Asking questions, according to the NRC, increases and enhances individuals' understanding of natural phenomena. To address the need to further students' application of scientific knowledge, Spooner et al. encouraged the field to teach science inquiry skills to students with severe disabilities. According to Spooner et al., these steps include: (a) asking a question, (b) making a prediction, (c) conducting an experiment, and (d) finding the answer. Additionally, teaching students to ask and answer questions they have formulated is another way to increase the personal relevance of students' educational experiences.

Of the 17 studies identified by Spooner et al. (2011) in which science content was taught to students with severe disabilities, only one team (Agran, Cavin, Wehmeyer, & Palmer, 2006) included instruction in the inquiry process. Agran et al. taught students to engage in student directed learning processes, which included teaching students to ask themselves questions to identify or access their own prior knowledge of the content. Since the publication of Spooner et al.'s (2011) literature review, several other studies have examined methods for teaching inquiry skills to students with severe disabilities (e.g., Courtade, Browder, Spooner, & DiBiase, 2010; Jimenez, Browder, Spooner, & DiBiase, 2012; Knight, Smith, Spooner, & Browder, 2012; Knight, Spooner, Browder, Smith, & Wood, 2013; Smith, Spooner, Jimenez, & Browder, 2013; Smith, Spooner, & Wood, 2013).

The following model for building and conducting inquiry science lessons was

derived from the work of Browder et al. (2012) and Smith et al. (2013). Curricula for teaching science to students with severe disabilities have been developed based on this research, including the *Early Science Curriculum* for students in elementary school (Jimenez, Knight, & Browder, 2012) and *Teaching Standards: Science*, for students in middle and high school (Courtade, Jimenez, Trela, & Browder, 2008). In addition to learning the steps to an inquiry-based science lesson, additional comprehension strategies may help increase students' understanding of science content; through the combined strategies of inquiry and comprehension students may gain a deeper understanding of science. Consequently, the purpose of this paper is to describe both the steps for building science lessons and strategies for promoting comprehension of science text.

Building Science Lessons

A science lesson for students with severe disabilities, across grade bands, can be conceptualized as a math equation, in which the sum of (a) background information, (b) a hands-on experiment, and (c) the use of a graphic organizer (i.e., KWLH chart) equals a science inquiry lesson. The following steps are suggested for teaching science content and processes using this model. *Step 1* is to help the students identify background knowledge. Smith, Spooner, Jimenez, and Browder (2013) presented students with a science-related story related to the concepts demonstrated by the hands-on experiment. These stories can be short expository texts located in physical books or on the Internet. These stories can also be teacher made. A teacher-made text should be written to pique interest and introduce a concept. Picture symbols can be paired with key terms, and the story should be brief (one paragraph). The

story can end with one summarizing (or concept) statement. Alternatively, the story might pose a question for the student to consider or wonder. Consider, as an example, a science text about precipitation. The target concept statement could be: "Rain falls from clouds," and the question posed to students could be: "Why does rain fall from the clouds?"

Step 2 is to review target vocabulary. Teachers select target vocabulary that is necessary for understanding the lesson. Vocabulary should be salient and can be taught using constant or progressive time delay. The role of the students is to identify the target vocabulary. In keeping with our example, target vocabulary may include precipitation, evaporation, and condensation. For example, teachers, paraprofessionals, or peers can teach students to pair target vocabulary words with brief definitions of the words (e.g., Jimenez et al., 2012; Knight et al., 2013). In initial instructional sessions, the instructor presents a vocabulary word and asks the students to touch or say the card with the matching definition, given an array of several definition cards. During these initial sessions (0-s delay rounds), the instructor immediately points to the correct definition and waits until each student has responded correctly. In subsequent sessions, the instructor provides the directional cue ("What does precipitation mean?") and waits a predetermined increment of time (e.g., 4 s) before delivering the controlling prompt of pointing to the correct answer. This type of instruction promotes near-errorless learning. Instructors should provide reinforcement (e.g., verbal praise, high five) for correct and prompted correct responses.

For *Step 3* of the science lesson, the teacher shows the students materials that will be used in the science experiment. The teacher then tests the students' prior knowledge of the materials by asking, "Do you know what this is?" and "What do you know about this?" This is an additional way to activate prior knowledge, teach the student safety or procedural rules related to the materials, and pique the students' interest in the science content and activity. Developing a "science manual" of equipment that can be referenced during lessons and experiments is one way to keep a visual record of important materials, procedural information, and safety rules related to the materials. For example, a chart with a picture symbol or photograph of goggles can be referenced when goggles are needed in an experiment. The procedural rule students can learn is: "Keep these over our eyes during the whole experiment." The safety rule students can learn is: "We need to keep our eyes safe." Being consistent about the use of materials (particularly for materials that will be used over multiple experiments or lessons) is another way to build students' understanding of both scientific practice and safety.

In order to organize information and aid in prediction making, a KWLH chart is used in the next steps of the science lesson. A KWLH chart is a graphic organizer that is separated into four columns: What do we Know?, What do we Want to know?, How will we find out?, and What have we Learned? For *Step 4* in the inquiry-based science lesson, students will generate ideas about what they know about the science target based on their knowledge of the target vocabulary and the materials that will be used in the experiment. For example, after examining the experimental materials that include a pitcher of water, a student may

conclude, "Water is wet." That statement would be recorded in the "K" column using pictures or words.

In *Step 5*, the teacher asks the student, "What do you want to know?" about the materials or the science story. For the science lesson, teachers can choose to teach students to generate full questions, perhaps with prior training in WH- words (e.g., who, what, where, when, why, how) or question generating, or the teacher can provide students with a question template. In this instance, the teacher might first model wondering something. For instance, the teacher might say, using think-aloud procedures, "I remember in our story that it was raining. I wonder, where does rain come from? Your turn. What do you wonder? Do you remember anything from our story you can wonder about?" If the student needs additional prompting or support, the teacher can provide the student with several topics from the story about which to wonder. *Step 6* is to record the question or topic in the "W" column of the KWLH chart. To record this information, teachers can encourage students to write or draw the responses, give students pictures or words to paste on the chart, or (if the KWLH chart is presented on a SMART Board) encourage students to drag a related image or word to the "W" column.

Step 7 is for the teacher to explain the experiment that they are about to conduct and ask the students for their predictions. The teacher may ask for broad predictions, such as, "What do you think will happen in this experiment?" Teachers may also ask students to make specific predictions, such as, "Will sponge clouds rain even with less water?" Teachers should reinforce or praise students for making any prediction, even if the

prediction is not likely to be accurate. To encourage students to wonder about the experiment, teachers should encourage any response that is intentional. Some students may benefit from an array or response options with words and pictures or photographs. Other students may be able to generate a prediction in their head and state it aloud or using a voice output device.

Step 8 is for teachers to allow students to initiate responses using experimental materials. This an excellent opportunity to build in self-determination and preference-making opportunities for students while allowing them to explore science materials. For example, teachers can allow students to put their hands in the water, pour water in cups or bowls, prepare sponges for cloud experiments, or decide where the “rain” will go. Students should have time built into the lesson to touch and manipulate materials before beginning the activity. This time for exploration will allow them to familiarize themselves with the materials and how to use them. Students will also be more likely to remain engaged in the upcoming experiment if they have had an opportunity to manipulate the materials on their own first. During this exploration time, teachers can evaluate which materials are preferred by particular students; identifying preferred materials will help students participate in the experiment.

Completing the “How will we find out?” section of the KWLH chart is *Step 9* of the inquiry-based science lesson. These methods (the “how”) should describe the experiment. The experiment must be conducted in order to find out the answer to the question that the student posed under the “W” section of the KWLH chart. The teacher can explain and describe alternate ways of seeking

information, including findings answers in texts, the Internet, or by asking others. The teacher can describe the actions that will be performed by the student in the target experiment and teach these specific action words (e.g., squeeze, measure, stir, mix). After discussing and learning about specific actions that will be performed, the students can write, draw, paste, or drag action words into the “H” column of the chart.

Step 10 of the lesson is to conduct the experiment with the students. Students should be taught to follow procedural steps presented on a student-friendly task analysis for completing the steps of the experiment as independently as possible. For the rain experiment, students can pour different amounts of water over sponge “clouds” to see if they still produce rain. Students can work with other peers or in small groups with teachers or paraprofessionals to follow the steps of the experiment. Students can each be given a copy of the procedural task analysis in a clear page protector. Students can mark or check each step as it is completed. It may be necessary to review and post a brief set of safety rules immediately prior to beginning the experiment, even if these have been discussed in previous steps.

Following the experiment, *Step 11* is to reread the concept statement from the science text that was read at the beginning of the lesson (e.g., “Rain falls from clouds”). Students can either read or text point to the statement. The teacher can gesture to materials from the experiment while reading the statement, or demonstrate the concept once more using the materials.

Once the experiment is concluded, students can determine if they have answered the

questions posed in the “What do we want to Know?” column of the KWHL chart, which in this example was “Why does it rain?” As a result of the experiment, the students have learned that clouds rain when they are full of water. *Step 12* is to record that information into the KWHL chart under the “What have we Learned?” column.

After completing the KWHL chart, *Step 13* of the inquiry-based lesson is to revisit the predictions students made prior to conducting the experiment. For example, if students were asked to predict if clouds would rain even with less water, a “yes” response confirmed this prediction and a “no” response did not.

Step 14, the final step of the inquiry-based science lesson, is to summarize the science concept. This is the same concept that was the topic of the science text and the experiment. The teacher can present the science concept statement to the student and the student can fill in the statement using words, picture symbols, photographs, or objects. This will summarize and emphasize the main takeaway of the science lesson.

These 14 steps serve as a basic task analytic model for teaching inquiry-based science lessons to students with severe disabilities. The model is based on the idea that background knowledge, combined with hands-on experimentation and graphic organizers, can result in inquiry-based science instruction.

Teaching Students to Comprehend Science Texts

Improving students’ ability to access and comprehend science text is an important way to increase students’ knowledge of science content. In addition to expanding students’

understanding of scientific material, students can apply comprehension strategies to develop or deepen their background knowledge about a scientific topic and develop scientific processes through generating and answering questions about science. The following strategies describe ways practitioners can use research-based methods to promote the comprehension of science text for students with severe disabilities.

A modified system of least prompts.

Comprehension strategies can be embedded in read aloud procedures of expository text. Wood, Browder, and Flynn (2014) developed a procedure to teach comprehension of expository texts to students with severe disabilities. Teachers begin a read-aloud by activating and providing background knowledge through reading the chapter introduction. After reading the introduction, the teacher facilitates a short “picture walk,” during which the teacher points to pictures and makes associations and comments. The teacher then reads small sections of the text to students. Brief definitions of unknown vocabulary words can be embedded in the text. After asking comprehension questions, the teacher may need to reread portions of text. Finally, students can be taught to use a “stop sign” (built with red construction paper and a craft stick) as a response board to indicate when they hear an answer in the text.

When answering comprehension questions, teachers can use a modified system of least prompts to teach students to find the answers within the text (e.g., Hudson, Browder, & Jimenez, in press; Mims, Hudson, & Browder, 2012; Wood, Browder, & Flynn, 2014). If a student cannot answer a comprehension question or answers a

question incorrectly, the first prompt the teacher can deliver is a reread of three sentences of text containing the answer. The teacher repeats the question and waits for the student to respond. If the student does not provide the correct answer, the next level of prompting involves the teacher rereading just one sentence of text that contains the answer and asking the question again. If the student does not provide the correct response, the third level of prompting is the teacher saying and pointing to the answer. If, after restating the question, the students still do not respond correctly, the teacher will move to the physical level of prompting the physically selecting the answer on a response board, if applicable. Response boards (an array of answer choices, the target and distractors, presented in words, picture symbols, photographs, or objects) may or may not be necessary for students to answer questions. For instance, in several recent studies, students with moderate intellectual disability answered comprehension questions without response boards (i.e., Browder, Hudson, & Wood, 2013; Wood, Browder, & Flynn, 2014; Wood, Browder, & Spooner, 2014). In these studies, students used the text itself as a tool for finding the answer. This modified system of least prompting promotes reading and listening comprehension by teaching students to attend and return to the text to find information.

Teaching students to generate questions. For this skill (*Step 5* in the task analysis), the teacher can scaffold the process of generating a question in several ways. Some students do not yet have a clear understanding of the concept of a question. Students may need explicit training to understand and learn the definition and concept of specific WH-question words. For example, Browder et al.

(2013) taught middle school aged students with moderate intellectual disability to pair WH- words with definitions using constant time procedures (e.g., the instructor trained students to identify “people” when shown the card “who”). In Wood, Browder, and Flynn (2014), teachers taught students to generate questions by modeling through a system of least prompts procedures to combine a question word with a topic word. In Wood, Browder, and Spooner (2014), teachers used constant time delay procedures to teach students to form questions about science e-texts using the iPad app GoTalk NOW. Students were provided with visual and auditory prompts of the definitions of WH-words. After viewing pictures related to the science topic, students selected a WH- word to start the question. Next, students selected a “topic” button with words and pictures related to the science topic (e.g., tornadoes). Then students finished the sentence by selecting a button with a question mark. Finally, students could voice their question in its entirety by pressing a white text-to-speech bar. See Figure 1 for a screenshot of the question generating template used in this study. Teaching students to generate their own questions prior to reading a text or engaging in an activity can help students seek out information that is relevant or important to the learner. Furthermore, teaching students to evaluate if they can or cannot answer their own questions may equip them with the understanding of how to seek out information they want or need. Wood, Browder, and Flynn (2014) taught students to evaluate if the answer to their questions was in the book or not in the book. Wood, Browder, and Spooner (2014) taught students how to use the question they created as a tool for finding the answers to their questions in the science e-texts.

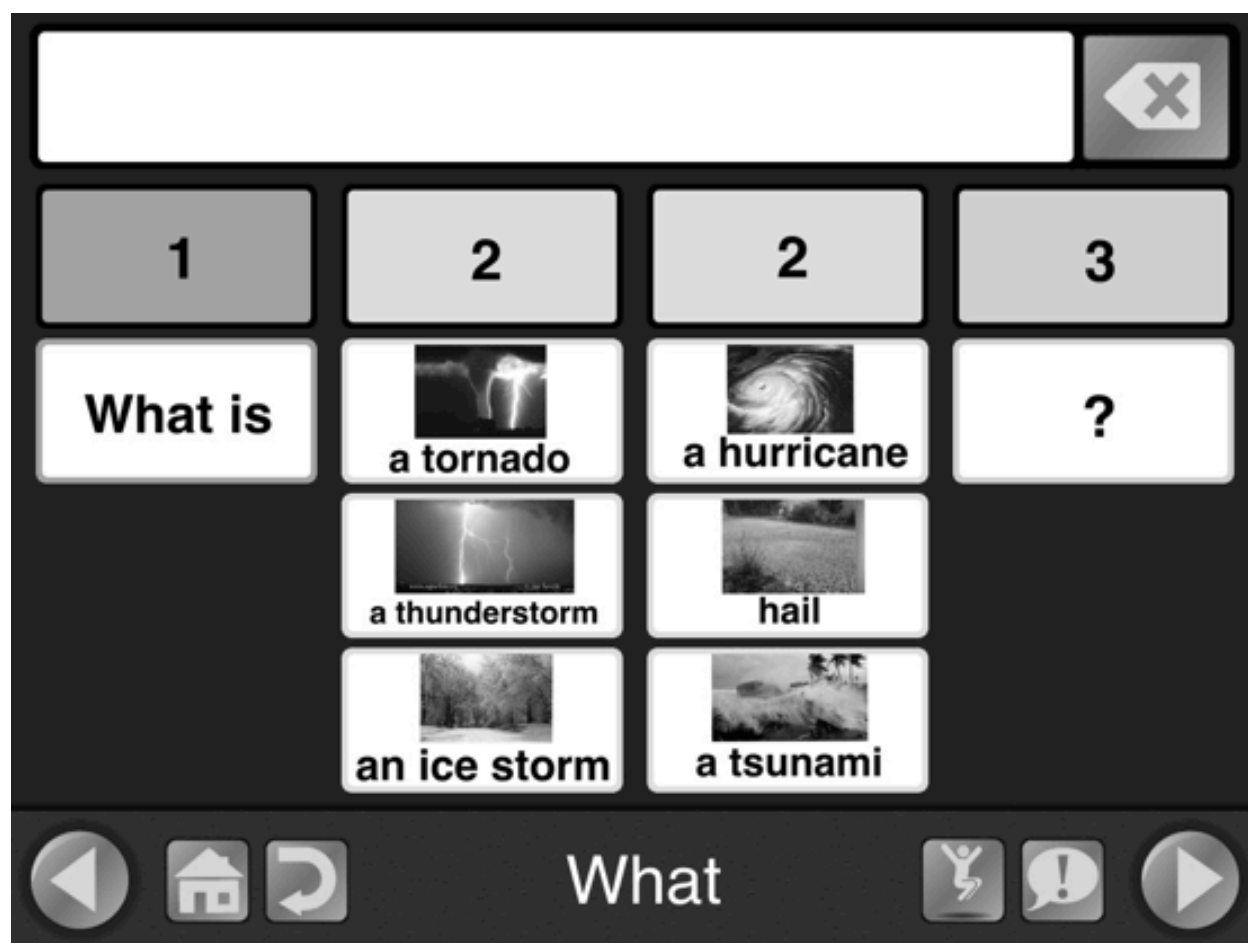


Figure 1. Example of a WH- “what” question template created using the GoTalk NOW application, presented on an iPad. Teachers used constant time delay procedures to teach students to construct a question by first selecting a question starter, next selecting a question topic, then selecting the question mark, and finally pressing the white bar to voice the complete sentence using text-to-speech software.

Teaching students to access and use technology. Considering the influx of technological growth, students are in need of both scientific and technological understanding in order to thrive in our rapidly changing world. Technology offers students means for accessing a broad range of text, including scientific e-texts. To maximize the extent to which students have the ability to independently access text, students with severe disabilities may benefit from systematic instruction in *how* to access texts online. Zisimopoulos, Sigafoos, and

Koutromanos (2011) taught elementary aged students with moderate intellectual disability to access information on the Internet by teaching students the steps of a task analysis using constant time delay procedures. Wood, Browder, and Spooner (2014) expanded on the methods of Zisimopolous et al. by presenting the steps to the task analysis on an iPad. The use of the iPad allowed instructors to create a task analysis that included vivid images (pictures of the desktop computer displayed on an iPad using the GoTalk NOW app) and recorded auditory cues of each step.

Using the task analysis presented on the iPad, students learned to locate the Web site Discovery Education, search for a specific e-text, and navigate the e-text (use play, stop, highlighting to replay, advance page, reverse page). Figure 2 displays examples of the visual referents presented on an iPad for accessing e-texts on a desktop computer. Additionally, the use of e-texts may reduce the amount of preparation teachers must do to create or adapt materials that are accessible for students with severe disabilities. E-texts may include photographs, highlighting to

accompany text-to-speech, embedded definitions of target vocabulary, and links to additional information about certain topics. Wood, Browder, and Spooner (2014) taught students to locate and listen to e-texts that were developed at a Kindergarten to second grade readability level. See Table 1 for an example of a text and comprehension questions used in this study. The topics of these texts aligned with Kindergarten through fifth grade science topics (e.g., solar system, ecosystems, land forms).



Figure 2. Examples of visual referents used by students as part of the task analysis for locating specific e-Texts on the Discovery Education Web site (<http://discoveryeducation.com>). Each page in the communication book (or step in the task analysis) included an auditory directional cue programmed into the application. Students were taught to touch the picture to hear the task direction. Teachers taught students to follow the task analysis using constant time delay procedures.

After students have learned to access science e-texts, they can learn the strategies mentioned above to improve their listening comprehension of the texts. For example, a system of least prompts procedure can be used by a teacher to demonstrate how to generate and answer questions about science e-texts. Similar to the “wonder” element of the inquiry-based science task analysis,

students can learn how to wonder or ask a question about the text prior to listening to it read aloud. Google Images includes pages of visual examples of particular concepts (e.g., habitats). Using multiple visual examples of one concept can provide students with the background knowledge necessary to ask a question about a topic. Using a graphic organizer presented on an iPad, students can construct a question by first picking the

question starter (WH- word), next picking the question subject, then picking the question mark, and finally voicing the question using text-to-speech. Students can learn to play the story independently and listen for the answer to the question they have asked. Using the question as a visual referent, students can use the question topic words to search for the area of text that most likely contains the answer. Student can highlight and replay target areas of text to narrow down and eventually identify the specific answer to their question,

if the students are not able to answer the question in their head. Through a combined use of these components (accessing texts through a visual task analysis and constant time delay, building background knowledge with related images, building questions on an iPad through constant time delay procedures, answering questions through a system of least prompts procedures) students may increase their comprehension of science texts.

Table 1

Example of Science e-Text from the Discovery Education Web Site (<http://www.discoveryeducation.com>) and Researcher-Developed WH- Questions

The Sun (Grade 1; Lexile 590)

Page 1

The sun is a star that is so close to Earth that we can see it in the daytime.

Page 2

The sun is where light and heat come from. That heat warms the air and soil. Most living things need light and heat to grow. Vitamin D, one of our important nutrients, comes from the sun.

Page 3

Too much of the sun's heat is harmful. It can cause sunburn and, over time, cancer. It is important to get just the right amount of sun.

Questions:

1. What is the sun? (star)
2. What is the sun close to? (Earth)
3. Where do light and heat come from? (sun)
4. Where does vitamin D come from? (sun)
5. What is harmful? (too much sun; heat; cancer; sunburn)

Teaching students science across contexts.

When instructing students with severe disabilities, it is important to be mindful of the educational context in which the instruction takes place. Inquiry-based science lessons can be taught to students in inclusive settings alongside peers without disabilities. Teachers can support the instructional needs of students with severe disabilities in inclusive settings by promoting their inclusion in small or whole group lessons, with systematic instruction embedded within those lessons. A literature review conducted by Hudson, Browder, and Wood (2013), identified 17 studies that were effective when using embedded systematic instruction to teach academic content to students with severe disabilities in general education settings. One study was identified that used embedded instruction to teach science descriptors. Jimenez et al. (2012) embedded systematic instruction within their inquiry-based science lesson procedures; strategies included constant time delay to teach vocabulary and completion of a KWHL chart to promote comprehension. While the study focused on students with severe disabilities, instruction took place in a fully inclusive, general education setting. Peers can also play a crucial role in facilitating successful inclusion for students with severe disabilities. Jimenez et al. (2012) and Wood, Browder, and Spooner (2014) both constructed hands-on activities related to science content that required students to participate with their typically developing peers. Hudson et al. (in press) is another example of successful academic inclusion in general education with peer supports. Similar to Jimenez et al., Hudson and colleagues trained same-aged peers to deliver systematic instruction to students with severe disabilities in a general education classroom. Across these studies,

peers used constant time delay and a system of least prompts to teach (a) science descriptors and the use of the KWHL chart (Jimenez et al.) and (b) listening comprehension of science text (Hudson et al.). The context in which instruction is delivered and measured should be considered during instructional science inquiry planning for students with severe disabilities.

Summary

Inquiry-based science is an instructional approach that can be used to extend science instruction for students with severe disabilities beyond basic vocabulary and functional skills by promoting wonder and understanding of the scientific world. Through the 14 steps of an inquiry-based task analysis, teachers can provide students with severe disabilities with the supports necessary to engage in and learn science concepts. Additionally, these methods promote the concept of “wonder,” which teaches students to actively consider the world around them. Students learn scientific content by learning words, definitions, and concepts, but students also learn about scientific processes, such as asking questions, investigating answers, and evaluating predictions. There are several strategies that emerge from recent research on teaching students with severe disabilities that suggest ways to increase the comprehension of science texts. Constant time delay can be used to teach students to access and pose questions about e-texts. A system of least prompts procedure can be used to teach students to locate and answer comprehension questions about science. Technology can be used to help students locate texts, generate questions, and listen to texts independently. Additionally, the use of e-texts can provide students with greater access to expository content that may not need further

modifications or adaptations. Through an inquiry-based approach that includes comprehension strategies, students with severe disabilities can expand their

understanding of both science and the process of learning.

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Teaching Literacy with Functional Skills to Students with Significant Intellectual Disability

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Abstract: Current practices for teaching students with significant intellectual disability emphasize the importance of teaching academics that connect to the Common Core State Standards (CCSS). Although academic skills are important, research emphasizes the importance and effectiveness of teaching functional skills to students with significant intellectual disability. Evidence based practices support the effectiveness of using systematic instruction. In this study, the use of story-based instruction and system of least prompts were used to teach three elementary school students with significant intellectual disability emergent literacy and hand washing skills. The students were taught emergent literacy skills while reading three different books about hand washing, and then asked to wash their hands. The emergent literacy skills were taught in small inclusive reading groups. A multiple baseline design across participants evaluated the effectiveness of the intervention. The results show the percentage of independent and correct steps on both the story based task analysis and hand washing task analysis increased when story-based instruction and system of least prompts were implemented. Future research is needed to determine if the acquisition of reading about hand washing leads to the rapid acquisition of hand washing or if the training package of reading about hand washing, understanding hand washing and then performing hand washing with system of least prompts is the reason for the progress.

Special education teachers instruct students on everything from eating to catching a bus, in addition to the CCSS. No other educator is required to teach both life skills and the CCSS across grades K-12. Special education teachers are caught in a tug of war over what to teach students with significant intellectual disabilities (Ayres, Lowrey, Douglas, Sievers, 2011; Courtade, Spooner, Browder, & Jimenez, 2012). On one hand many administrators and lawmakers emphasize teaching CCSS. On the other hand related service personnel, parents, students, and

community personnel emphasize teaching functional skills. Many teachers are removing the intensive instruction of functional skills and shifting their priority to teaching only academic skills linked to the CCSS (NGA Center, 2010). Other teachers try to teach both functional skills and academics in isolation and find it overwhelming. Still other teachers want to shift toward academics but struggle to prioritize teaching academics over functional skills (Collins, Karl, Riggs, Galloway, & Hager, 2010). Finally, some teachers have not yet made the shift to

academics and continue to only teach functional skills (Browder, Flowers, Ahlgrim-Delzell, Karvonen, Spooner & Algozzine, 2004). How can special educators meet the true educational needs of students with significant intellectual disability, both the need for functional skills and access to the CCSS? Can we blend what we know works to teach both?

Teaching Functional Skills

According to Westling and Fox (2009), students with significant intellectual disability need to learn skills such as grooming, feeding, dressing, toileting, and hygiene to maintain health and to enhance acceptability by others in society. These skills are among the most important instructional objectives for students with severe disabilities, especially if they have not acquired these skills to the degree that corresponds to their chronological age (Westling & Fox, 2009). Teaching a student functional skills are important to parents and caregivers because it reduces the amount of time and assistance required to support the person (Westling & Fox, 2009). People with severe disabilities who are unable to acquire independence in personal care skills and have complex medical needs may be limited to nursing homes or institutions.

For the last 30 years special education teachers successfully taught functional skills to students with severe disabilities using systematic instruction. Hand washing is a functional skill taught using a task analysis and the system of least prompts. A multiple probe design across participants conducted by Parrott, Schuster, Collins, and Gassaway (2000) evaluated the effectiveness of simultaneous prompting procedures when teaching five students with moderate to severe disabilities hand washing. Training

consisted of a simultaneous prompting procedure of a 16-step task analysis and verbal praise after each completed step. The intervention was effective in teaching all five participants hand washing.

Teaching Literacy

Literacy improves the quality of life and increases opportunities to gain new information for all students (Browder, Mims, Spooner, Ahlgrim-Delzell, & Lee, 2008). Literacy is central to improve communication (Calhoon, 2001), gain employment (Calhoon, 2001), learn cooking skills (Fiscus, Schuster, Morse, & Collins, 2002), shop (Taylor & O'Reilly, 2000), become conventional readers and writers, learn independence (Copeland & Keefe, 2007; Erickson & Koppenhaver, 1995), and participate within our society (Calhoon, 2001; Copeland & Keefe, 2007). Copeland and Keefe (2007) state being a reader is a "highly valued social role" that allows students to "participate more fully within society" (p.1). Because of all its benefits, literacy could be viewed as the most essential skill needed for future success.

Despite the possible benefits, teaching literacy skills to students with significant intellectual disability has not been a priority in the past (Browder, Spooner, & Ahlgrim-Delzell, 2011). The lack of exposure to literacy for this population was fueled by society's view that students with severe disabilities could not learn literacy skills (Erickson & Koppenhaver, 1995). Limited exposure and low expectations in the home, school, and community have also considerably decreased the opportunities for students with disabilities to learn reading and writing skills (Al Otaiba & Hosp, 2004; Copeland & Keefe 2007; Koppenhaver, Hendrix & William, 2007). Al Otaiba and

Hosp (2004) found students with disabilities start school with less than half the exposure to books and other printed material than students who are typically developing. Once in school, students with intellectual disability have only a 30% chance of learning to read and write (Erickson & Koppenhaver, 1995).

No Child Left Behind (NCLB) (2001), the National Reading Panel (NRP) report (2000), and the Individual with Disabilities Education Act (IDEA) (2004) emphasize teaching literacy skills connected to the CCSS for students with significant intellectual disability. Educators looked to the NRP's (2000) framework for developing literacy instruction for all students. This framework includes (a) phonemic awareness, (b) phonics, (c) fluency, (d) comprehension, and (e) vocabulary instruction.

Educators struggle with how to teach literacy skills to students with significant intellectual disabilities for several reasons. First, students with significant intellectual disability demonstrate specific learning characteristics such as difficulty attending to stimuli, memory problems, generalization, self-regulation, problems with observational learning, and synthesizing skills (Westling & Fox, 2009). Second, many educators do not know how to teach literacy skills to this population (Al Otaiba & Hosp, 2004; Browder et al., 2008; Cooper-Duffy, Szedja, & Hyer (2010). Third, many students are non-verbal communicators making it difficult to know how to teach phonological awareness and vocabulary instruction (Koppenhaver et al., 2007). Furthermore, knowing how to adapt reading and phonics instruction for non-verbal learners challenges educators (Browder et al., 2008).

Despite these challenges story-based instruction is an approach that is showing positive effects for this population. Story-based instruction is an instructional method that provides an interactive experience where students engage in a shared conversation about a book, derive meaning from the stories, pictures, and events, and encounter a predictable context for language learning and emergent literacy development (Koppenhaver, Erickson, & Skotko, 2001). There are several critical elements of story-based instruction for students with significant intellectual disability. These elements include: (a) offering literacy in the natural setting (Koppenhaver & Erickson, 2003), (b) providing task analytic instruction and systematic prompting to learn steps of literacy (Browder et al., 2008), (c) choosing age appropriate books (Browder et al., 2007), (d) embedding communication systems (Browder et al., 2008), and (e) adapting materials for shared story reading (Browder et al., 2008).

Story based instruction helps students develop communication skills (Koppenhaver et al., 2001), comprehension and vocabulary skills (Browder, Trela, & Jimenez, 2007). Hudson and Test (2011) evaluated story-based instruction as an evidence-based practice to promote literacy with students who have extensive support needs and found a moderate success. Koppenhaver et al. (2001) evaluated the effects of shared storybook reading on four girls with Rett syndrome. Mothers were trained to (a) attribute meaning during communication attempts, (b) prompt and model the use of the communication devices, (c) provide direct instruction, and (d) find vocabulary words that provide richer communication. The results showed girls with Rett syndrome increased their communication and participation during storybook reading.

Browder et al. (2007) instructed three teachers to use a task analysis for teaching middle school students with significant intellectual disability. A total of eight books on the middle school reading list were adapted to include definitions of new or unfamiliar words and pictures to support key vocabulary. Teachers were instructed to self monitor using a 25-step task analysis, and constant time delay. Results showed all students increased independent responses during shared story reading.

Mims, Browder, Baker, Lee, and Spooner (2009) found that books adapted to include objects velcroed on pages combined with a system of least prompts increased the listening comprehension of two elementary students with significant intellectual disability and visual impairments during shared story reading. Browder et al. (2008) investigated a method for implementing shared stories for three students with multiple disabilities. Three popular elementary level books were adapted to include the students' name as the main character and a repeated story line that stated the main idea of the book. The researchers created a 16-step task analysis to prompt (using the system of least prompts) students' participation and comprehension during shared story reading. All three students increased their independent responses during shared story reading, suggesting that shared story reading is an effective way to teach emergent literacy skills to students with significant intellectual disability.

Teaching Both Emergent Literacy and Functional Skills

A few references in the literature mention simultaneously teaching literacy and functional skills to students with disabilities. Courtade et al. (2012), stated sight word

instruction has been used to teach individuals with significant intellectual disability to (a) learn leisure skills, (b) perform grooming skills, (c) navigate public transportation, (d) perform cooking skills, and (e) learn food safety skills. Minarovic and Bambara (2007) taught employees with moderate intellectual disabilities to read sight word checklists to initiate job tasks and self-monitor the completion of the jobs on the list. Bucholz, Brady, Duffy, Scott, and Kontosh (2008) provided three employees with severe developmental disabilities with a customized picture book teaching how to request materials, and return to work on time. Instructors explained both how to read the book and perform the work behaviors. These studies all indicate some success teaching both literacy skills and a functional behavior.

The purpose of this study was to evaluate the effects of teaching emergent literacy and hand washing skills to students with significant intellectual disability by using story based instruction and system of least prompts. Specifically, the purpose of the study was twofold: (a) to evaluate the implementation of story-based instruction for students with significant intellectual disability on the number of independent and correct responses on the story based task analysis, and (b) to evaluate the implementation of story-based instruction and the system of least prompts for students with significant intellectual disability on the number of independent and correct hand washing responses.

This study extends the work of Browder et al. (2008), Koppenhaver et al. (2001), and Mims et al. (2009) by evaluating not only the number of independent communication responses or emergent literacy responses, but also evaluating if the child can perform the

task of hand washing after reading about it and receiving the system of least prompts. This level of application and reading comprehension has not yet been examined for this population (Browder et al., 2011). This present study goes further by blending what we know works for teaching functional skills with what we know works using story-based instruction. Furthermore, this study is the only one to include student peers within story-based instruction sessions.

Method

Setting

This study took place in one public elementary school in Western North Carolina in a special education classroom for students with significant intellectual disability. All sessions took place in a resource room. Hand washing took place at a variety of sinks in the school. The sessions took place around a table where the teacher sat on one side and the student with significant intellectual disability sat across from the teacher. The two peers without disabilities sat on either side of the student with significant intellectual disability.

Participants

One graduate student at Western Carolina University implemented the intervention. This teacher instructed nine students with significant intellectual disability in grades K-2. Three participants with significant intellectual disability between the ages of six and eight years old participated in the study (Table 1). They received services in a self-contained classroom and participated in general education activities with same age peers during select times of the day. The eligibility requirements for students to participate in this study included: (a) adequate vision and hearing, (b) ability to attend to a group setting for ten minutes, (c) physical ability to demonstrate hand washing, (d) inconsistent responses or communicative attempts during literacy lessons, (e) IQ scores no higher than forty, (f) English as the primary language, and (g) nonverbal, gestural, and/or communicates with Augmentative and Alternative Communication (AAC) such as Big Mac or Step-by Step.

Table 1. *Characteristics of Participants with significant intellectual disabilities*

Student	Age	Grade	Diagnosis and learning characteristics	Gender
Denny	6	K	Developmental delay/Autism, communicates with pointing, difficulty focusing on task.	M
Maquela	8	2	Developmental delay/ Autism and Down syndrome, points to communicate, difficulty focusing on task	F
Stephanie	7	1	Developmental delay, points to communicate, wore glasses, difficulty focusing on task.	F

A total of six students from the general education K-2 classes participated as reading buddies. Two students without disabilities from each grade participated in inclusive reading groups. Three general education teachers identified two readers from their class who met the following requirements: (a) the same grade level as the student with significant intellectual disability, (b) would benefit from additional reading practice in a small group format, and (c) could model emergent literacy skills to the student with significant intellectual disability. No data were collected on this group of students.

Materials

Materials used in the study included four copies of three different books on how to wash hands. The books were *Show Jo How to Wash Your Hands* by Buckley (2007) (1st grade level), *Jimmy Washes His Hands* (teacher made book) (1st grade level) and *Wash Your Hands* by Ross (2001) (2nd grade level). The books were selected because they contained the hand washing steps and were on the 1st or 2nd grade reading level as calculated by the Fry Reading Level (Fry, 1977). These books were adapted to include the repeated line, "When we wash our hands" which was printed on a small piece of paper taped to the bottom of each page.

A small bottle of bubbles was used to gain the children's attention prior to starting the story. Another important tool was the picture strip showing the task analysis of hand washing. Each student was given a strip (2 X 22 inches) to use during reading sessions and at the sink. On the strip, 10 pictures of hand

washing steps were paired with the following vocabulary words, (a) sink, (b) water on, (c) wet hands, (d) get soap, (e) rub hands, (f) rinse hands, (g) water off, (i) paper towel, (j) dry hands, and (k) trash can. The strip was used to teach vocabulary words, as visual sequence for hand washing, and to help answer questions about the stories.

At the end of each story, there was a multiple choice quiz in picture format. Three questions were on the quiz. An example of a quiz question was "What do you need to dry your hands?" The possible options for answers were a) truck, b) soap, or c) paper towel. All answers were in picture/text format from the vocabulary strip. The comprehension questions were related to the book and were chosen to test comprehension of the students. All sessions were videotaped. Two more important tools were the hand washing and story-based task analysis. The hand washing task analysis (Table 2) was used to record the number of independent and correct responses the students made when washing their hands. The steps of the hand washing task analysis included: a) move to the sink, b) turn the water on, c) wet hands, d) get soap, e) rub hands together, f) rinse hands, g) turn water off, h) get paper towel, i) dry hands, and j) throw paper towel away. The story-based task analysis (Table 3) consisted of 11 steps representing discrete actions the students demonstrated during the story. The story-based task analysis used was the Shared Story Task Analysis from Browder et al. (2008).

Table 2. Steps to Handwashing

1. Move to sink
2. Turn on the water
3. Wet hands
4. Get soap
5. Rub hands together
6. Rinse hands
7. Turn off water
8. Get paper towel
9. Dry hands
10. Throw paper towel away

Dependent Variables

The first dependent variable was the percentage of steps completed correctly and independently on the story-based task analysis by students with significant disabilities during an inclusive reading group. The number of correct student responses on the task analysis out of 11 possible steps were calculated for each session and recorded as a percentage. The data were recorded as follows: (+) independent and correct responses without prompting during a five-second delay, or (-) no response by the student or an error by the student, which required correction or prompting. A total of two data collectors recorded data.

The second dependent variable was the number of independent correct responses the student demonstrated on the hand washing task analysis. The number of independent correct hand washing responses was defined as non-prompted response of the participant

on the hand washing task analysis. The data collectors recorded the number of identified behaviors in the task analysis as correct and independent (unprompted). Scoring was as follows: (+) independent and correct responses without any prompting during a five-second delay, or (-) no response by the student or error by the student, which require correction or prompting.

Data Collection

The researcher conducted two, one-hour sessions to teach observers how to collect data. To establish inter-rater reliability, the researcher explained and reviewed the story-based task analysis and datasheets to data collectors. The researcher demonstrated behaviors of the teacher and student to data collectors using the story-based task analysis and datasheet. Then the researcher reviewed the behaviors on the hand washing task analysis and the data sheet. Afterwards, the researcher and the data collectors watched

Table 3. *Elementary Story-based Lesson Task Analysis*

Teacher Responses	Student Responses
1. Get students attention	Interact with materials
2. Review vocabulary and new symbols	Say/repeat/point to word or symbol
3. Ask for prediction	Indicates response to prediction
4. Read the title	Point to title
5. Read the author	Point to author
6. Ask, "How do we get started?"	Opens book to first page of the book
7. Reads text	Turns pages when appropriate
8. Pauses for repeated story line	Anticipates repeated story line or finishes repeated story line
9. Pauses for finding the word/picture on page	Points to picture/ word/ object that teacher says
10. Give student an opportunity to point to chosen line	Text point to chosen line in book
11. Asks comprehension question/ review prediction	Answers question

Adapted from "Training Teachers to Follow a Task Analysis to Engage Middle School Students with Moderate and Severe Developmental Disabilities in Grade-Appropriate Literature by D. Browder, K. Trela, and B. Jimenez, 2007, *Focus on Autism and Other Development Disabilities*, 22, p.211.

several videos of a teacher implementing both task analyses. The researcher and data collectors scored the behavior of the students with significant intellectual disability separately, and then compared scores. The

Inter-rater reliability was conducted for 30% of the sessions. Agreement was calculated for

each session by taking the total number of agreements and dividing it by the number of agreements plus disagreements and multiplying that number by 100%. Procedural fidelity was taken on the teacher's ability to consistently implement the intervention during the study. The data collectors were trained to score the teacher behavior using the

same training procedures as stated above for the student behavior. The data collectors viewed the videotapes and recorded the steps of the story-based task analysis that the teacher implemented. The data collectors watched the teacher in 30% of the videotaped sessions and scored the number of items the teacher delivered correctly when instructing the story-based task analysis and on the hand washing task analysis. When the teacher correctly prompted the student on the story-based task analysis, a (+) was recorded. If the teacher skipped a step of the task analysis or did not use the correct prompts then a (-) was recorded. The number of correct steps the teacher delivered was divided by the total number of steps and multiplied by 100%.

Research Design

Multiple baseline probe design across participants was used to demonstrate experimental control. All students started and remained in baseline until they showed a stable baseline. At that point, the first student received the intervention while the others stayed in baseline. Once the first student reached 80% mastery on the story-based task analysis, all remaining students in baseline were probed to ensure the baseline remained unchanged. Then, the second student received the intervention. This continued until all students received the intervention. After a student demonstrated 80% mastery in one book, they were given a second book along with the same intervention. One student was given a third book after demonstrating mastery of book 2.

Procedure

Baseline. The special education teacher worked with the general education teachers to create reading groups. Each group contained two students without disabilities and one

student with significant intellectual disabilities, all from the same grade. The special education teacher received the materials described above. The teacher gave each child the same book and read the story. The teacher paused and provided the student with significant intellectual disabilities with an opportunity to respond with the behaviors identified on the story based task analysis. No instruction or feedback was given. During the story, the peers followed along in the book while the teacher read. The peers were simply part of the reading group listening and following along while a story was read. No training was provided to peers.

After the story, the teacher dismissed the peers and asked the student with significant intellectual disabilities to “go wash their hands,” followed by a five second delay. The teacher paused to provide opportunities for the student to respond on each step of the hand washing task analysis. The teacher provided no feedback. For example, the teacher waited for the student to respond to step one. If the student did not respond, the teacher completed that step for the student with no feedback. The teacher repeated the sequence for each step of the task analysis until it was complete. If the student independently responded on a step, the teacher said nothing and waited to see if the student completed the next step.

Intervention. The teacher was directed to read only the books the researcher selected and assigned. First, *Show Jo How to Wash Your Hands* was read with the first student only until that student demonstrated 80% mastery on the story based task analysis. The second book entitled, *Jimmy Washes His Hands* until the student demonstrated 80% mastery on the story based task analysis. Finally the teacher read the book entitled,

Wash Your Hands until the student demonstrated 80% mastery.

The special education teacher was given the story-based task analysis and the hand washing task analysis. The researcher reviewed behaviors on the task analysis with the special education teacher. The researcher described and modeled how to implement the use of constant time delay to teach each response on the story-based task analysis and the system of least prompts was used to teach the behaviors on the hand washing task analysis to the students.

The special education teacher conducted the intervention sessions with the same materials, in the same setting and with the same students as in the baseline sessions. The teacher implemented constant time delay with a physical and verbal prompt to teach each response on the story-based task analysis. During two zero delay training sessions (day one and day 2), the teacher read the story using the story based task analysis. Each step of the task analysis the teacher physically and verbally prompted the student for the correct response. Once the teacher asked the student to point to the vocabulary word, the teacher immediately guided the students hand to the correct word and said, "This is the word soap, good pointing to the word". After the two training sessions at zero delay were completed (day 3) the teacher then followed the task analysis and waited five-seconds for the student to make a response for each step of the task analysis. If the student responded correctly and independently within the five-seconds, the teacher labeled the correct response and offered praise such as "Wonderful, pointing to the author." If the student did not respond or responded incorrectly, the teacher immediately returned

to the zero delay procedure for that step of the task analysis. The teacher would state, "No, point to the title like this". At the same time the teacher would physically assist the student to pointing to the title on the book.

Once the teacher finished teaching the steps on the story based task analysis, the peers were dismissed, and the student with significant intellectual disabilities was asked to wash their hands. The system of least prompts was used to teach the students the steps to the hand washing task analysis. The teacher taught the system of least prompts using the following prompts: (a) verbal prompt, (b) verbal and gesture prompt, and (c) verbal and full physical prompt. A five-second delay was used between each level of prompt. For example, the teacher would say, "Wash your hands", followed by a five-second delay. If there was no response, the teacher would say, "Move to the sink", followed by a five-second delay. If the student did not move to the sink, the teacher would say "Move to the sink" while pointing to the sink. If the student still did not move to the sink, the teacher would say, "Move to the sink" while physically moving the student to the sink. If the student demonstrated a correct and independent response on a step of the task analysis the teacher would offer praise by saying, "Nice moving to the sink". If the student made an error, the teacher would correct the error immediately with a verbal and physical prompt.

Results

Procedural fidelity for the teacher administering each step of the story-based task analysis and the hand washing task analysis was 100%. The mean inter-observer scores for all the students with significant intellectual disabilities on steps of the story

based task analysis were 87%, 100%, and 100% for baseline and 87%, 87%, and 98% for intervention. The mean inter-observer scores for all the students with significant intellectual disabilities on hand washing skills were 100%, 100%, and 90% for baseline, and 95%, 97% and 88% for intervention.

Participant Data

Results show all participants demonstrated an increase in both the percentage of independent and correct responses on the story-book task analysis and the hand washing task analysis once the intervention was implemented. In the baseline condition, the average percentages of independent responses on the story-based task analysis was Denny 20.75%, Maquela 0%, and Stephane 0% (Figure 1). In the intervention condition with book 1, the average percentages of independent responses on the story-based task analysis was Denny 50.6%, Maquela 60.3%, and Stephane 52.2%. During book two, the average percentages of independent responses on the story-based task analysis was Denny 85.87% and Maquela 57.27%. Stephane did not make the 80% mastery criteria with book one before the school year ended; therefore she did not go on to book two. During the intervention condition with book three, the average percentage of independent responses on the story-based task analysis was Denny 82.62%. The school year ended before we could collect data on the other students with book three.

In the baseline condition, the average percentage of independent responses on the hand washing task analysis was Denny 32.5%, Maquela 26.66%, and Stephane 7.5% (Figure 2). In the intervention condition with book one, the average percentage of

independent responses on the hand washing task analysis was Denny 70%, Maquela 83%, and Stephane 62%. With book two, the average percentage of independent responses on the task analysis was Denny 100%, and Maquela 96.36%. With book three, the average percentage of independent responses on the task analysis was Denny 98.46%. The school year ended before we could collect data on the other students with book three.

Social Validity

The special education teacher participated in a follow-up survey (Table 4). He rated all items in the survey with a 3 or 4. He reported his students were engaged and participated in literacy lessons and other classroom activities more than they did before the study began. He stated that inclusive reading groups would be beneficial for teaching other skills. The teacher reported that both task analysis sheets were helpful for teaching the skills and he continues to use the story-based task analysis during literacy lessons to teach emergent literacy skills to his students with intellectual disabilities.

Discussion

All three students demonstrated near zero independent and correct responses in the baseline condition for both story-based and hand washing task analysis. After receiving intervention, all students showed an immediate and significant increase on the percentage of correct response on the story-based task analysis and hand washing task analysis. All students showed a significant increase on the percentage of correct responses for the hand washing after three to four sessions of reading the first story about how to wash your hands and practicing washing their hands with the system of least

Figure 1. Percentage of Correct Responses on the Story Based Task Analysis

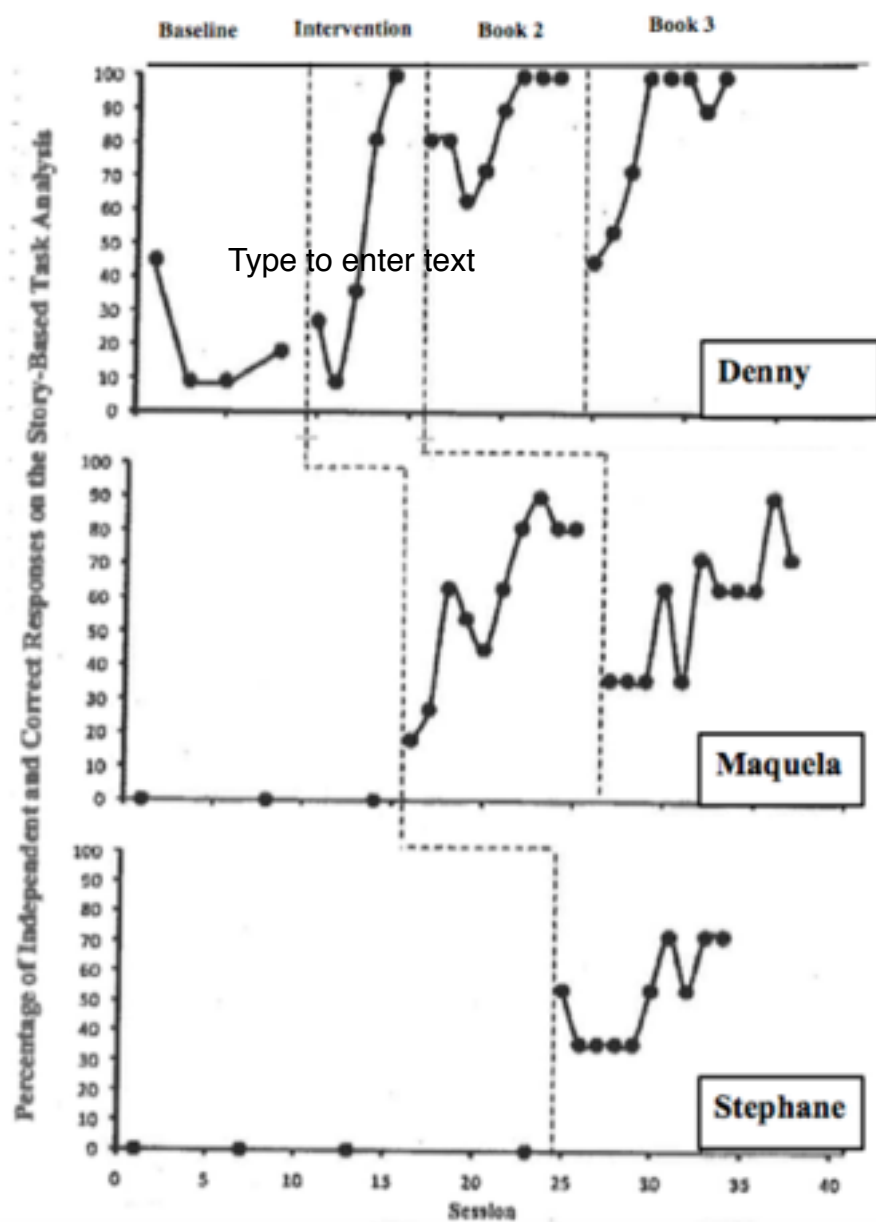


Figure 2. Percentage of Correct Responses on Hand Washing Task Analysis

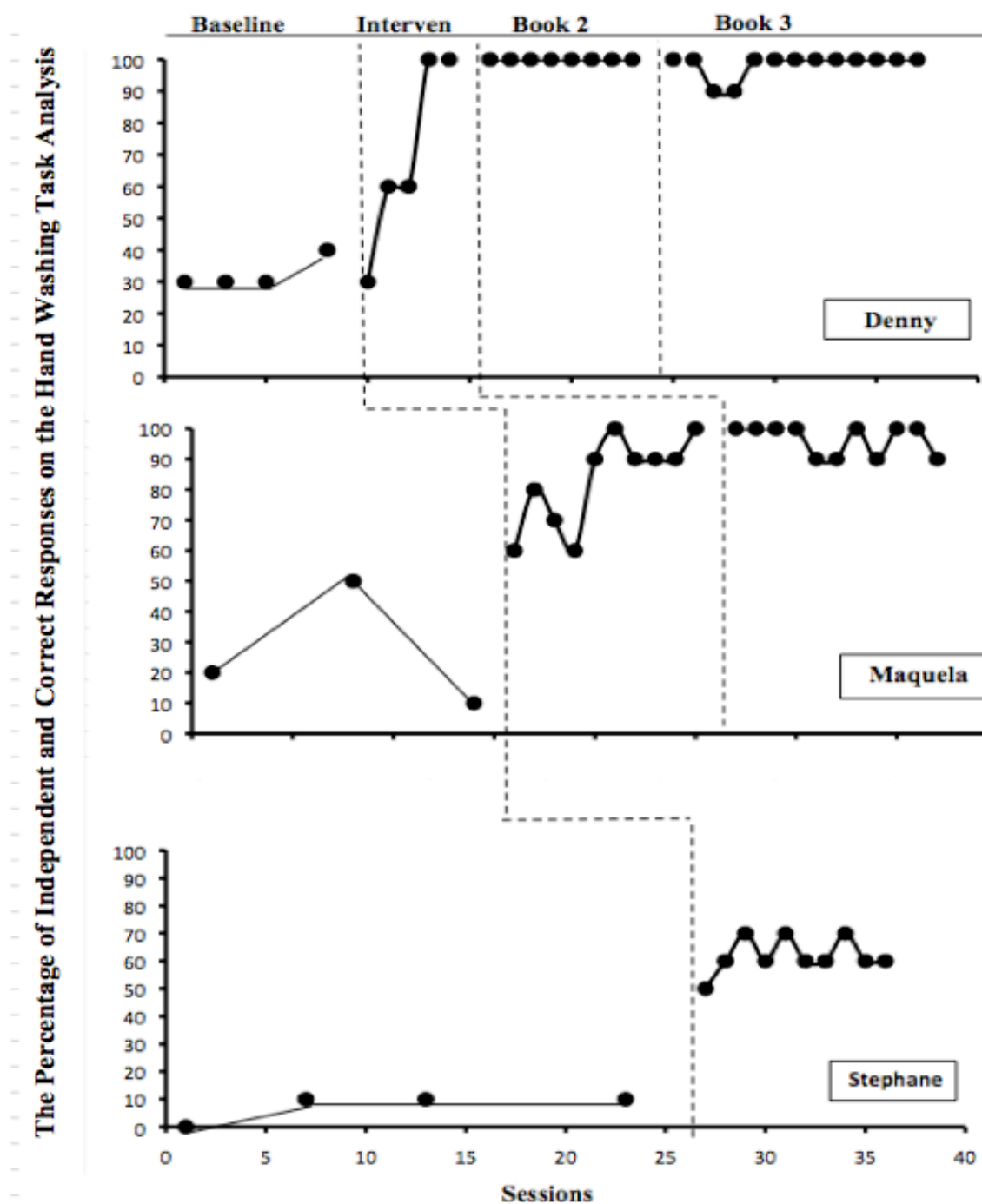


Table 4. Teacher Social Validity Questionnaire

Questions	Strongly disagree	Disagree	Agree	Strongly agree
1. The story-based task analysis and datasheet helped me teach students with significant intellectual disabilities emergent literacy skills.	1	2	3	4
1. Implementing story-based instruction enabled my students with significant intellectual disabilities to demonstrate emergent literacy skills.	1	2	3	4
1. The hand washing task analysis and datasheet helped me teach my students with significant intellectual disabilities hand washing skills.	1	2	3	4
1. Instruction using the hand washing task analysis and datasheet, enabled students with significant intellectual disabilities to independently wash their hands.	1	2	3	4
1. Story-based instruction could provide a means for teaching other personal care skills to students with significant intellectual disabilities.	1	2	3	4
1. It would be beneficial for other teachers to learn to teach students with significant intellectual disabilities story-based lessons.	1	2	3	4
1. I enjoyed teaching my student with significant intellectual disabilities in an inclusive reading group.	1	2	3	4
1. I think more students with significant intellectual disabilities would benefit from an inclusive reading group.	1	2	3	4
1. I will use story-based instruction to teach literacy skills and other functional skills to my students with significant intellectual disabilities in the future.	1	2	3	4
1. I am glad I received training in story-based instruction to teach emergent literacy skills and hand washing skills to students with significant intellectual disabilities.	1	2	3	4

prompts. As emergent literacy skills increased so did the hand washing skills.

Denny and Maquela were able to generalize the steps of the story-based task analysis and hand washing across one unfamiliar story. These students showed an initial reduction in their percent of independent responses with the new book and later returned to their previous level of mastery. The reduction may have occurred because of the novel stimulus of the unfamiliar books or the increased difficulty of the books. The students wanted to explore the new books but since that was not part of the task analysis the teacher simply stuck to the intervention. It is possible that with an opportunity to explore the new books this reduction could have been prevented. Despite the initial reduction in independent responses, within a few sessions the students were able to return to 100% mastery on the story-based task analysis. The last student was not able to participate in the generalization phase because the school year ended. Despite the initial decline in the percentage of emergent literacy responses Denny and Maquela maintained their level of mastery on hand washing.

The combined process of reading books about functional skills with systematic instruction and then performing the skills with the system of least prompts was effective in teaching students both skills. This combined approach may be helpful for teaching students with significant intellectual disability both literacy and functional skills simultaneously. Data from this study indicated that the story based task analysis with the hand washing task analysis and system of least prompts taught students to read about a functional skill which

enabled them to learn some emergent literacy skills while also learning to wash their hands.

This study extended the work of Mims et al., (2009) because the students participated in small reading groups with peers of the same age and grade. Ryndak, Morrison, and Sommerstein, (1999) suggested that small group literacy experiences with peers might be beneficial. The peers acted as a continuous model for the students with significant intellectual disability. The peers took turns reading aloud to practiced reading fluency and cheered for each other when difficult steps were finally learned. Incidental observation showed students without disabilities engaged in more reading practice during the intervention sessions, than in baseline. Could this approach provide needed opportunities for reading practice for struggling readers without disabilities, in an environment that is repetitive and non-threatening? Other incidental observation showed the small group reading enabled the students with disabilities to support and encourage their peers.

Implications for Practice

This method of combining story-based instruction with functional skill instruction provides teachers with an efficient way to teach both content areas. This approach may provide teachers a way to teach multiple skills in less time and in small groups. Multiple academic and functional skills could be addressed throughout the school day. This is not to say that special education teachers need to only provide reading experiences around functional skills; it simply provides a way for teachers to teach needed content for students with significant intellectual disabilities within an academic context. This method may be a

way to prevent the loss of much-needed functional skill instruction. Teachers who are asked to only teach academics, may be able to teach both literacy and functional skills at the same time.

Teachers may begin thinking about how to link instruction to Bloom's taxonomy when teaching students to read about concepts, comprehend concepts, and then apply the concepts to real life. In this study the teacher was able to instruct students to answer comprehension questions and demonstrate application of the reading material. Browder et al. (2011) provide examples of how comprehension questions are based on Bloom's Taxonomy of knowledge. According to Karvonen, Wakeman, Flowers, and Browder, (2007) teachers tended to rely on the first level of Bloom's taxonomy or use what they call "awareness" level. For example students would only be expected to show awareness that they were being read a story. Browder et al. (2011) explored different levels of comprehension (easy, medium, and high) for each level of Bloom's taxonomy for students who may be at different levels of comprehension. For students who have limited or no verbal communication in addition to significant intellectual disabilities they could demonstrate comprehension by performing what was read to them. In addition to pointing to text or pictures there are few options for students to demonstrate what they know to show comprehension. As noted in Browder et al. (2011) the student may be asked to act out what happened in the story. If a child with significant intellectual disabilities is able to read about a functional skill and later perform the skill under the correct and needed conditions it seems that this would be a form of comprehension such as application. Perhaps extensions of this

study could enable students to meet that level of skill acquisition based on Bloom's taxonomy.

The special education teacher in this study noted that he found this method to be very efficient and he enjoyed using story based instruction and functional skill instruction. The special education teacher noted he would use this approach to teach other types of functional skills.

Limitations

There are several limitations to this study. First, it is limited to only one functional skill, future studies would need to evaluate the effectiveness of this approach for other functional skills. Second, the small number of participants limits the ability to generalize the results to all students with significant intellectual disability. Replication across other learners with significant intellectual disabilities will need to be done to show generalization of the results. Third, there was no generalization across teachers. Only one special education teacher provided the instruction to the small group of students. The results might be different if another teacher were to implement the instruction. Fourth, no data were taken on the typically developing students who participated in the small reading groups. Data on reading fluency, or comprehension might show change. Data such as their views on participating in the group with students with significant intellectual disability may be interesting. Finally, this study was conducted with elementary school students. The possibility to expand this work to middle and high school students warrants further exploration.

Conclusions and Future Research

There are several interesting areas of research to explore beyond this study. First, future studies would need to evaluate the effectiveness of only teaching the students with the story-based instruction to read about functional skills and assessing students to see if they were able to learn the functional skills without the use of supplemental systematic instruction. Many people are able to read about skills and perform them. This approach may hold some promise for folks with significant intellectual disability and provide a route where teachers can provide both story-based and functional skills instruction. Second, research is needed to determine if the intervention leads to skill mastery in fewer sessions than with systematic instruction alone. Third, research can be conducted to determine if the intervention can be a model for demonstrating a level of comprehension on Bloom's taxonomy, such as application. Finally, research is needed to explore how to prepare special education teachers to blend both story-based and functional skill

instruction using small inclusive reading groups.

In conclusion, this study adds to the rapidly growing body of research that indicates students with significant intellectual disability are able to learn emergent literacy skills beyond basic sight word reading. It also indicates that story-based instruction can be taught in inclusive small reading groups. It shows that students with significant intellectual disability are acquiring emergent literacy skills in relatively few training sessions. Students with significant intellectual disability in this study and the study conducted by Mims et al. (2009) show the ability to generalize correct responses on the story based task analysis across other unfamiliar books. Research is needed to fully understand if story-based instruction could be used to teach students with significant intellectual disability a variety of other functional skills.

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Video Self-Modeling Via iPad Minis to Promote Sustained Attention of a Student with High-Functioning Autism in General Education

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Abstract: Growing numbers of students with autism spectrum disorder (ASD) are educated in general education classrooms. Many studies on effective interventions in ASD have centered on video modeling (VM) and video self-modeling (VSM) to teach a variety of skills. While considerable literature exists on VM/VSM to address the social communication, functional, vocational, and behavioral needs of this population, studies targeting academic skills in general education classrooms have only recently emerged. This study examined the impact of VSM, delivered using video iPad minis, on the sustained attention of a student with high-functioning ASD during general classroom instruction. Using an ABAB reversal design, results indicated positive treatment effects, with the participant increasing attending and on-task behaviors during the VSM intervention and maintaining these behaviors. Recommendations and future research directions are described.

Autism spectrum disorder (ASD) is the most rapidly growing developmental disability, ranks as the 6th most commonly classified disability in the U.S., occurs in all social, racial, and ethnic groups, and is estimated to currently affect a sobering 1 in 68 children (Center for Disease Control and Prevention, 2014). While considerable literature exists on strategies to address the social/behavioral needs of children with ASD, the literature on academic and instructional techniques is less prolific, with research-based investigations and supplementary teaching recommendations for children and youth with ASD only recently emerging (Arick, Krug, Fullerton, Loos, & Falco, 2005; Hart & Whalon, 2012; Marks, Shaw-Hegwer, & Schrader, 2003; Whalon & Hart, 2011). Although schools are serving more students

with ASD than ever before, teachers often feel ill-equipped to meet the needs of such students, making evidence-based strategies to enhance on-task behaviors and academic engagement of students with ASD crucial and well timed. Today, an urgent educational challenge facing schools is to ensure general and special educators not only are prepared to include students with ASD, but also are able to instruct them effectively in alignment with grade level standards (Loiacono & Valenti, 2010).

Video modeling (VM) and video self-modeling (VSM) have demonstrated efficacy as evidence-based practices for individuals with ASD and have been used to increase communication, functional, play and social skills as well as treat a variety of maladaptive

behaviors (see Bellini & Akullian, 2007; Delano, 2007; Gelbar, Anderson, & McCarthy, 2011; Wong et al., 2014 for reviews). Results from a meta-analysis suggest that VM and VSM are not only effective interventions for individuals with ASD, but they also produced comparable treatment, maintenance, and generalization effects when employed across settings including home, school, and clinics (Bellini, Peters, Benner, & Hopf, 2007). Both VM and VSM present individuals with ASD a model of a targeted behavior performed to mastery (Gelbar et al., 2011). The main difference between VM and VSM is that in VSM, the child with ASD serves as the video model, while in VM, the target behavior is performed by another individual (e.g., typically-developing peer).

VM and VSM are considered powerful approaches as they support the needs of students with ASD and promote appropriate behaviors rather than exclusively focusing on decreasing negative behaviors (Bellini & McConnell, 2010). For example, learning from a live model can be difficult for individuals with ASD because they often show deficits in their ability to engage in imitation and observational learning (Plavnik & Hume, 2013) and struggle to differentiate important information from extraneous details (Tsatsanis, 2005). VM and VSM remove superfluous information and isolate the target behavior (Bellini et al., 2007). Additionally, individuals with ASD tend to be more visual learners, and VM and VSM profit from this asset by providing a visual model of a target skill (Bellini et al., 2007). Moreover, VSM may serve to encourage self-efficacy as it offers the student with ASD demonstrable, visual confirmation that he/she is able to perform the task efficiently (Buggey,

Hoomes, Sherberger, & Williams, 2011).

In spite of evidence documenting the effectiveness of both VM and VSM, some gaps still exist in the literature. For example, evidence suggests that although VM and VSM are considered effective practices, VSM may have a more pronounced impact for individuals with ASD in some instances, depending on factors such as the type of task or student characteristics (Buggey et al., 2011; Marcus & Wilder, 2009). However, a relatively small number of studies use self as model (i.e., using individual children with ASD as participants) (Buggey et al., 2011; Marcus & Wilder, 2009), highlighting the need to further investigate the effect VSM has on students with ASD. Moreover, the evidence base of VSM has primarily centered on the communication, social skills, and behavior of children with ASD with less evidence of VSM's impact on academic skills or behaviors (Odom, Collet-Klingenberg, Rogers, & Hatton, 2010), particularly in general education. It has been recommended that researchers explore the role of VM/VSM to improve the skills of students with ASD in academic contexts (Delano, 2007; Hart & Whalon, 2012).

VSM may be one approach to teach learners with ASD how to maintain attention, sustain academic focus, and engage in discussions about academic content. Children with ASD show difficulties with executive functions, sustained attention, and joint attention (Kasari, Freeman, & Paparella, 2006). They also are challenged to perceive and recognize similarities between different stimuli, which cause problems with generalizing information (Wong, Karasi, Freeman, & Paparella, 2007). Furthermore, additional diagnoses also impact their academic performance as a subset of

students with ASD also has a co-morbid diagnosis of Attention-Deficit Hyper-activity Disorder (ADHD, 31%, Lecavalier, 2006).

Such attention challenges present a further problem for students with ASD attempting to engage in classroom discussions given the nature of classroom discourse. Classroom discourse is comprised of reciprocal interactions to learn information (Cazden, 2001). Classroom interactions often begin with teacher initiation followed by student response, then teacher evaluation of that response. These interactions increase in complexity because precise interpretation involves accurately attending to and comprehending cues such as gaze, proximity, intonation, and volume, and may include multiple communication partners (Cazden, 2001). Because students with ASD have difficulty attending to multiple forms of stimuli, distinguishing relevant from extraneous information, and shifting attentional focus (Tsatsanis, 2005) such classroom interactions are inherently difficult for them (Tager-Flusberg, Paul, & Lord, 2005), as they have trouble interpreting both nonverbal cues and discourse (Loveland & Tunali-Kotoski, 2005).

The purpose of this study was to teach a 4th-grade student with ASD to attend and maintain on-task academic behavior during learning activities in the general education classroom using VSM delivered by an iPad mini. One of the criticisms of VSM is that it may be more time consuming than VM (Gelbar et al., 2011). The iPad mini was chosen because it enables the task of taking and editing video to be more efficient, thereby facilitating the production of effective self-modeling videos. Moreover, it is small and a less stigmatizing technology, enabling

users to create “in the moment” learning. For many students with ASD who struggle to learn and participate in academic contexts, creative technologies linked to evidence-based approaches such as VSM can serve as potent interventions to augment academic skills and provide a faster, more accessible path to learning than would be otherwise feasible (Hart & Whalon, 2012).

Method

Participant

Carlos was a 9 year old, 4th grade student with ASD who had been evaluated due to his difficulty staying on task, focusing attention, and academic difficulties. While in 3rd grade, Carlos was diagnosed with ASD by his pediatrician. His individualized education team identified that Carlos had significant speech delays in addition to social and cognitive deficits. Since then, Carlos has been receiving speech and language and occupational therapy in addition to academic supports in a resource classroom for reading, writing, and mathematics.

In 4th grade, Carlos spent 80% of his school day in a 4th grade general education classroom where he took part in grade level lessons and activities with other 4th grade students without disabilities. His classroom teacher, Mr. Navarro used standard accommodations as well as a modified math curriculum during classroom instruction, but Carlos continued to struggle in all academic areas. According to quarterly benchmark assessments, Carlos scored a 24% on his last math assessment, a 43% on the last reading assessment, and a 17% on the writing portion of the assessment. Carlos is also able to read 115 words a minute at a fourth grade level and his classroom teacher has stated that Carlos is currently at a second grade level in

writing and mathematics, but noted that Carlos has extreme difficulty paying attention in class. Mr. Navarro also stated that Carlos has difficulty staying focused on and completing his classroom assignments.

Observations of Carlos in his general education class during the baseline period indicated that he was generally off-task during academic activities, including whole-group discussion, small group activities, and independent seatwork. Carlos was often observed to be quietly off-task, meaning that he was not overtly disruptive, but rarely appeared to be academically engaged in learning activities, regardless of the form they took. During learning activities, Carlos would often manipulate the materials in his desk or backpack, stare at the various posters on the wall of his classroom, or make quiet vocalizations to himself. Although his teacher demonstrated overall effective management of student behavior, he would not attempt to engage or re-engage Carlos very frequently. Like many students with ASD, Carlos initiated very few interactions with his peers and his attempts to do so tended to result in his peers ignoring him. Although his teacher described several areas of concern, he identified his most pressing goal for Carlos to be improving his level of sustained attention during learning activities. Therefore, increasing Carlos' attending behaviors during classroom instruction was the behavior targeted for intervention.

Setting

This study was conducted in a Kindergarten through 8th grade public elementary school in the southwest in a 4th grade general education classroom during daily reading instruction. The school is a highly diverse Title 1 school with a large population of culturally and

linguistically diverse students, most of whom were of Hispanic descent. Mr. Navarro's class was made up of 32 students, (20 boys and 12 girls) at a variety of academic levels. Mr. Navarro arranged the class into eight groups of four and labeled the groups by color (i.e., red table and green table) and held the students at each table accountable for one another's behaviors using a variety of reinforcers.

During the reading block, the teacher led instruction at the front of the room near the whiteboard, and circulated regularly throughout the classroom to engage students with frequent questions. In general, most students would respond verbally and enthusiastically to the teacher, and the flow of the discussion was often conversational in tone, with the teacher providing reinforcement or constructive feedback to students based on their responses. There was no paraprofessional observed to be in the classroom during any of the observed instructional sessions. Observation and video data during the baseline period revealed that Carlos would regularly lose focus shortly after learning activities began, would often become engaged with unrelated materials around him, and would generally not have the needed instructional materials (e.g., book, booklet, worksheet) open and in front of him during activities. He also did not seem to notice when his peers would attempt to direct him towards the target materials or teacher (i.e., peers would make eye contact with Carlos and then nod or look expectantly at teacher or materials). When transitioning from one activity to the next, Carlos would quickly lose focus.

Outcome Measure

Prior to the intervention, the teacher was interviewed regarding Carlos' participation in academic settings, and any competing behaviors that impacted his attention and engagement. Carlos' teacher wanted to increase his level of attention and task completion during reading instruction. Attending behavior was defined along the following four dimensions (Hart & Whalon, 2012):

- Attention to individual: Student is looking at teacher, paraprofessional, or peer while engaged in an activity/ academic game, or having an academic discussion with that person (i.e., asking a question, answering a question, giving directions, etc.).
- Attention to content/activity: Student is writing, manipulating materials needed to complete an academic activity or game (i.e., reading aloud, reading silently, flipping pages in text, flash cards, cut and paste, word games, erasing, etc.)
- Transitioning to or from activity: Student is gathering materials needed to begin a new activity (i.e., sharpening pencil, getting out notebook/book, etc.).
- Other: Student is looking at or manipulating objects or materials that are not needed for the academic activity/task. This may include a repetitive/stereotypical behavior such as rocking, hand flapping, pencil twirling etc.

Experimental Design and Procedure

A single-subject, ABAB reversal design was used to evaluate the effectiveness of the VSM-iPad mini intervention in this study. An ABAB design, or reversal design, permits the confirmation of a treatment effect by showing

that behavior changes systematically with conditions of No Treatment (baseline) and Treatment (Barlow & Hersen, 1984).

Baseline data was collected until Carlos' attending behavior was stable or descending and lasted approximately 2 weeks over seven instructional sessions. Intervention data was collected for approximately 5 weeks over 20 instructional sessions. Following 20 sessions of Phase B, the VSM-iPad mini intervention was withdrawn and return baseline conditions continued for a total of 2 weeks with 10 data points. In the second intervention phase (B), the VSM-iPad intervention was resumed for an additional 5 days with five instructional sessions to ascertain the impact of the intervention a second time. Lastly, two additional maintenance data points were collected three and four weeks following the removal of the intervention.

The authors of the study and one research assistant collected all data by videotaping each instructional session throughout all study phases. Analyzing the video data allowed observers to return to the video for any specific incidents in the data requiring further analysis or exploration. During observations of instruction, the observer sat several feet away from the participant, set up the iPad zoomed in on him, and made efforts to remain unobtrusive by working on a laptop or engaging in other activities that deliberately appeared unconnected to the participant.

Partial interval recording. Partial interval recording (PIR) was used in this study. PIR involves recording an occurrence if the target behavior occurs at any point during an interval. PIR of the target behavior (e.g., attention, as defined above) was coded during 15-minute instructional segments of teacher-

led discussion. Each 15-minute lesson segment was divided into 60, 15-second observation intervals. Using partial interval recording, observers evaluated the video data, marking down whether attending behavior occurred any time during the interval by placing an "X" for occurrence and an "O" for non-occurrence. Once the recording was complete, the number of intervals in which attending behavior was observed were counted and a percentage of intervals with the behavior was calculated.

Because Carlos' attending behavior tended to occur for only relatively short periods of time, if at all, partial interval recording was determined to be most appropriate to evaluate the data. One advantage of this method is that it provides an estimate of frequency and duration of a behavior, and provides information about where behaviors are occurring across observational sessions, which could assist in determining which types of instructional activities might capture Carlos' attention and engage him more effectively (Richards, Taylor, & Ramasamy, 2013).

Baseline. In each baseline phase (A), Carlos was observed during 15-minute instructional sessions in his reading classroom setting. Baseline consisted of "business as usual" with classroom staff conducting regular instruction and behavior management routines. Carlos' rate of attending behavior was recorded for seven sessions, until his observed attention was stable or descending.

Video Self-Modeling (VSM). The VSM conditions (B) were the same as baseline with the addition of VSM delivered via the iPad mini. After observing Carlos in the classroom, a video self-modeling script was created with

the teacher in order to target the specific observable manifestations of attending behavior. Because Carlos had difficulty demonstrating examples of attending behaviors, his special education teacher provided verbal prompts while videotaping. The camera on the iPad mini was used to video Carlos displaying attending behaviors including maintaining eye contact with his teacher during teacher-led discussion, maintaining eye contact with the materials utilized during instruction, and engaging in task completion. Next, the video was downloaded onto a Macintosh MacBook pro laptop. Videos were organized using folders that were titled VSM script, Baseline I, Intervention Phase I, Baseline II, Intervention Phase II, and Maintenance. Each file was also organized using the date and phase descriptors (i.e., 110513_Intervention Phase I).

The researchers used iMovie to edit the videos to remove any teacher prompting and highlighted *only* the desired behavior (i.e., attending behaviors) in a 2-minute video clip, which included a brief directive on the screen accompanied by the special education teacher's voice indicating, "Carlos knows how to pay attention in class. Paying attention means keeping eye contact with my teacher, staying focused in class and not getting distracted, and completing all of my work." After the short directive, Carlos watched a video of himself engaging in the desired behaviors for a period of one minute. Then, a second narrated directive appeared on the screen stating that "When Carlos pays attention in class, he gets to play games on the iPad. Good job Carlos!" Just prior to the start of reading class each morning, Carlos was directed by his teacher to view the 2-minute video clip on the iPad mini at least 2

times (approximately 3-5 minutes; Buggey, 2005).

Treatment fidelity. The teacher was administered a form with boxes representing the days of the week. He was asked to check the box on each day Carlos observed the video (Bellini et al., 2007). The teacher indicated that the student viewed the video prior to instruction on each day of the intervention, and this was corroborated on the video recordings from each session.

Inter-observer agreement (IOA) of the dependent variable. The study authors and a research assistant coded 30% of the data across each phase (i.e., baseline, intervention, return to baseline, re-introduction, and maintenance). Inter-observer agreement was based on an interval-by-interval appraisal of agreement. That is, each observer's recording of occurrence and nonoccurrence was compared for each interval. Reliability was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Agreement occurred when all observers independently recorded the same number of intervals in which attending behaviors were evident. The IOA for the target variable (attention) was 99%.

Results

Results per instructional session are shown in Figure 1. Based on visual inspection of the data, a positive treatment effect is indicated, with a functional relationship demonstrated between the VSM-iPad mini condition and Carlos' duration of attending behavior, which clearly increased during both intervention phases (B), and was even maintained, though not at the same level, in the return to baseline condition. In order to test the hypothesis that

Carlos demonstrated a relatively increased level of attention during the return to baseline condition because he acquired the actual skill, we decided to obtain two additional maintenance data points three and four weeks after the intervention had been removed entirely. In doing so, it was confirmed that Carlos continued to demonstrate a consistent and relatively increased level of attention during classroom activities even after the intervention had been removed a month previously.

During baseline, Carlos demonstrated attending behavior an average of 15% of the time during direct instruction in his general education classroom. However, his attending behavior increased with the introduction of the initial intervention phase in which Carlos demonstrated an average of 90% attending behavior. During the second baseline phase, Carlos's attending behavior decreased to an average of 62%. However, Carlos's attending behavior increased with the re-introduction of the second intervention phase to 93% of the time. Finally, the two additional maintenance data points showed Carlos still attending at a relatively high rate though a decrease was evident. At maintenance, Carlos demonstrated attending behavior during classroom instruction on average 72% of the time. Table 1 depicts the percentage of time Carlos manifested attending behavior across phases as well as the calculated difference between percentages at each phase. This is helpful in providing an additional metric for interpreting the findings and understanding the level of increase in attention during intervention phases and corresponding decrease in the target behavior during return to baseline phases.

Figure 1. Percentage of time student sustained attention during academic instruction across phases.

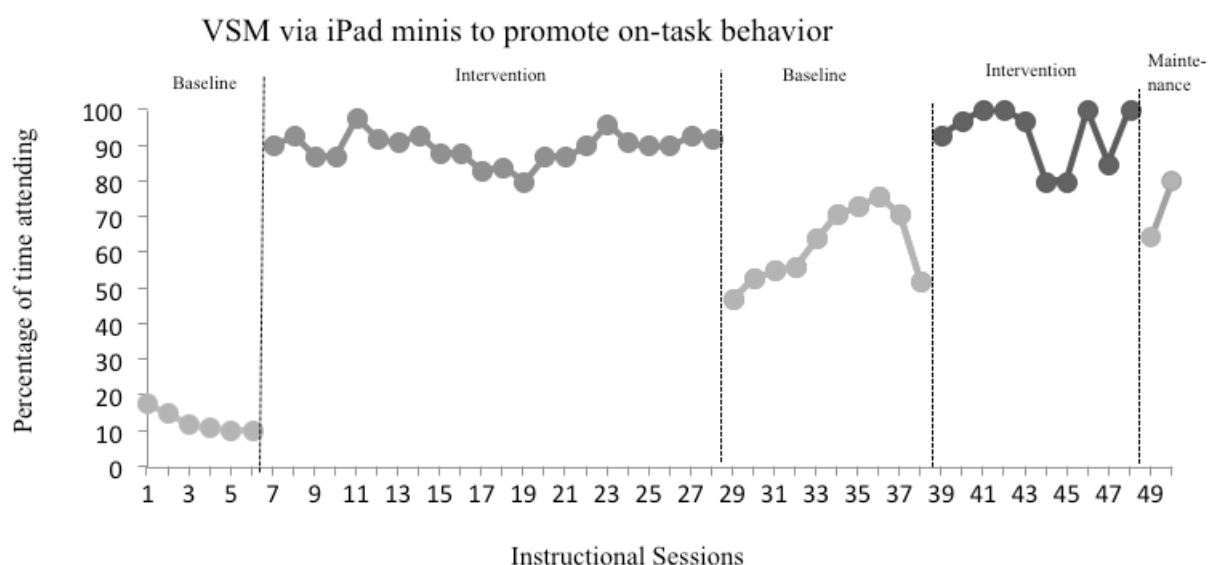


Table 1. Percentages of time of attending behavior and differences between study phases

Stages	Percentage of time demonstrated attending behavior	Difference between percentages at each stage
Baseline I	15%	
Intervention I	90%	+75%
Baseline II	62%	-28%
Intervention II	93%	+31%
Maintenance	72%	-28%

Discussion

Results suggest that the VSM intervention delivered using the iPad mini was effective for increasing the duration of attending behavior of a 4th-grade student with ASD in the context of a general education, reading class setting. Although there was some minor

variability during the VSM conditions, substantial increases in Carlos' duration of attention were consistent across both intervention phases. Although there was a corresponding decrease in attention following the removal of the VSM condition, the maintenance of a relatively high level of

sustained attention during the return to baseline condition also suggests that attention may be a skill that sustains once it is acquired, and at the very least, that it appears the student acquired it in this case based on the maintenance data points.

Although not specifically measured in this study, observational notes taken during all phases of the study suggested that, as Carlos increased his ability to attend and complete his work, both his peers and his teacher began interacting with him at a greater rate and in a more positive manner. Whereas the majority of teacher interactions with Carlos observed during baseline were corrective in nature (e.g., “Carlos, pay attention!”), later observations during subsequent phases of the study indicated the teacher engaged Carlos with more words of encouragement and positive reinforcement. To a lesser extent, Carlos was also observed to interact more successfully with his peers during small group activities, and his peers began interacting with him more frequently. As a result, the teacher has expressed interest in a follow-up study to target improving Carlos’ level of classroom participation during academic activities.

This study makes several important contributions to the current knowledge on effective interventions for students with ASD, and in terms of VSM specifically. First, although the iPod and other personal digital assistant (PDA) devices have recently been used to deliver video modeling interventions (Cihak, Fahrenkrog, Ayres, & Smith, 2010; Mechling, Gast, & Seid, 2009), this study is the first to utilize an iPad mini to deliver VSM, which given its smaller size, may be more useful for students without significant intellectual disability, as in Carlos’ case.

Secondly, this VSM study was conducted with a unique population in that the student was one with high-functioning autism and one who received nearly all of his academic instruction in the general education setting; in fact the study itself took place entirely in the general education classroom. Third, the focus of the study was on an academic variable, whereas other video modeling studies have focused on behavioral, social, leisure/play, language, and functional life skills (Bellini & Akullian, 2007; Buggey, Toombs, Gardener, & Cervetti, 1999; Cihak et al., 2010; Mechling et al., 2009; Whitlow & Buggey, 2003). Fourth, responding to the call for video modeling interventions to be evaluated in natural settings (Delano, 2007), this study was conducted in the naturalistic classroom as opposed to a more controlled separate educational setting (e.g., self-contained, resource room) or lab setting. Nonetheless, the intervention was successfully implemented relatively unobtrusively and the teacher reported ease of use, which may encourage future research in settings where children typically receive their instruction and may also enable general education teachers to implement evidence-based practices with their included students.

Teacher Preparation Implications in ASD

Classroom instruction in both general and special education settings involves a substantial amount of teacher talk, and students with ASD in these settings are less likely to demonstrate behaviors associated with engagement (Carnahan, Basham, & Musti-Rao, 2009; Carnahan, Musti-Rao, & Bailey, 2009). The social, reciprocal nature of classroom instruction may even reduce the ability of children with ASD to participate in certain academic activities, particularly group instruction (Carnahan, Musti-Rao, & Bailey,

2009). Evidence suggests that students with ASD exhibit higher levels of engagement when instruction is conducted in smaller groups, at a fast pace, and with a lot of teacher direction using short, explicit language (Kamps, Leonard, Dugan, Boland, & Greenwood, 1991). Students with ASD also demonstrate a greater level of engagement when teachers incorporate a variety of media and materials in their lessons (Kamps et al., 1991).

Although there is a high likelihood that both general and special educators will come across students with ASD in their teaching, particularly those without comorbid intellectual disability, consistent with the findings of the National Research Council (2001), the majority of teacher graduates receive minimal to no preparation in evidence-based practices for students with ASD (Morrier, Hess, & Heflin, 2011). In fact, personnel preparation remains one of the most tenuous elements of effective programming for children with autism spectrum disorders and their families (NRC, 2001). It is therefore not unexpected to find that teachers are often lacking in their capacity to employ evidence-based, instructional strategies with students with ASD (Hess, Morrier, Heflin, & Ivey, 2008).

Limitations and Future Research Recommendations

Specific limitations that may affect the overall interpretations of this study are important to consider. In accord with single subject research, a small sample size was analyzed, and in this investigation, due to the constraints of the classroom setting and the large number of general education students, the intervention was explored with only one student. Moreover, only one academic skill

was targeted for intervention. With this in mind, conclusions must be contextualized and interpreted within the study's setting.

Additional studies with larger sample sizes are needed and should include analysis of multiple, target academic variables to verify the results more comprehensively and validly. Moreover, future research should also address the generalization of skills to other classroom contexts throughout the school day, which this study did not attend to. Lastly, it has been recommended that VSM be explored in tandem with additional evidence-based intervention methods in order to strengthen efficacy (Collier-Meek, Fallon, Johnson, Sanetti, & Delcampo, 2012). In this study, positive reinforcement supplemented the VSM iPad intervention. Future researchers should consult relevant literature to determine whether VSM should be implemented alone or which empirically supported practices may enhance its effectiveness.

In summary, poor outcomes for youth with ASD point to the need for a re-evaluation of the quality and quantity of academic preparation individuals with ASD receive throughout their schooling (Fleury et al., 2014). As such, advances in research-based, academic interventions for students with ASD who are included in general education and other settings are greatly needed. VSM has been identified as an evidence-based practice for this population of students (Wong et al., 2014). Although widely recommended, school practitioners do not regularly implement evidence-based interventions (Collier-Meek et al., 2012). This may be due in part to the fact that many investigations are not conducted in naturalistic school settings and do not provide sufficient details to inform practicing teachers on how they can effectively incorporate such approaches as

part of their naturally occurring instructional routines (Hart & Whalon, 2012). Future studies employing VSM by way of innovative technologies and that are accompanied by informative implementation steps may result in the development of more authoritative,

useful guidelines for educational practice and feasible application for teachers seeking to meet the academic needs of children and youth with ASD.

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Comparison of Video Modeling and Video Feedback to Increase Employment-Related Social Skills of Learners with Developmental Disabilities

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Abstract: The purpose of this study was to compare the effectiveness of video modeling and video feedback on independent correct responding of vocational tasks and use of appropriate employment-related social skills of four young adults with autism and/or developmental disabilities. The video modeling condition involved showing positive examples of the complete task with embedded appropriate social skills on an iPad prior to work. The video feedback condition involved video recording learners with an iPad while they worked and asking them to evaluate their own performance by reviewing the videos. All participants had an in-school job of delivering passes to teachers throughout the building. Data were analyzed within the context of a multiple treatments with reversal design and results indicated that although both conditions resulted in improved independent correct responding and use of targeted social skills, three of the four participants demonstrated more substantial gains with the video feedback condition while the fourth demonstrated similar results across conditions and improved performance with video feedback only after the video modeling condition was presented.

One day, as we were working with a young lady with autism who was responsible for collecting recycling throughout her school building, we followed along behind her and were collecting data on each step in the recycling task analysis to determine if our intervention had an impact on her independent task completion. The intent of the intervention was to increase her ability to complete the task independently so that she could perform the job without the assistance of her job coach in the future. At the time, she was participating in a study where she

watched a video of her job coach performing the recycling task prior to going to work (i.e., video modeling). As we followed, we could hear her reciting lines of her favorite movie scenes as she worked. Because we did not want to add additional prompts and because her scripting behavior was not distracting her from the task at hand, we continued. In most classrooms, she was expected to quietly enter the back of the room, pick up the recycling bin, dump it into the large wheeled recycling receptacle, replace the emptied recycling bin in its original location, and walk to the next

classroom to repeat the process. We were quite impressed and pleased with the impact of our intervention because she was completing almost every step in the task analysis correctly and independently! Our silent celebration quickly turned to disbelief, however, when the following scenario unfolded. A teacher came to the door of one of the classrooms and said, “May I help you?” Not only did she ignore the teacher and his question, she also pushed her way past him into the classroom, hit him with the recycling bin as she moved it out into the hallway, and continued to quietly sing a song from the *Little Mermaid*, ignoring him as he thanked her and moved out of her way while she replaced the bin in the classroom. Although her task completion was accurate and independent according to our task analysis, the quality of her performance was abysmal. It was at this moment we realized that our video modeling intervention could have been far more effective had we emphasized not only the task-related requirements of the job but also the social behaviors required to perform the job effectively.

Video-based instruction is emerging as an effective instructional technique. For example, in the last decade, several researchers have conducted literature reviews (Ayres & Langone, 2005; Banda, Dogoe, & Matuszny, 2011; Delano, 2007; Hitchcock, Dowrick, & Prater, 2003; Mechling, 2005; Shukla-Mehta, Miller, & Callahan, 2010) and meta-analyses (Bellini & Akullian, 2007) on video-based instruction demonstrating the effectiveness of video modeling and video prompting procedures for improving the skill level of individuals with disabilities across a wide range of skills. Video modeling is an instructional approach that involves having learners view videos of an entire skill

sequence or situation prior to engaging in the demonstrated skill or activity. It has been used effectively for improving vocational skills of individuals with Autism Spectrum Disorders (ASD) and/or Developmental Disabilities (DD) in employment settings (Allen, Wallace, Greene, Bowen, & Burke, 2010; Allen, Wallace, Renes, Bowen, & Burke, 2010; Cihak & Schrader, 2008; Goh & Bambara, 2013; Van Laarhoven, Van Laarhoven-Myers, & Zurita, 2007; Van Laarhoven, Winiarski, Blood, & Chan, 2012), and has also been shown to be effective for improving social skills (Bellini, Akullian, & Hopf, 2007; Bidwell & Rehfeldt, 2004; Buggey, 2005; D’Ateno, Mangiapanello, & Taylor, 2003; Maione & Mirenda, 2006; Nikopoulos & Keenan, 2003; 2007; Simpson, Langone, & Ayres, 2004). Unfortunately, there is very little research available reporting the effectiveness of video modeling on social skills required in employment settings.

Another video-based strategy often used for improving social skills or decreasing challenging behavior is self-evaluation video feedback. With self-evaluation video feedback, learners are shown a video of their own performance following task engagement (e.g., they are recorded as they engage in the task and review the tapes of themselves following practice). It often involves having learners review their performance while answering evaluative questions. For example, in a study by Kern-Dunlap, Dunlap, Clarke, Childs, White, and Stewart (1992), students with severe emotional and behavioral difficulties observed their own videotaped interactions that occurred during a peer activity. They reviewed the tapes and had to answer, “yes” or “no” statements regarding whether or not they engaged in desirable peer interactions during each 30-sec interval on the

video. Results indicated that desirable behavior increased and undesirable behavior decreased with the intervention. Self-evaluation feedback is often part of a treatment package and has been used to reduce challenging behavior (Embregts, 2000; Embregts, 2002; Embregts, 2003; O'Reilly, O'Halloran, Sigafos, Lancioni, Green, Edrisinha, et al., 2005), to teach social communication (Maione & Mirenda, 2006; State & Kern, 2012; Thieman & Goldstein, 2001), daily living (Lasater & Brady, 1995), and shopping skills (Haring, Kennedy, Adams, & Pitts-Conway, 1987).

Self-evaluation feedback is often used in conjunction with antecedent-based strategies and two sets of researchers used video feedback paired with antecedent-based strategies to teach social communication to individuals with ASD. For example, Thieman and Goldstein (2001) presented a combination of social stories and written text cues prior to social situations to effectively teach five children with ASD social skills such as securing attention, initiating comments, initiating requests, and contingent responses when engaged in peer-mediated social interactions. Each social interaction was video-taped and participants evaluated their performance of targeted skills following the sessions. Maione and Mirenda (2006), on the other hand, used video modeling to teach a child with ASD social language with peers during play-based activities. Video modeling was implemented across three play activities and although social initiations and responses increased with the video modeling condition alone, much greater gains were observed when video feedback and reinforcement were added to the treatment package for two of the three activities.

In some instances, researchers embedded social skills into a video modeling sequence to improve both the skills-based and social aspects of a task. For example, Bidwell and Rehfeldt (2004) used video modeling to teach three adults with severe intellectual disability how to make coffee (skill-based) and to initiate serving coffee to a peer and sitting down with peer to drink it (social). The intervention consisted of video modeling and verbal praise and was effective for improving both the domestic skill and social initiation for all three participants.

While most research on social skills instruction for individuals with ASD and DD has focused on the acquisition and generalization of these skills in school, community and home settings, few studies conducted over the past 15 years have addressed the social skills necessary for success in employment situations. However, in a recent review of the literature, Lee and Carter (2012) identified instruction in work-related social skills as one of seven critical components for effective transition for individuals with ASD. Over the years, a number of researchers investigated the specific social skills that are necessary for successful employment. Results of several surveys (Foss & Peterson, 1981; Ju, Zhang, & Pacha, 2012; Rusch, Schutz, & Agran, 1982; Rusch & Mithaug, 1980) found employers expect workers with disabilities to possess both work-related and non-work-related social skills. Work-related social skills include skills such as following directions, accepting criticism or authority, staying task focused and able to work independently without direct supervision, and requesting assistance when needed. Non-work related social skills include skills such as maintaining appropriate personal appearance, interacting

appropriately with co-workers (e.g., using appropriate language, showing respect to others). Many individuals with ASD and DD have difficulties with both work-related and non-work-related social skills. For example, some individuals may misinterpret social cues from supervisors or co-workers. Others may have difficulty discriminating when it is appropriate and when it is not appropriate to engage in small talk or other social exchanges at a place of work. Other difficulties could be associated with personal space, accepting criticism, or managing time independently (Hurbutt & Chalmers, 2004). Significant problems can occur when there is a discrepancy between the skill level of the individual and the skills that are expected by an employer.

Further research is needed to determine the most effective and efficient ways in which to teach employment-related social skills to individuals with ASD and DD. Lee and Carter (2012) provide a number of recommendations based on the available research literature. Among other things, they recommended social and work-related instruction be a prominent focus of the secondary curriculum for these students. They also recommend employment-related social skills be taught using evidence-based instructional practices with instruction delivered in the context in which the skills will be used. A few recent studies have been conducted that fit the guidelines proposed by Lee and Carter. For example, Gear, Bobzien, Judge, and Raver (2011) used in vivo modeling and role play to teach job-related social skills to a 20-year-old female with Down syndrome and moderate intellectual disability who worked at a university child care setting. The participant was at risk for termination because she often tried to engage co-workers in personal

conversations during tasks and did not respond appropriately when her work performance was criticized or when she was provided feedback by a supervisor. Two trainers conducted daily 20 minute sessions in a conference room at the child care center using written scripts with examples based on recent incidents that had occurred with the participant at the work setting. The job-related social skills included (a) establishing and maintaining eye contact with supervisors and co-workers during conversations and feedback, (b) waiting to speak until adults were finished speaking, and (c) giving appropriate verbal responses to directions, feedback or criticism from a supervisor. Although the participant's performance was variable, she showed improvement in all the target skills that maintained when follow-up data were collected five weeks after the conclusion of the structured instructional sessions.

In another study specifically addressing employment-related social skills, Bucholz, Brady, Duffy, Scott, and Kontosh (2008) used a combination of social stories (Gray, 2000) combined with modeling and behavioral rehearsal to address job-related social behaviors of three individuals with moderate to severe disabilities. The intervention resulted in an increase in independent requests for materials and increased work engagement for two women with moderate disabilities. At the same time, a decrease was observed in the amount of time the participants engaged in social interactions with peers when they were supposed to be working. In a second experiment, an adapted social story was successfully used with a man with severe cognitive disabilities to decrease the level of assistance he required to return to work after breaks.

To date, research investigating the effectiveness of video modeling for improving vocational skills of individuals with ASD and/or DD has focused primarily on the improvement of the skills-based aspects of the job rather than the social skills required to be successful in the employment setting. Despite the evidence supporting the use of video modeling as an effective instructional strategy for improving vocational and social skills of learners with disabilities, other than a study conducted by Morgan and Salzberg (1992), there is little research on how social skills can be improved through the use of video-based instruction in employment settings. In addition, there is little if any research available on the use of self-evaluation video feedback to teach vocational skills, which is somewhat surprising given that quality of performance and use of appropriate social skills are critical in maintaining employment. The purpose of this study was to compare the effectiveness of video modeling and video feedback on independent correct responding of vocational tasks and use of appropriate employment-related social skills of four young adults with autism and/or intellectual disabilities in an employment setting.

Method

Participants

Four young adults with Autism Spectrum Disorders (ASD) and/or Intellectual Disability (ID) participated in the study. Two of the three female participants, Ginger and Millicent, had a diagnosis of ASD and mild ID, and the other two participants, Mary Ann and Bobby, had a primary diagnosis of moderate and mild/moderate ID, respectively. The three female participants were 16 years old and the male participant was 18 years old at the time of the study. All participants

attended an inclusive public high school, attended general and special education classes, and had jobs in both community-based and school-based settings.

Ginger was a 16-year-old female with a primary diagnosis of ASD and a secondary diagnosis of intellectual disability. She was functioning at a mild/moderate range and received a score of 61 on the WIAT-III and a score of 54 on the CELF-4. Her adaptive functioning skills were measured using the Vineland Adaptive Behavior Scale and she received a score of 66, which placed her in the 1st-4th percentile. Academically, Ginger had good visual-spatial skills and also had relative strengths with basic reading and decoding, spelling, and writing (sentence formulation, structure, and mechanics), but had more difficulty with expressive language, reading comprehension, applied math, and substantive writing. She often needed prompting to engage in activities independently and reminders to use appropriate social skills in various environmental contexts.

Millicent was also a 16-year-old female with a primary diagnosis of ASD and a secondary diagnosis of an intellectual disability. She received a score of 62 on the WIAT-III and was at a mild range of intellectual functioning. Her academic strengths included spelling, decoding, sight word reading, and listening comprehension. She struggled with reading comprehension, basic math problem-solving and written expression. Millicent also required a great deal of instructional prompting to complete tasks and needed frequent reminders to use appropriate social and communication skills.

Mary Ann was also 16 when the study was conducted and had a primary diagnosis of cognitive delay. She had a moderate disability and received a score of 48 on the WIAT-III and a score of 59 on the OWLS. Her adaptive behavior was measured using the Vineland Adaptive Behavior Scale and she received a score of 62. She had very good expressive language and performed well with basic decoding and basic math skills; however, her academic weaknesses included applied math problems, reading comprehension, and substantive writing. Mary Ann was quite social but sometimes needed prompts to use appropriate social skills particularly in employment settings (e.g., talking with coworkers, using appropriate greetings, asking for assistance).

Bobby was an 18-year-old male with a primary diagnosis of intellectual disability and a secondary diagnosis of Other Health Impairment. He fell within the range of mild/moderate intellectual functioning and received a score of 61 on the WIAT-III and a score of 64 on the Vineland Adaptive Behavior Scale. Academically, Bobby had difficulty with basic reading and comprehension, math problem-solving and operations, as well as written expression and oral language. Bobby often required prompting to use appropriate social communication skills in a variety of settings.

Setting

This study was conducted in a large public high school located in the western suburbs of Chicago. The high school served approximately 4,000 students in grades 9-12 and had a freshman campus and a main campus. The main campus building, where the study was conducted, was organized by class houses. For example, there was a

sophomore class house, a junior class house, and a senior class house with academic classrooms serving students in each grade level located in close proximity to the class houses within different wings of the building. All four participants worked at the main campus of the high school and were responsible for going to class houses, collecting passes from administrative assistants, and delivering passes to students in classrooms.

Research Design

A multiple treatments with reversal design (Cooper, Heron, & Heward, 2007) was used to evaluate the effectiveness of video modeling and video feedback on independent correct responding of vocational tasks and correct use of employment-related social skills. Multiple treatments with reversal designs are used to compare the effects of two or more experimental conditions to baseline and/or each other. The sequence of conditions is typically arranged so that each experimental condition can be compared directly to an adjacent condition such as baseline (e.g., ABAB; ACAC) and/or the other experimental condition (e.g., BCBC, CBCB). A functional relation is demonstrated when one can demonstrate that the independent variable is responsible for behavior change, particularly if repetition of baseline and treatment phases approximate the original phases (i.e. return to baseline levels when intervention is withdrawn and associated change in level and trend when intervention is reinstated) and when one can demonstrate differential effects between adjacent treatment conditions (e.g., one treatment condition is associated with a higher or lower level or trend when compared to the other adjacent treatment condition). The drawbacks of this design are that it is

vulnerable to sequence effects (order of conditions) and irreversibility or carry over effects, particularly when learning takes place. To minimize the influence of sequence effects, two students, Ginger and Mary Ann, were randomly assigned to this sequence: A-B-A-B-C-B-C-A-C and two students, Millicent and Bobby, were assigned to this sequence: A-C-A-C-B-C-B-A-B (i.e., A = Baseline, B = Video Modeling, C = Video Feedback).

Research Conditions

Baseline (A). During baseline phases, participants completed the job without any instructional materials and minimal prompting from the job coach.

Video model (B). During the video modeling (VM) condition, participants watched a video model of the skill sequence (with embedded social skills) on an iPad prior to going to work in the building. Participants were told it was time to go to work and that they needed to watch the video and do what they saw in the video before departing for work.

Video feedback (C). During the video feedback (VF) condition, participants were recorded using the video camera on an iPad while they completed the job and were then asked to review their performance on each targeted skill and social skill after going to class houses and delivering passes to each classroom. Students evaluated their performance by reviewing videos on the iPad and answering questions about their performance (e.g., did you get teacher's attention; did you remember to say thank you).

Instructional Materials

For the video modeling condition, a female peer and job coach were recorded completing the delivering passes skill sequence. Social skills needed to perform the job well were highlighted in the video using voice over narration and title overlays (e.g., gain attention by knocking on the door or saying "excuse me"; look at the teacher/secretary; smile at teacher/secretary, say "thank you"). In addition, problem solving situations were also embedded within the video. For example, the video showed the peer model going into a class house and asking the secretary if there were any passes that needed to be delivered. This segment was followed by a clip showing the peer obtaining the passes in a folder if the secretary was not at her desk. Voice over narration and title overlays emphasized the alternative performance strategies for problem-solving scenarios. The video was approximately two minutes in length.

For the video feedback condition, participants were recorded while they performed the task and were then asked to review the recording and evaluate their performance by answering questions delivered verbally from their job coach (e.g., did you ask for passes; did you use an attention getter; did you smile). The questions that were asked corresponded to the steps indicated on each data sheet or the list of social skills required in the classrooms.

Data Collection and Dependent Measures

Data were collected on each step in a task analysis to measure the percentage of independent correct responses completed in the class houses. A plus was circled for independent correct responses, a minus was circled for incorrect or missing performance, and a N/A was circled in the event that the student could not complete the step due to environmental circumstances (e.g., unable to

say thank you or ask for more passes if secretary was away from her desk). Steps required in the class houses included: 1) Tell job coach where you are going, 2) Walk to class house and greet secretary, 3) Obtain passes or ask for them, 4) Say, "Thank You", 5) Ask if there are more passes, 6) Organize passes, and 7) Inform job coach of where you are going.

Data were also collected on the percentage of social skills used correctly in each classroom and were recorded in the same manner as the class houses. These included the following: 1) Use appropriate attention getter (e.g., knock on door, say "excuse me"), 2) Make eye contact with teacher, 3) Smile, 4) Use appropriate greeting (e.g., "hello", "hi"), 5) Use appropriate volume and tone of voice, 6) Say, "Thank You", and 7) Terminate conversation (e.g., goodbye).

Data Analysis

Percentage of steps completed independently in class house. Participants were assessed on how independently they performed the skills in each class house and the data were converted to percentage scores by dividing the number of steps with correct independent responding by the total number of steps in the skill sequence and multiplying by 100. In the event that a N/A was marked on the data sheet, that step was disregarded and only the remaining steps were included in the analysis and calculations.

Percentage of correct social skills displayed in classrooms. Participants were assessed on how well they performed social skills required in each classroom. Data were summarized by dividing the number of correct social skills displayed by the total

number of social skills required in each classroom and multiplying by 100.

Effect sizes. To determine the magnitude of the effect or growth for each condition when compared to adjacent baseline levels and to determine the magnitude of difference between adjacent treatment conditions, data were analyzed by computing the mean growth from (a) baseline to video modeling, (b) baseline to video feedback, (c) video modeling to video feedback (for Ginger and Mary Ann), and (d) video feedback to video modeling (for Millicent and Bobby). Effect sizes were computed using Cohen's d (Cohen, 1988) which represents the difference between mean scores in adjacent phases and/or conditions, divided by the pooled standard deviations. The following scale is generally used to interpret the magnitude of an effect based on d : Small effect- $0 < d < .2$; moderate effect- $.2 < d < .5$; large effect- $d > .5$.

Reliability

Reliability sessions were conducted by the first and second author and/or a job coach for 30% of all sessions to ensure accuracy of the data. The percentage agreement index (i.e., number of agreements divided by number of agreements plus disagreements and multiplied by 100) was used to calculate interobserver agreement for independent correct performance in class houses as well as percentage of social skills displayed correctly in classrooms. Interobserver agreement resulted in a mean score of 97% across sessions with a range of 71-100%. Reliability sessions that had scores below 85% were exclusively in the video feedback sessions and were due to the secondary observer being unable to see or hear the participant based on their position in the hallway or classroom. In these situations, the video feedback

recordings were viewed again and the most accurate score was used in the analysis.

Procedural Fidelity

In addition to conducting reliability sessions, the secondary observer also collected procedural reliability data to ensure that the treatment conditions were implemented as intended (Billingsley, White, & Munson, 1980). These measures included the following: (a) checking to ensure that the correct condition was in place for each participant based on their individual research schedule, (b) checking to ensure that the baseline and treatment conditions were presented correctly and according to protocol, (c) checking to ensure that participants attended to video or did not view a video during baseline phases, and (d) checking to ensure that no verbal or gestural prompts were given by job coaches during baseline and/or treatment phases. Procedural reliability was calculated by dividing the number of correct measures by the total number of assessed variables and multiplying by 100. Procedural reliability was conducted across 30% of all sessions and resulted in a mean score of 99% with a range of 75-100%. Surprisingly, most of the incorrect implementation variables were a result of verbal or gestural prompts being delivered by well-intentioned office staff and/or classroom teachers. These individuals were later asked to refrain from prompting students in subsequent sessions and procedural reliability improved. The only other issue that occurred was when the job coach was unable to get a good angle for recording a student's performance in one of the video feedback sessions.

Social Validation

Informal social validation surveys were given to participants and the job coaches who were implementing the treatment conditions. Participants were asked to respond to six questions which were read to them if necessary and they either wrote or dictated their responses. The questions asked which condition they preferred, if they felt that watching videos on the iPad improved their performance, and if they would like to use video-based instruction in the future. Teachers and job coaches were also asked to complete a social validation questionnaire and were asked to respond to nine questions that asked if they liked using video modeling and video feedback (why or why not) and to also indicate which condition they preferred. In addition, they were asked to indicate if they thought the conditions were effective in improving social behavior, if they thought they would use either condition in the future, and to indicate if they had any tips for improving the instructional procedures in the future.

Results

Results indicated that although both conditions resulted in improved independent correct responding and increased use of targeted social skills for all participants, three of the four participants demonstrated more substantial gains with the video feedback condition. The fourth participant demonstrated similar results across conditions and improved performance only after the video modeling condition was presented. However, results are tempered by the fact that the data are somewhat variable and demonstrate carryover effects between conditions, particularly in the latter phases of the study.

Independent correct responding in class house. Figure 1 displays the percentage of

independent correct responses for the skill sequences completed in each class house for participants who began with the video modeling condition. Ginger's data demonstrates that video modeling had very little impact on her independent correct performance as her responding did not differ much from baseline levels following the first two introductions of the treatment. However, after video feedback was introduced, her performance increased with a sharp change in level and also resulted in improvement in her performance when video modeling was re-introduced. Mary Ann's performance improved somewhat following the first introduction of the video modeling condition as can be noted in the change in level of the data from the first baseline phase; however, her performance did not differ much from baseline levels after the second introduction of video modeling. Like Ginger, her independent correct performance improved dramatically after the video feedback condition was introduced and her performance was highest during the phases in which video feedback was in place. However, both participants, particularly Mary Ann, had a great deal of variability in their independent correct performance under each condition. When the *means* of each condition were compared, both Ginger and Mary Ann performed best when video feedback was used (Ginger $M = 92$; Mary Ann $M = 73$), followed by video modeling (Ginger $M = 57$; Mary Ann $M = 38$), and baseline (Ginger $M = 56$; Mary Ann $M = 24$).

Figure 2 displays the percentage of independent correct responses for the skill sequences in each class house for participants who began with the video feedback condition. Millicent's data is displayed in the top panel and demonstrates that her independent correct

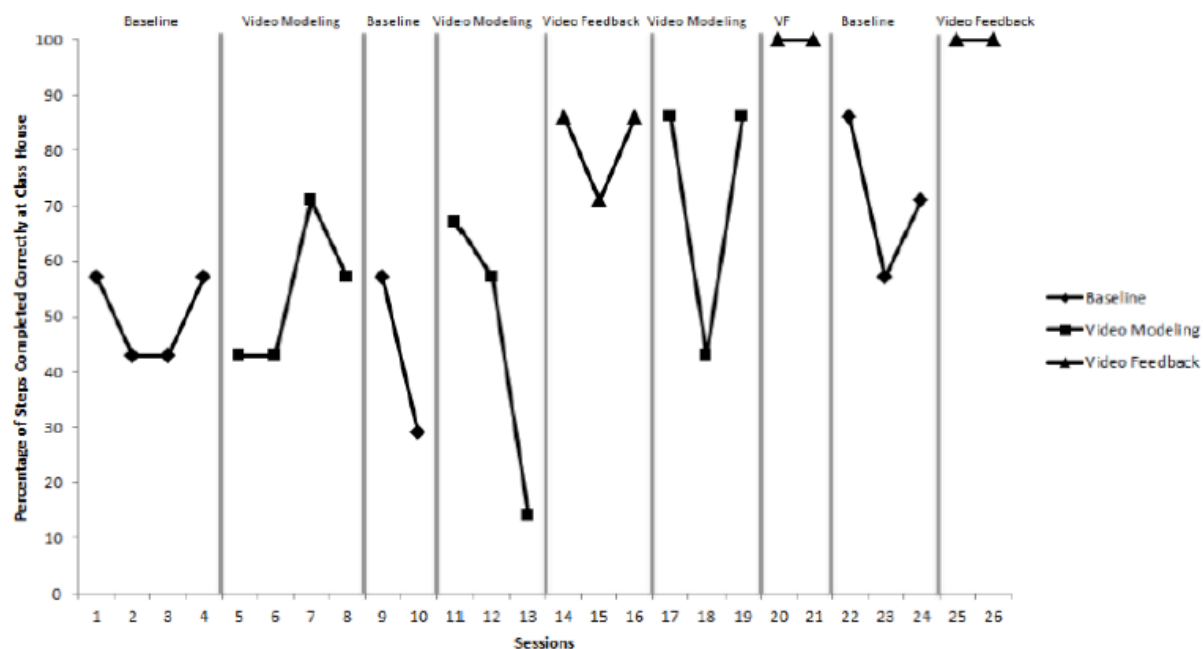
performance in the class house improved substantially after the first introduction of the video feedback condition and improved slightly after the second introduction. Her performance increased again after video modeling was introduced and then had a sharp change in level once video feedback followed the video modeling condition and then remained at a higher level with subsequent video modeling phases. Bobby's data is displayed in the bottom panel and demonstrates that his performance improved sharply following the first introduction of the video feedback condition and remained relatively high in each subsequent phase. When the *means* of each condition were compared, Millicent performed best when the video modeling condition was in place ($M = 91$), followed by video feedback ($M = 79$), and baseline ($M = 46$). Bobby, like Ginger and Mary Ann, performed best when video feedback was used ($M = 95$), followed by video modeling ($M = 88$), and baseline ($M = 75$).

Figure 3 displays effect size between conditions when measuring the percentage of steps completed independently in each class house. Effect sizes between conditions were computed using Cohen's d (Cohen, 1988) to determine the magnitude or strength of the interventions.

The largest effect, or growth, occurred from baseline to video feedback for three of the four participants. Another large effect occurred when video feedback followed video modeling. Small to moderate effects were evident from baseline to video modeling, with the exception of Millicent, who had a large effect, and when video modeling followed video feedback.

Figure 1. Percentage of independent correct responding in class houses for students who began with video modeling

Ginger



Mary Ann

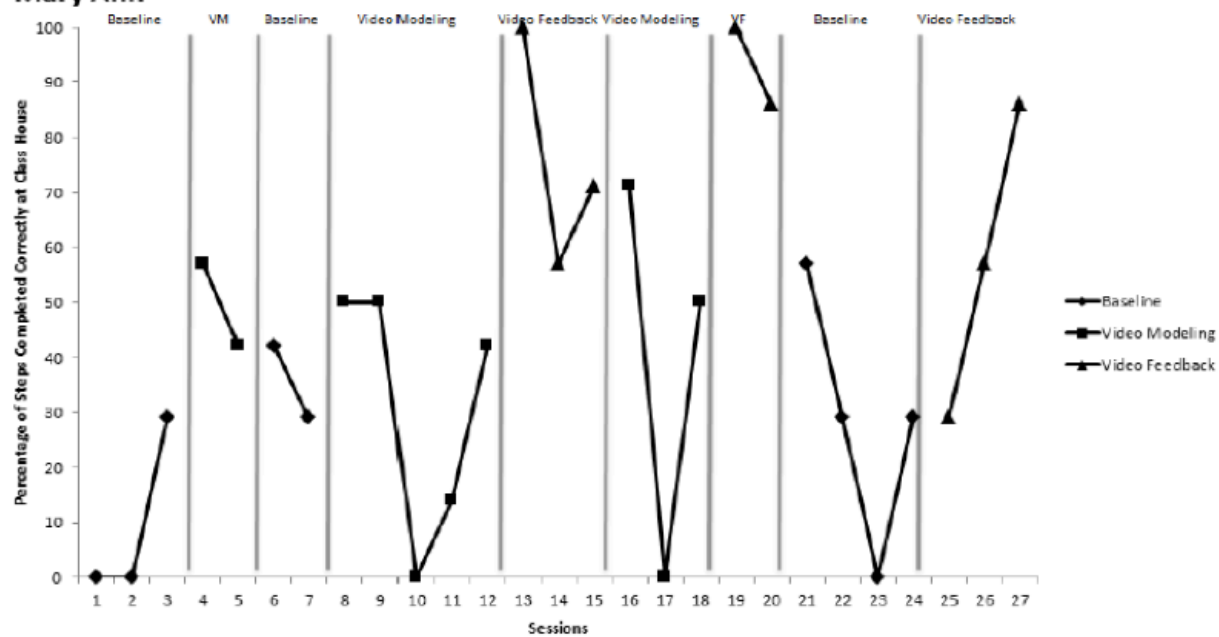


Figure 2. Percentage of independent correct responding in class houses for students who began with video feedback

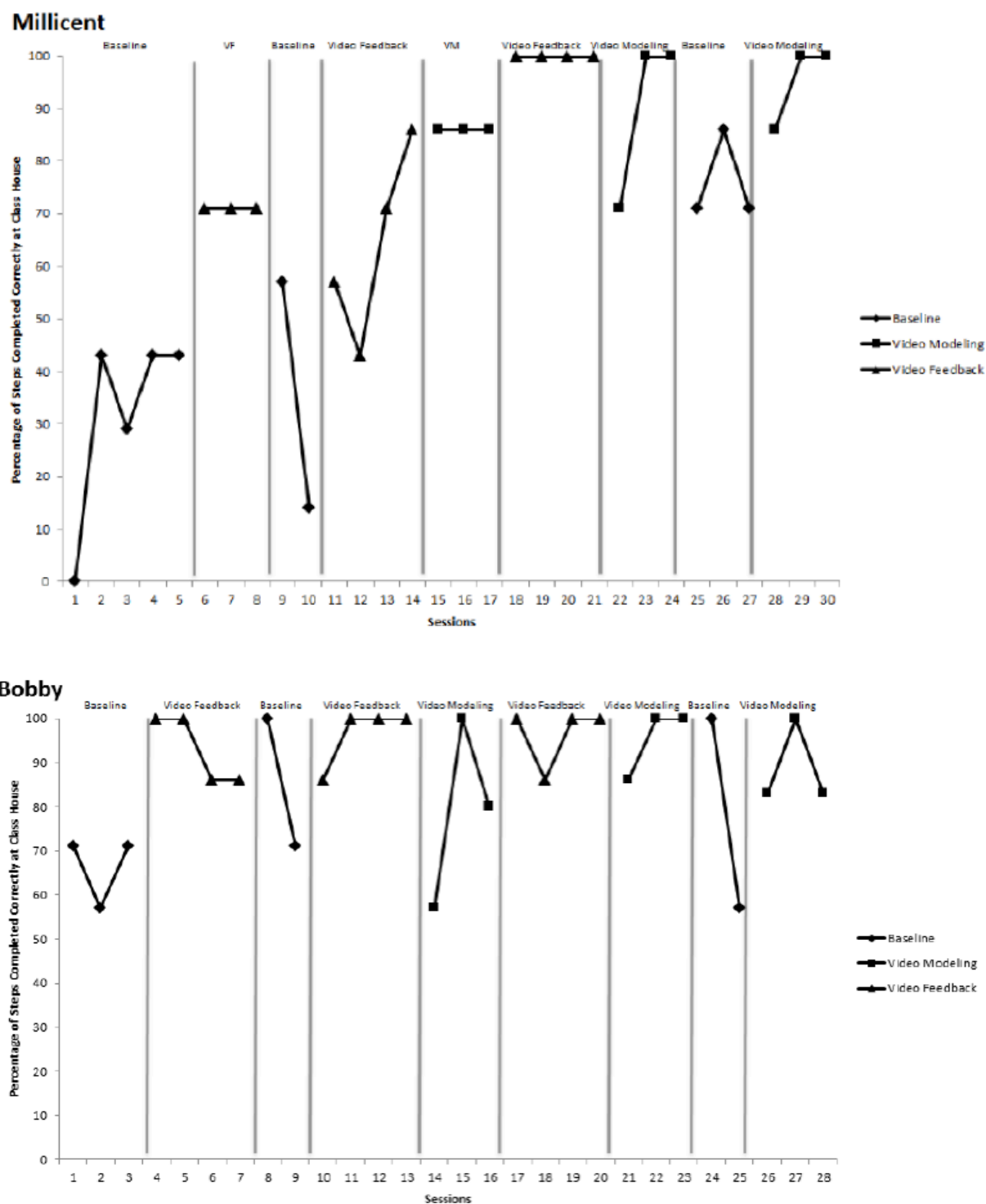
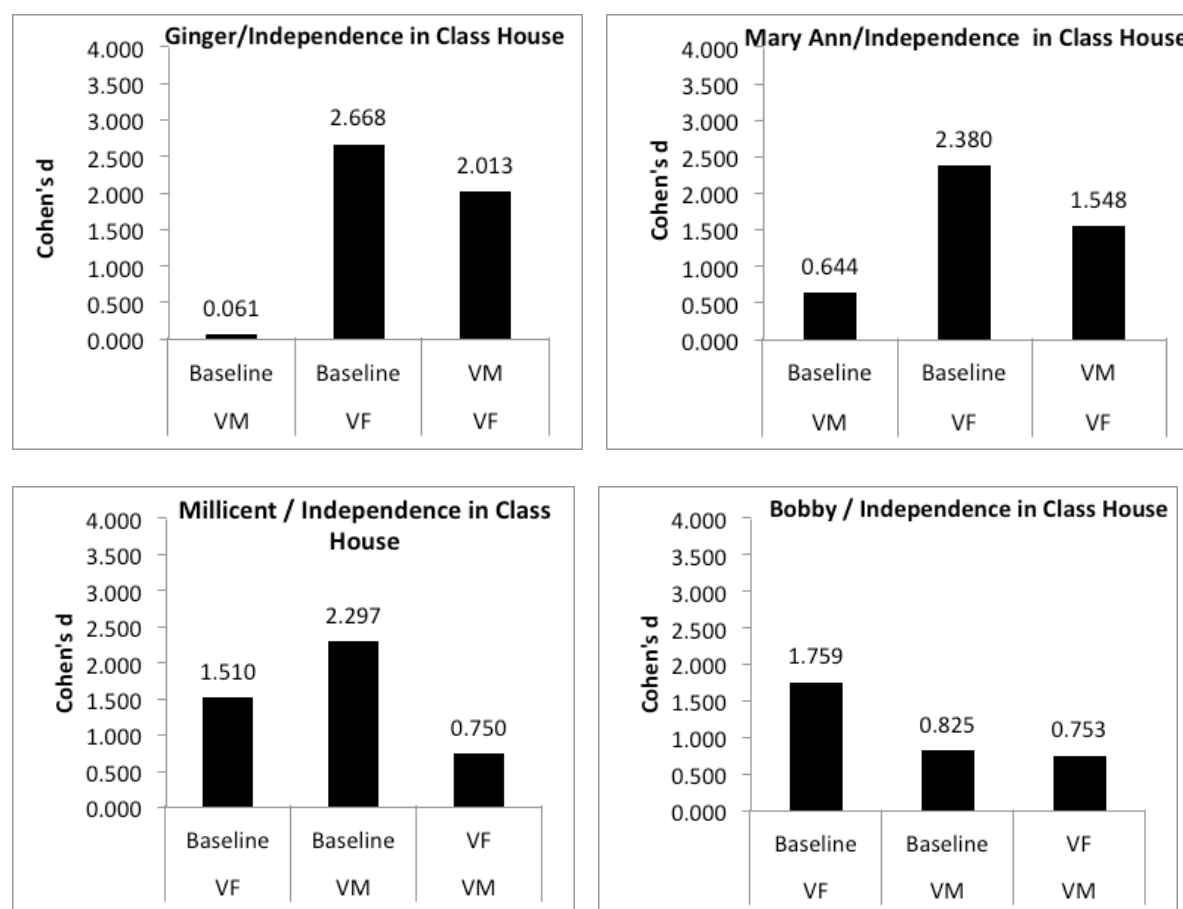


Figure 3. Effect size across conditions for skills performed in class houses



Percentage of Social Skills Performed Correctly in Classrooms

Figure 4 displays the percentage of social skills performed correctly in each classroom for students who began with the video modeling condition. After the first introduction of the video modeling condition, Ginger displayed a large increase in the percentage of social skills she used in the classrooms; however, her performance did not rebound to that level after the second introduction of video modeling, which indicates that the effects of the intervention were relatively short-lived. When the video feedback condition was introduced, there was

a sharp increase in her performance after the first introduction. In addition, when video feedback was in place in other phases, her performance stayed at a consistently higher level than the other conditions, which indicates that video feedback was associated with improved performance. In the bottom graph of the panel, Mary Ann's performance, albeit variable, demonstrates an increase in performance with both introductions of the video modeling condition in the first four phases and a similar pattern of responding when the video feedback condition was first introduced. Surprisingly, her performance decreased to baseline levels when video

modeling was reinstated following the introduction of the video feedback condition. Her performance then improved greatly with each re-introduction of the video feedback condition with the last phase associated with her using of all of the social skills correctly in the last six sessions. When the *means* of each

condition were compared, both Ginger and Mary Ann performed best when video feedback was used (Ginger $M = 98$; Mary Ann $M = 82$), followed by video modeling (Ginger $M = 65$; Mary Ann $M = 54$), and baseline (Ginger $M = 54$; Mary Ann $M = 41$).

Figure 4. Percentage of social skills performed correctly for students who began with video modeling

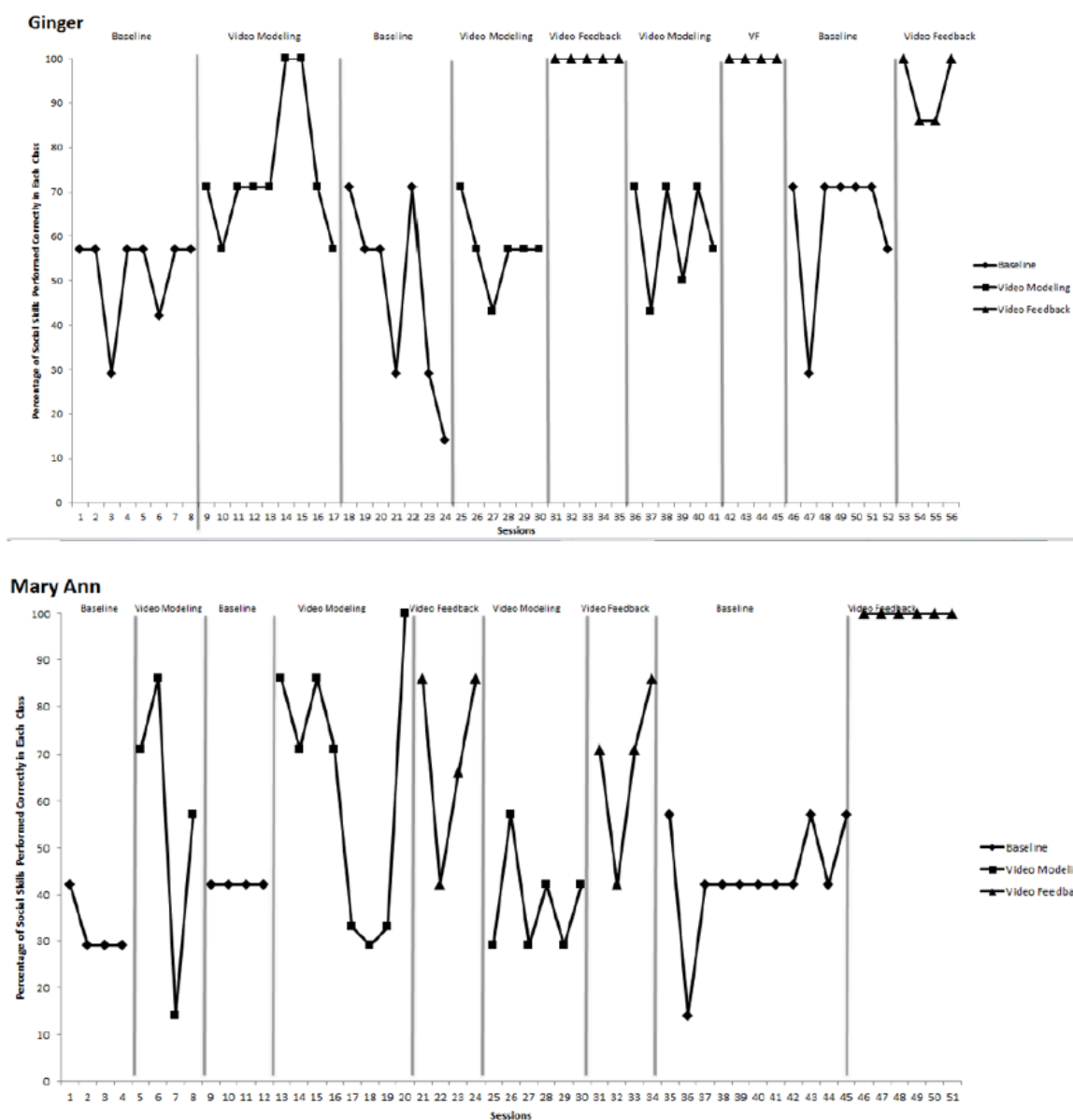


Figure 5 displays the percentage of social skills performed correctly in each classroom for participants who began with the video feedback condition. When looking at Millicent's graph, one can clearly see that her improved performance was associated with each introduction of the video feedback condition during the first four phases of the study and that the last two sessions of the second introduction of video feedback brought her performance to a level where it remained for each subsequent phase, including video modeling and baseline phases. When video feedback was first introduced with Bobby, there was marked change in the level of his performance; however, when the baseline was reinstated, it did not return to the original baseline level and the second introduction resulted in similar performance. There was a slight decrease in his performance when video modeling was introduced, followed by a slight increase with the video feedback condition, and then his performance decreased again with each introduction of video modeling and baseline conditions. When the *means* of each condition were compared, Millicent performed best when the video modeling condition was in place ($M = 85$), followed by video feedback ($M = 63$), and baseline ($M = 29$). As was the case with Ginger and Mary Ann, Bobby performed best when video feedback was in place ($M = 89$), followed by video modeling ($M = 77$), and baseline ($M = 73$).

Figure 6 displays the effect size between conditions when measuring the percentage of social skills used correctly in classrooms. Effect sizes between conditions were also computed using Cohen's d (Cohen, 1988) for measures related to social skills. The largest

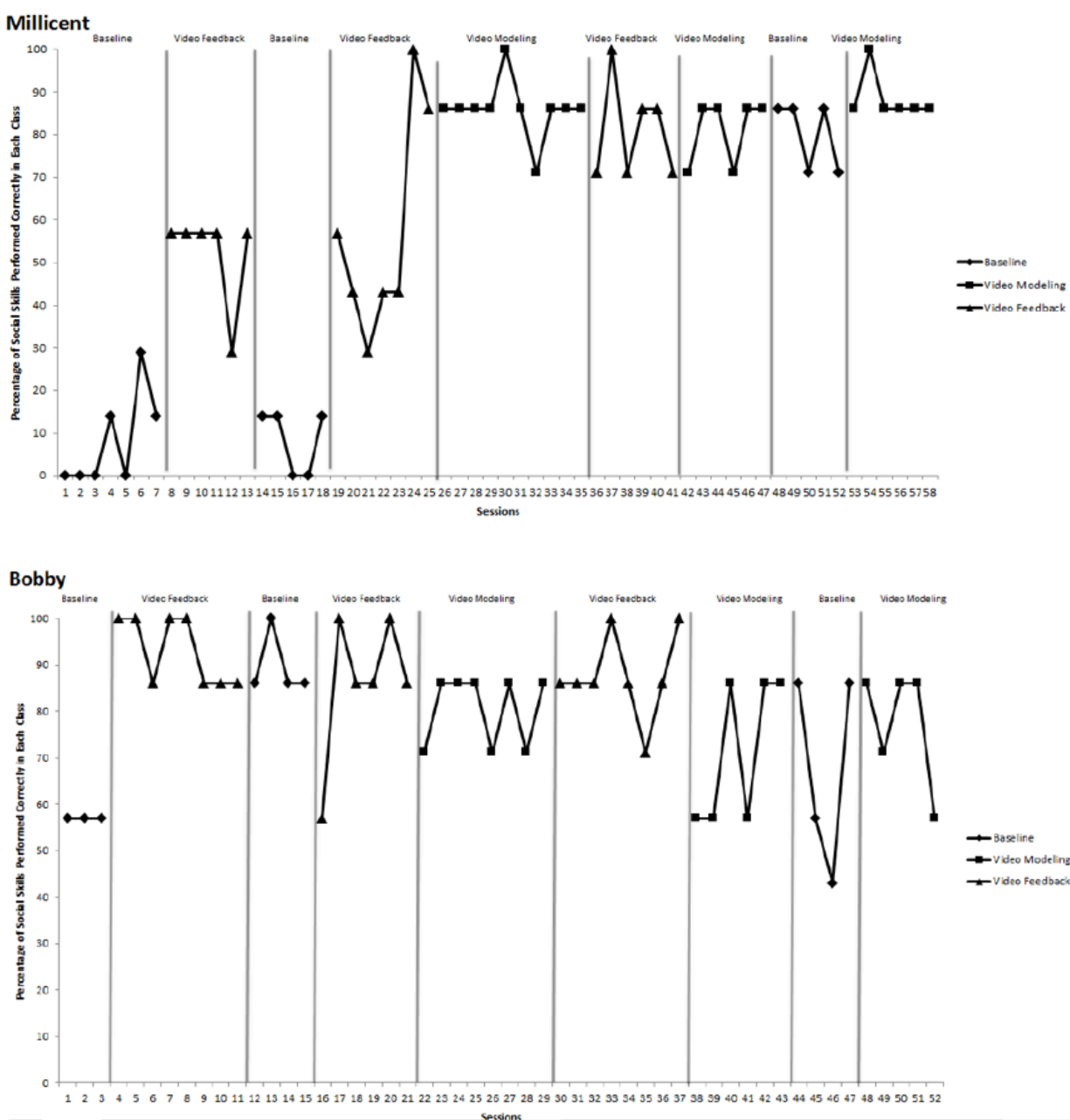
effects occurred between baseline and video feedback for three of four participants. Although Millicent also demonstrated a large effect from baseline to video feedback, her largest gain occurred from baseline to video modeling. Another large effect occurred when video feedback followed video modeling and when video modeling followed video feedback. Moderate effects occurred from baseline to video modeling for three of the four participants.

Discussion

Video modeling and video feedback appeared to be effective for improving task-related skills and social skills associated with the school-based job of delivering passes. Video feedback was associated with higher gains for three of the four participants and three of the four participants appeared to perform better when video feedback followed video modeling. This finding makes sense as it seems logical to first show learners *how* to perform the tasks through video modeling and then have them evaluate their performance through video feedback. These findings are consistent with the results of the Maione and Mirenda (2006) study. As was the case in their study, although some participants had modest improvements in independent task performance and correct use of social skills when video modeling was introduced, their performance did not improve substantially until video feedback followed it.

Millicent was the only participant who appeared to respond better to the video modeling condition when means and effect sizes were considered. However, upon closer inspection of her data, one can see that the introduction of the video feedback condition was associated with sharp improvements in

Figure 5. Percentage of social skills performed correctly for students who began with video feedback



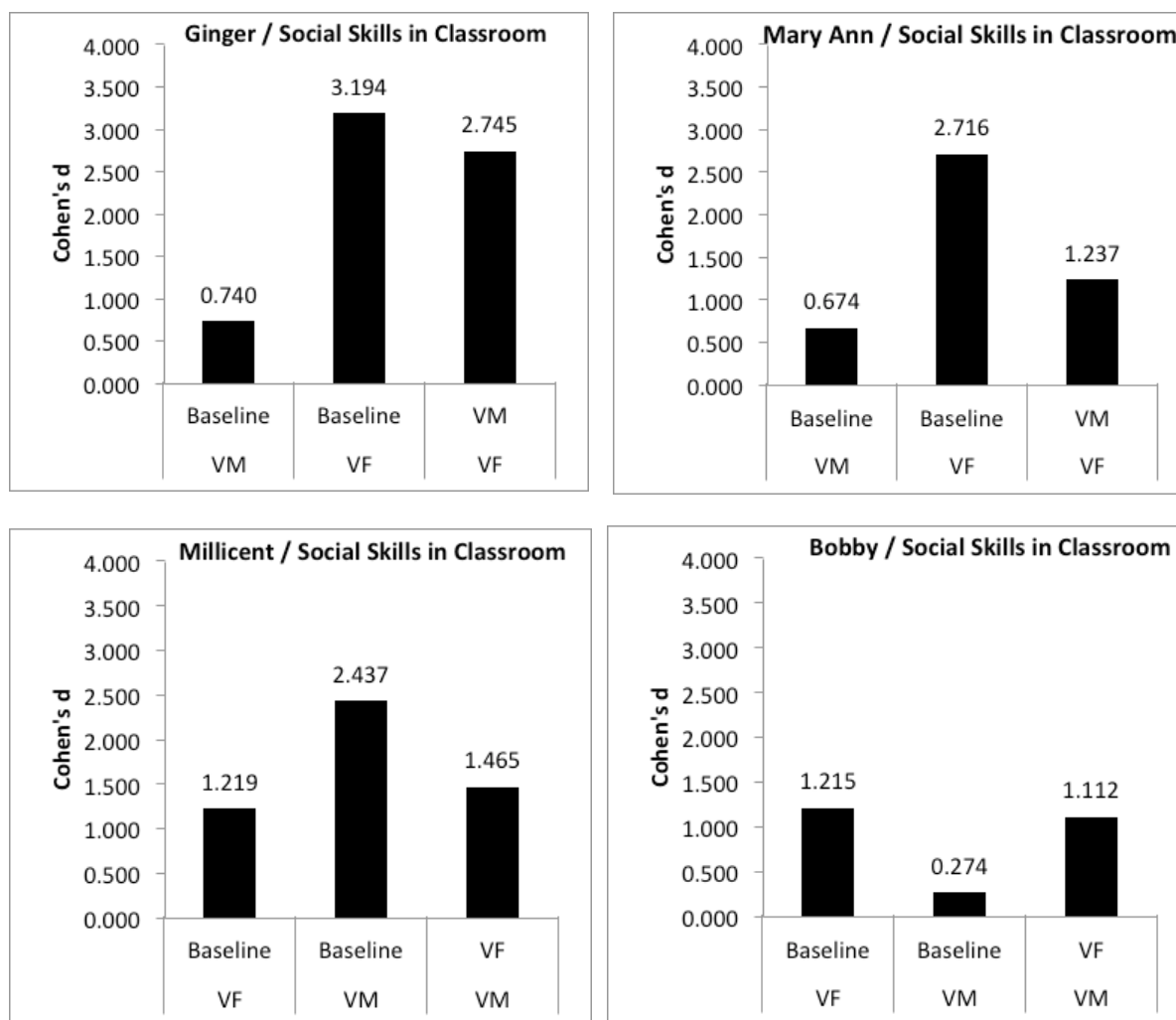
both task-related skills and social skills during initial phases of the study. Once the video modeling condition was introduced with the task-related skills in the class house,

her performance in the following video feedback phase resulted in perfect performance for four consecutive sessions. Perhaps her level of responding with

independent task performance may have been improved much earlier had she been given the opportunity to view the video model prior to receiving video feedback. Bobby, on the other hand, responded very well to the video feedback condition immediately. His performance remained relatively high for both

task-related skills and social skills throughout the study with a slight decrease in performance during the latter baseline and video modeling phases, which indicates that video feedback was very powerful for him.

Figure 6. Effect size across conditions for social skills performed in classrooms



Although all participants improved their performance with both task-related and social

skills as a result of both the video modeling and video feedback conditions, results are

somewhat tempered by the carryover effects evident between conditions and the variability of the data. Unfortunately, carryover effects are always a possibility when comparing different instructional techniques and that is why we attempted to carefully sequence the phases so that we could compare each condition with adjacent baseline conditions as well as the other condition using effect size calculations. In addition, we tried to control for sequence effects by randomly assigning participants to two different instructional sequences. In terms of the variability of the data, our plan was to extend each phase until there was more stability in responding within each phase; however, there were several days and/or weeks when there were either no passes available for delivery or only one or two passes available and we were simply running out of days in the school year. In addition, we were unsure if extended time in each phase would have improved the stability of performance. We noticed that in some cases, student performance, particularly for Ginger and Mary Ann, was influenced by their familiarity with and how well they liked the office staff and teachers in the classroom and this may have had an impact on the variability of their data. As is the case with most human beings, we tend to look at and smile more at those with whom we are familiar and these participants were no different. Fortunately, familiar and unfamiliar staff and teachers were present across all conditions which minimizes the potential confounds introduced into the study.

To determine the acceptability of the treatment conditions, social validation surveys were given to all students and were completed by three of the four participants (Millicent did not complete her form). Ginger, Mary Ann, and Bobby all indicated that they

liked being recorded and watching themselves on the iPad. Bobby indicated that he did not like the video modeling condition and watching others perform the skill. Perhaps his preference for the video feedback condition explains his superior performance with that condition. Ginger and Mary Ann indicated that they would like to continue using video modeling and video feedback in the future while Bobby indicated he only wanted to use video feedback. Mary Ann also indicated that she wanted to use both procedures at the preschool where she works.

Two job coaches also completed social validation surveys. One preferred the video modeling condition primarily due to the awkwardness of recording students in the classrooms and the difficulties that were encountered with trying to get the best angle when recording. The other staff member liked both conditions and indicated that both should be used simultaneously. Both found the interventions effective and indicated that they would like to use video modeling and video feedback in the future.

Future Research

Although video feedback appeared to be more effective than video modeling for three of the four participants for both task-related and employment-related social skills, future research may be aimed at investigating the influence of reactivity from being video recorded. Most people respond differently when they are being recorded and perhaps this added an element of increased motivation for participants to perform well when the video feedback condition was in place. Perhaps future investigations could measure the effects of a true video feedback condition and a placebo condition (i.e., pretend to record participants as they engage in tasks) to

determine if reactivity results in changed performance. Another study might be to compare the effects of self-monitoring versus video feedback on the social skills of individuals with ASD and/or ID in employment settings to extend the research conducted by State and Kern (2012). In their study, the researchers reduced inappropriate social interactions of a young man with Asperger's syndrome and found that the in-vivo self-monitoring condition resulted in greater reductions in inappropriate behavior. Another possibility might be to investigate the influence of the verbal evaluation component typically associated with video feedback. Perhaps students could self-evaluate their performance using a rating scale versus having a supervisor assisting them verbally during the evaluation or students could review the recordings with or without the verbal evaluation component. Other possibilities may include comparing packaged interventions. For example, researchers may want to compare video modeling followed by video feedback to video modeling followed by self-assessment.

Clearly, there are several possibilities for extending this research and future research is warranted.

In closing, much more research on embedding or focusing on social skills within video-based instructional techniques is warranted. It is particularly important for individuals with ASD and/or ID who are employed or who are transitioning from school to work.

Competency in employment-related social skills is often just as critical to success as the performance of specific job skills (Huang & Cuvo, 1997). In some cases, learning appropriate social skills may make the difference between maintenance of or termination of employment. In addition, embedding social skills within video models and evaluating their use in employment settings will potentially increase the effectiveness of instruction and facilitate teaching these essential skills within the context in which they will be used (Lee & Carter, 2012).

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Using a Photographic Electronic Activity Schedule to Decrease Latency in Transition Time for a Nine-Year-Old Girl with an Autism Spectrum Disorder

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Abstract: Utilizing iPads for students with ASD is a growing trend in educational settings; however, research to support the use of this technology is in its infancy. This study examined the use of an electronic photographic scheduler for a 9-year-old girl for transitions across the school day in an inclusive school setting. An ABAB design examined the implementation of the app Routinely onto an iPad to visually represent an electronic schedule. Results demonstrated a decrease in both latency for transitions and type and number of prompts in order to make transitions throughout the study. A reversal was not seen in latency or prompt usage. The study illustrates initial results to support the use of the iPad for use of visual schedules with students with ASD. Limitations and suggestions for future research are discussed.

The use of tablet-based technology in educational settings has increased substantially in recent years due to the accessibility and user-friendly nature of this new technology. For children with Autism Spectrum Disorder (ASD)—characterized by deficits in social communication and repetitive and restricted patterns of behavior (American Psychiatric Association, 2013)—the introduction of the Apple iPad has provided additional options for instruction in the school environment, mostly due to its inherent accessibility and portability (Neely, Rispoli, Camargo, Davis, & Coles, 2013). The iPad may be a favoured technological tool for individuals with ASD as its many educational and popular features are reinforcing, along with its status as a popular

tool used by peers who are typically developing (Jowett, Moore, & Anderson, 2012; van Laarhoven, Johnson, van Laarhoven-Myles, Grider, & Grider, 2009). However, due to its fairly recent release (Apple, 2010), research in the field of iPad use in education is in its infancy. Many of the outcomes, so far, relate to anecdotal commentary, such as educator Amy Lynn Thompson in Ontario, Canada—the geographical area of this study—who shared one of her experiences in her diverse, inclusive Kindergarten classroom with a struggling student:

“He was really struggling, with no friends, no motivation, no reading ability and no interest in writing with a pencil,” she says. He quickly took to

tracing letters on the iPad, and soon became so proficient he was teaching other kids. “He even discovered the feature that allows you to distort faces in a photo. His mom came in to say how much he loved going to school now.” (Bortolotti, 2013, para. 7)

A more sustained example of pedagogical practice is provided by Aronin and Floyd (2013), utilizing iPads in an inclusive preschool setting to benefit all students with diverse abilities targeted towards science, technology, engineering, and math (STEM) concepts and skills. They note that although preschool-aged children are exposed to much technology in their day-to-day environment, there is a disconnect between this and the preschool setting, even though documented research evidence exists demonstrating that early introduction of technology improves later achievement. The authors provide a range of practical, classroom-based suggestions for utilizing iPads in such a setting, including learning centers, small groups, brief instruction (e.g., iPad skills, STEM-related apps), practice time, teacher observation, scaffolding, and sustained involvement, as well as the pairing of related manipulatives to support concepts under investigation. Publications related to the use of iPads for group andragogy and pedagogy, as well as individualized instruction for children with exceptionalities in professional practice are just emerging. This is truer for research outcomes related to iPad-use for children with exceptionalities in inclusive classroom environments.

iPad applications or *apps*—specific electronic tools with educational, social, and/or practical applications designed for iPad use—have grown exponentially in recent years (Barseghian, 2012), reflecting similar growth

in iPad use. Many apps mimic or mirror techniques that research currently considers effective teaching practices for children with ASD, including activity schedules, a well-known type of visual support system with positive effects in transitions, communication skills, daily living skills, challenging behaviors, and more (Banda, Grimmett, & Hart, 2009; Lequia, Machalicek, & Rispoli, 2011). Using teaching, modelling, prompting, fading, and generalization in a data-driven manner, activity schedules are a “sequential format to represent a targeted sequence of the student’s day ... [they] provide predictability throughout the student’s day and allow a student to anticipate changes in the daily routine” (Banda et al., 2009, p. 17).

Traditional activity schedules are tactile, created with materials such as objects, notebooks, and sentence strips, paired with visuals such as words, photographs, drawings, and clip art to represent transitions. Recently, iPad apps such as *Routinely* (Logical Thought, 2013) have emerged as electronic alternatives to these traditional approaches; however, a need still remains for research data to support the effectiveness of transitioning these techniques to an iPad platform. Therefore, this research focused on examining the effectiveness of an iPad-based electronic scheduler for a student with ASD to increase independence and decrease latency in transitions.

Research support for the use of visual strategies for children with ASD has been well-documented (National Professional Development Center on Autism Spectrum Disorders, 2010), and the specific use of tangible visual schedules for children with ASD has been similarly well-supported. For example, Macduff, Krantz, and McClannahan (1993) taught a group of four boys with

autism between the ages of 9 and 14 living in a group home to utilize photographic activity schedules in a multiple-baseline design. This procedure taught the use of the activity schedule and measured on-task, on-schedule behaviors utilizing graduated guidance to acquire complex response chains. Macduff et al. (1993) found that the use of the photographic activity schedules was learned, maintained, and became “functional discriminative stimuli” (p. 97) for daily living tasks and recreational activities. On-task and on-schedule behaviors were generalized to new activity sequences, and these children were able to maintain on-task behaviors. Replicating and extending this design, Bryan and Gast (2000) utilized similar variables in an ABAB design. In this case, four students aged 7 to 8, who were described as high-functioning students with ASD, were taught in an ASD-specific classroom in a neighbourhood school. In this study, picture schedules were utilized during a center-based 45-minute language period using graduated guidance. Results again found that activity schedules were an effective intervention utilizing graduated guidance for teaching for all four students, including generalization to novel activity schedules. Within the school system, Dooley, Wilczenski, and Torem (2001) evaluated the use of a photographic activity schedule to enhance transitions within the school day for a 3-year-old boy diagnosed with Pervasive Developmental Disorder engaging in challenging behaviors during transition periods. The photographic activity schedule decreased challenging behaviors, and allowed for increased compliance during transitional periods.

Studies involving electronically-based visual schedules are recent and novel, but limited in quantity. Cihak, Fahrenkrog, Ayres, and

Smith (2010) utilized electronic-based transition supports in the classroom environment by incorporating video modeling through the use of an iPod. Four students age 6 to 8 watched a video model of a desired behavior and then were expected to demonstrate the desired behavior for each transition. Successful transitions were measured for each participant, and it was found that students were able to successfully transition with the video model on the iPod as compared to the absence of the iPod, and these skills were maintained nine weeks after the intervention was completed. Carlie, Reeve, Reeve, and DeBar (2013) also used an electronic visual schedule on the iPod across the school day for four children diagnosed with ASD. The iPod was set up to have a two-minute timer on each activity, prompting students to transition to the subsequent activity. On-task and on-schedule behaviors increased for all participants, and this simultaneously generalized to novel activity schedules not formally taught throughout the study. Maintenance checks demonstrated 100% accuracy of on-schedule behavior across participants. Further to its support as a transitional tool, the authors highlighted other benefits, including that iPods are easily accessible in the classroom environment and their electronic platform makes its use socially acceptable to peers. Nelson (2013) used similar technology to teach three students with ASD to use a visual schedule on an iPod. In this case, the visual schedule was introduced with graduated guidance to complete multiple math, writing, and reading tasks during an independent work period. After the students were taught its use in a self-contained classroom, the electronic visual schedule was generalized to other classrooms. Overall, it was somewhat effective in increasing on-task behaviors for two of the

three students--although there was significant variability--and decreasing adult prompts needed to transition.

The goal of this research project was to expand on the evidence supporting the use of tactile photographic activity schedules to determine if the use of an iPad would increase independence and decrease latency times between transitions across the school day for a child with ASD in an inclusive setting.

Method

Participant

The participant in this study was a 9-year-old girl with a diagnosis of Autistic Disorder and a seizure disorder, enrolled in a grade four class in a fully inclusive urban, inner-city school within a low-income neighborhood in southern Ontario, Canada. 160 students attended the school in the academic year of this study. One unique characteristic of this classroom was its technological integration. In the context of the second year of a board-led pilot study, all students in the class had an individually-assigned iPad. Though this was the second year this group of students had utilized iPads in their local school, it was the first year that their current teacher had led an iPad-infused classroom.

Abigail [a pseudonym] was included with her peers for instruction; however, a separate room was across the hall from her combined Grade 4/5 classroom, which was often used for individualized programming and breaks when challenging behaviors occurred. Abigail participated in the subject areas of the same-aged peers in her inclusive classroom, but her program was individualized, consisting of six alternate courses based on academic subject areas from the Ontario curriculum, as well as a modified Grade 1 Language course (Ontario

Ministry of Education, 2006). She regularly participated in alternative and/or modified objectives in the classroom in the same subject area as peers for 40% of the day, and was outside of the immediate classroom environment for 60% of the day completing individualized programming or tasks on the computer or iPad.

Before commencing the study, Abigail was assessed using the *Verbal Behavior Milestones Assessment and Placement Program* (VB-MAPP). The VB-MAPP is an assessment tool and curriculum guide for children with autism and other language delays that helps guide the creation of an individualized social skill, language, and learning program (Sundburg, 2008). Abigail received an overall score of 40 which fell primarily in the 'Level One' skill range, comprised of language and social skills in the birth to 18-month-old level. She had a small repertoire of one-word utterances to mand and tact basic items. Her imitation repertoire was limited, including only basic social and play skills. She had strong receptive identification skills, with equal strengths in visual perceptual tasks. Abigail displayed challenging behaviors at certain points in the day that included screaming and intense hand-flapping. Many of these included stereotypy and would precipitate without adult involvement. On occasion, when very frustrated, she would hit, bite, flick, and throw materials. These behaviors usually occurred as the result of a demand that was placed on her to complete a non-preferred activity. Abigail did not use an activity schedule prior to the implementation of this study and previous formal programming or behavior assessments were not completed.

Materials

The photographic electronic activity scheduler chosen for this study was the iPad app *Routinely* (Logical Thought, 2013). This particular app was utilized due to its viewing options. For example, Abigail's multiple upcoming activities in her schedule could be viewed simultaneously as well as a 'one picture per page' view. In addition, activities that were time-based included an integrated, electronic visual timer that demonstrated when the activity was complete. In this research project, *Routinely* was individualized daily and modeled after transitions in the daily classroom schedule, including Abigail's individualized programming.

Experimental Design

A single-subject ABAB reversal design was selected to evaluate the effectiveness of the photographic activity schedule on the latency, on-task behavior, and prompt level for transitions for Abigail across the school day. An ABAB design was chosen to isolate the photographic activity schedule as a variable to compare with baseline measures and be reintroduced to understand if the intervention was responsible for the behavior change (Gast, 2010). The phases of this experiment consisted of: (a) baseline, (b) treatment: teaching and implementing the electronic activity schedule; (c) baseline: no use of the activity schedule, and (d) treatment: re-introduction and implementation of the electronic activity scheduler.

Dependent Measures

Four behaviors were operationalized and measured to understand the effects of the electronic photographic activity schedule.

Latency. The time from when Abigail was given the discriminative stimulus (S^D) or instruction to the time when she moved to the

activity and started engaging in the next requested activity.

On-schedule. Each step of the following task analysis was recorded if completed: (1) The educator announced, "It's time for (insert activity/location);" (2) The iPad was placed in front of Abigail immediately prior to--or during the instruction; (3) Abigail tapped the screen on the current activity; (4) Abigail went to the activity and began the activity within 10 seconds or waited for the next instruction at that location; (5) The educator set the timer on the visual schedule for the length of time that is required at that particular location/activity (with no verbal accompanying words); (6) The educator said, "All done," when the timer stopped and placed the iPad in front of Abigail set to the next activity in *Routinely*; (7) Abigail pressed the arrow to see the next activity.

Off-schedule. Data were recorded if Abigail did not completely complete a step of the "on-schedule" task analysis above correctly within 10 seconds.

Prompts. The frequency and type of prompts that were used starting after the signal by the educator's S^D to assist Abigail in completing each of the on-schedule behaviors listed above were both measured. This dependent variable was measured during each opportunity across the day where a transition occurred and the on-schedule behavior was measured.

Baseline

During baseline conditions, no activity schedule was used. The educator was instructed to signal transitions as she typically did in everyday activities, which usually occurred through verbal instruction. Both

latency to complete transitions and prompts were measured during baseline conditions. On-schedule behavior was not measured in baseline, as the task analysis, the iPad, and *Routinely* app were not being utilized in these situations.

Teaching Procedure

The teaching phase of this procedure consisted of using graduated guidance to teach Abigail how to use the visual schedule and become independent throughout the task analysis of transitions throughout the school day. Graduated guidance involves beginning with a controlling prompt where hand-over-hand or full physical prompts are used with the student (Miltenburger, 2012). As the student begins to attain the skill, less assistance and fewer prompts are used and shadowing begins. Gradually, less and less assistance is provided until the student attains independence in the skills (Miltenburger, 2012). Prompts were issued if the student makes an error, is about to make an error, or more than 10 seconds passes (MacDuff et al., 1993).

During the beginning phase of teaching, the educator used full physical prompting to teach the use of the scheduler. After the S^D, “It’s time for ...” the educator’s hand was placed on top of Abigail’s hand, to guide her through the steps of completing the transition listed in the previous section. No verbal prompts were provided in this condition. After a minimum of five transitions were completed using this method, educators moved to spatial fading and provided partial physical prompting to complete the task analysis. Once complete—using the same criteria to transition through phases above—shadowing was implemented. If the student erred or was about to err, a prompt was

issued.

The final phase involved transitioning to independence of on-schedule behaviors from activity to activity throughout the day. When the student was on-schedule for 80% of transitions throughout the day, the educator moved to the independent phase. During this phase of teaching, Abigail was attending to the S^D of “It’s time for...” and would follow through with the demand placed on her. If Abigail erred or more than 10 seconds passed after the S^D was emitted, a greater level of prompt was implemented to redirect Abigail back to the electronic scheduler.

Data Collectors

A student from a one-year ASD graduate certificate program in a community college completed the data collection, partly as a requirement to complete a field practicum opportunity, and partly through additional institutional research seed funding. This student also completed the VB-MAPP assessment and was available to the educators to answer questions about challenging behavior and other related programming. The data collector completed data collection three times per week for 12 weeks. A second data collector with the same qualifications was utilized to fill in during a two-week absence.

Results

Results are presented in terms of each of the dependent variables measured throughout the study.

Latency

Latency decreased throughout the study with reduced transition times with the implementation of the *Routinely* app. As demonstrated by Figure 1, in the initial intervention phase (B), Abigail experienced a

steep deceleration in the latency between initial adult instruction and compliance within her daily routine. Following an initial rapid drop during this first treatment phase, the remainder of all sessions with and without the use of *Routinely* had little variability, fairly low rates of latency, and a level trend. When *Routinely* was withdrawn from Abigail's

programming, a significant reversal was not evident, excepting where Abigail's latency rose—for one session—with close to initial baseline levels. School staff reported that Abigail's challenging behaviors were particularly high during this session, and were thought to be due to illness.

Figure 1. Sum of mean latency between instructions and on-task behavior across each school day session when using the iPad app *Routinely*.

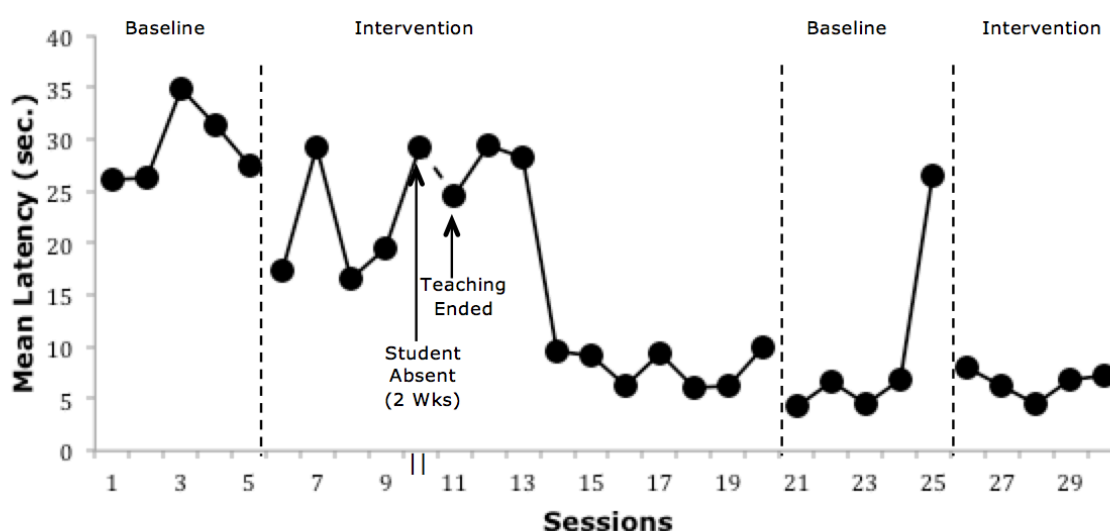


Figure 1. Sum of mean latency between instructions and on-task behavior across each school day session when using the iPad app *Routinely*.

Prompting

The sum of all instructional prompts utilized types (i.e., full physical, partial physical, verbal, gestural, and positional) per day related to on-task behavior were recorded during all four phases (ABAB) of this intervention (see Figure 2).

Overall, the quantity of prompts necessary to support Abigail's transition successfully showed a stable downwards trend with only

minor variability. In examining the type of prompts used by the educator in the study, the more intrusive prompts decelerated steeply. When inspecting only more intrusive prompt levels—full and partially physical prompts—they decreased from an initially high level during the teaching phase of *Routinely*, and remained at a low level at the completion of the study (see Figure 3). A significant reversal did not occur during withdrawal of this intervention.

Figure 2. Sum of all prompts types (i.e., full physical, partial physical, shadowing, gestural, proximity, verbal) across each school day session using the iPad app *Routinely*.

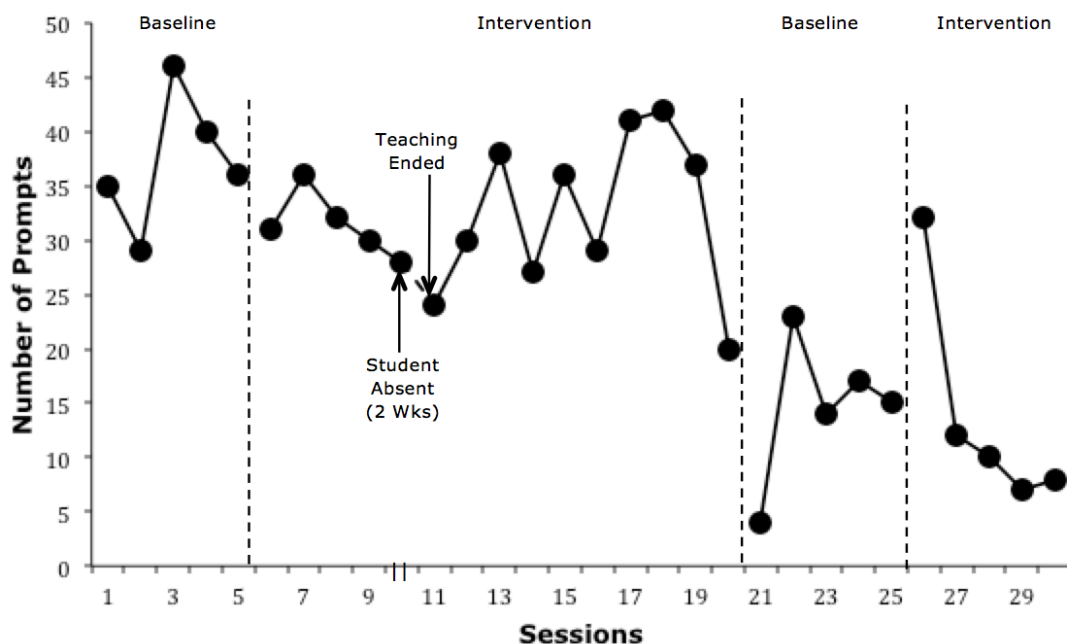


Figure 2. Sum of all prompts types (i.e., full physical, partial physical, shadowing, gestural, proximity, verbal) across each school day session using the iPad app *Routinely*.

Figure 3. Mean percentage of on-schedule behavior and sum of full and partial physical prompts.

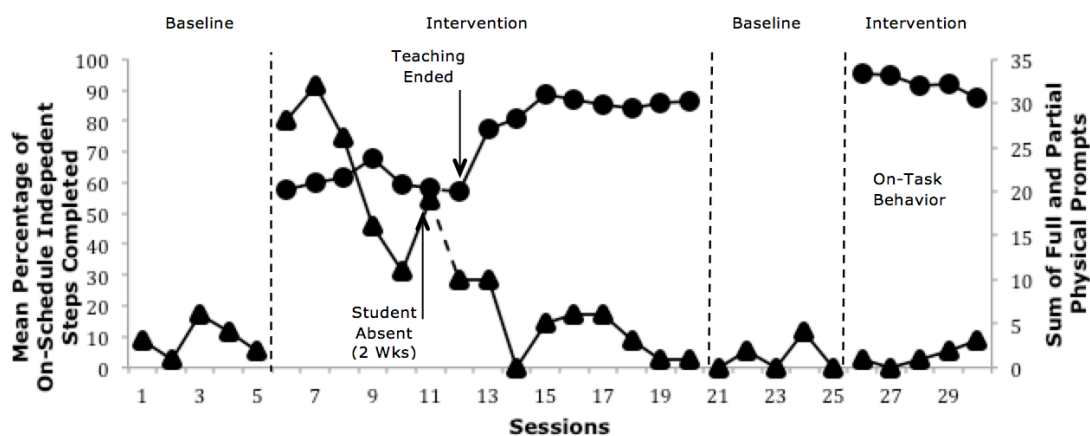


Figure 3. Mean percentage of on-schedule behavior and sum of full and partial physical prompts.

On-Schedule Behavior

The mean percentage of Abigail's on-schedule behavior, indicating the successful completion of steps in the task analysis for using *Routinely*, accelerated to high rates of over 95% success and remained stable through the remainder of the study. Figure 3 combines the demonstration of a simultaneous reduction in the quantity of physical prompting levels—combining full and partial physical prompts—with a like increase in on-schedule behavior. From near-zero very low levels of success during baseline, Abigail's daily mean percentage of independent completion of steps in the transition rose with a gradual upwards acceleration throughout the first intervention phase to a stable, high level—close to 100%—during the second intervention phase of this ABAB design.

Discussion

The results from the study demonstrate a decrease in the latency and amount of prompts needed for one child with ASD to transition from activity to activity throughout the day in a classroom environment with the use of an electronic activity scheduler. In addition, the on-task behavior chains the student was able to complete increased substantially and remained above 80% from the end of the teaching phase until the conclusion of the study. A lack of reversal in the second baseline phase failed to demonstrate a functional relationship, although decreased latency, enhanced on-schedule behavior, and decreases in number of prompts continued to demonstrate success from baseline levels.

The latency from the initial presentation of the S^D to Abigail's initiation of the activity decreased throughout the study. There was

some variability in single, daily instances, and anecdotal notes indicated increases in non-compliant behavior, often due to antecedent variables related to medical concerns or lack of sleep the night before. This latency remained stable throughout the reversal phase and did not increase with the withdrawal of the activity schedule on the iPad. It is hypothesized that this lack of reversal is due to the consistency with the presentation of the S^D and procedure initiated by the educator that allowed Abigail to consistently transition from activity to activity, even without the electronic schedule presented on the iPad. Before this study, Abigail had not had consistency with transitions and not used a visual activity schedule. Although it was initially thought that the presence of the visual schedule alone would cause the change in behavior, it became clear that the other consistent factors were very influential and caused Abigail to learn the transition procedure.

Of substantial significance was the decrease in overall prompts and especially intensity of prompts needed for Abigail to transition successfully throughout this study. The prompt level demonstrated Abigail's ability to independently transition throughout the day, which ultimately promotes adaptive and independent behaviors to assist in learning appropriate daily living skills (MacDuff et al., 1993). In educational settings, it is often the lack of training around Applied Behavior Analysis, prompt intrusiveness, and fading that leads to the inadvertent use of prompts, sometimes resulting in prompt dependence. The current study saw this in the baseline periods, and through the implementation of the task analysis, these prompts were eliminated and used in a systematic procedure, only when necessary, through

graduated guidance. One of the main purposes in using a visual schedule for children with an ASD is to promote independence and learn lengthy response chains with the assistance of visual strategies (MacDuff et al., 1993). Therefore, the lack of adult prompts to transition from activities and locations across the school day speaks to the interventions impact on the student.

Due to the fact that data did not revert back to baseline levels in the reversal condition, it is unclear if changes in latency can be attributed solely to the iPad-embedded electronic scheduler. This relates to a common difficulty in reversal design: in some situations, skills are learned and remembered (Miltenburger, 2012). In other words, when an intervention is withdrawn in the reversal phase, skills may not revert to baseline because the child has learned, for example, to transition by attending to consistent cues in the environment. In addition, the consistency of the approach for each transition, which included the same discriminative stimulus for both conditions may have been enough structure for Abigail to continue to transition between activities and locations throughout the day without the iPad schedule. Due to typical challenges in data collection in applied, inclusive environments, the reversal phase was ended at the end of the school year. It would be interesting to discover if the latency would return to baseline levels with increased time in the reversal phase. Perhaps Abigail had learned the value of compliance with the S^D of an adult's instruction, but it is unclear if this change in latency could be contributed solely to use of *Routinely*.

Implications for Current Practice

The results of the study demonstrate initial support for the use of electronic activity

schedulers to replace tangible, picture-based activity schedulers. When transitioning to electronic schedulers, the additional time involved in teaching the student a certain app must be considered. In addition, the consistency of the teaching procedure, including consistent S^Ds, may have been more significant than the use of the iPad in the current study. Therefore, ensuring a strong, consistent task analysis for implementing and teaching the schedule is of great importance. In addition, utilizing a graduated guidance approach proved to be effective in teaching on-schedule behaviors and decreasing latency, where it appeared to have a role in decreased use of prompts and the intensity of the prompts used throughout the study.

Future Research

Additional research is needed to determine if electronic visual activity schedules are effective in enhancing independent transitions for individuals with ASD; in particular, changing the methodology to a multiple-baseline or similar type of study would decrease the difficulties with the ABAB design and learning effects. Increasing the number of participants would also lend further credibility to results. In addition, testing for generalization and maintenance to understand the long-term effect of the learned skill would increase efficacy.

Overall, this study demonstrated initial support for the use of the iPad and the electronic visual schedule to use as a method to promote independent and successful transitions for a student with ASD across the school day. A firm conclusion to determine if the electronic scheduler alone caused the change in the latency of the transitions cannot be drawn because of the lack of the reversal when the iPad was reintroduced. Increased

independence was also a significant outcome of the study, with decreased prompts needed for Abigail to successfully transition independently throughout her day. Additional follow-up research is needed to confirm the effectiveness and perhaps a different research

design should be utilized to rule out learning effects.

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Development of a Standardized Benchmark Assessment Tool to Facilitate EBP for Students with ASD

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Abstract: The purpose of this paper is to describe the development of an accessible, standardized benchmark assessment (i.e., the Evidence Based Practice Classroom Checklist (EBP CC)) to support administrators, school leaders, and educators in collaborative implementation of evidence-based practices for students with autism spectrum disorder (ASD). This series of studies occurred in three phases across two states. The first phase was design and content validity testing. The second phase was testing of the implementation process in schools including reliability assessments. Finally, the third phase addressed implementation on a larger scale and evaluation. Results indicated the EBP CC was a valid tool that represented the foundational practices necessary for students with ASD. Administrators found such a tool important and necessary. Additionally, results indicated reliability in measuring evidence based practices used in classrooms. Implications for research and practice are discussed.

The number of students with autism spectrum disorder (ASD) served in public schools has steadily been on the rise (Wong et al., 2014). At the same time, The No Child Left Behind Act (NCLB) of 2001 and the reauthorization of the Individuals with Disabilities Act (IDEA) in 2004 have called educators to action, suggesting all teachers, including those serving students with ASD, must utilize effective, evidence-based practices (EBP) (Jones, 2009). In response, researchers have made considerable efforts to delineate what constitutes an EBP (Cook, Tankersley, & Landrum, 2009) and to disseminate the information to educators and other

professionals through efforts such as the Autism Internet Modules (AIM).

Educators are expected to select these EBPs by bringing together knowledge about the practices and the needs of their specific students (Odom, Boyd, Hall, & Hume, 2010). Unfortunately, availability does not equate to use (McLeskey & Billingsly, 2008; Simpson, 2005). Implementation of these EBPs with the frequency or rigor outlined in legislation remains low (Burns & Yssdelke, 2009; Cook & Schirmer, 2003). The development of EPB tools that diminish barriers and facilitate effective and efficient implementation for

teachers and administrators is necessary to bridge the gap between research and practice.

Implementing EBPs in Schools

Teachers indicate three primary barriers to their use of EBP in the classroom: time, access, and a lack of confidence in analyzing research (Williams & Coles, 2007). These barriers are especially understandable in the field of ASD, where the continuing increase in prevalence has caused the education system to be flooded with information about potential interventions, many of which lack effectiveness data (Simpson, 2004). When teachers do not have the time, access, and confidence to analyze the multitude of strategies available, they may implement non-evidence based strategies or implement EBPs poorly.

Access and Confidence

To support teachers in identifying which strategies in the field of ASD have a sound evidence-base, two national groups developed resources to help determine and disseminate information. The National Professional Development Center on Autism Spectrum Disorders (NPDC on ASD) and the National Autism Center (NAC) both published reports to inform educators and parents about evidence based practices. The NPDC on ASD published briefs on evidence-based practices identified through their work (2010, 2014). In 2010, 24 practices were identified. In 2014, these EPB were updated to include 27 practices. The EBP briefs provide an overview of the practice, a guide to the steps of implementation, an implementation checklist, and information detailing the evidence base for each practice. The NAC also published a report on their National Standards Project (2009) that identified established (11), emerging (22), and

unestablished (5) treatments for students with ASD. The report details the criteria for establishing treatments, describes each of the treatments and its supporting evidence, and makes recommendations about how the treatments should be implemented. These two national projects address educators' concerns about their ability to critically evaluate educational research. Although very useful in discerning which practices are evidence based,, teachers also indicate time constraints influence their use of EBP (Williams & Cole, 2007).

Time

These concerns about time are an important consideration in the development of resources designed to support classroom practices. Time related issues impact a teacher's ability to implement quality instructional practices and can be a significant source of job frustration (Billingsley, 2010). Simpson and colleagues (2011) suggested that qualified teachers of students with ASD should be knowledgeable about EBP and should have extensive experience in applying these practices to learners with varying levels of need. However, many teachers of students with ASD do *not* receive intensive preservice training or professional development about the disorder. Thus, it is not surprising that implementing EBP for these learners can feel time consuming for several reasons.

General and special education teachers with little knowledge of autism may not be aware of the NPDC or the EBP briefs. Lack of awareness could translate to substantial time searching for EBP. Second, awareness of EBP does not necessarily equate to knowledge or experience of how to actually implement practices. Thus, some educators may know there are specific EBP for serving

students with ASD, but without previous experience implementing these practices, may invest substantial time studying the practice and determining the steps necessary for specific settings. Finally, if educators are aware of the EBPs and resources for gaining additional information regarding these practices but lack experience in using these to meet individual needs, additional time may be needed to determine how to individualize each practice to meet the unique needs of students.

Supporting Systemic Implementation of EBP in Schools

Given the ongoing challenges of translating research to practice, recent focus has shifted to factors that influence systemic implementation of EBPs, or implementation science (Cook & Odom, 2013). Odom and colleagues (2010, 2013) described five aspects of implementation models including collaborative planning by stakeholders, high quality materials, technical support, stakeholder readiness, and contextual considerations. In order for implementation to be effective, much of the implementation science research describes important state level processes dependent on both top-down and bottom-up activities (Odom, Duda, Kucharczyk, Cox, & Stabel, 2014).

Many classroom teachers, administrators, and other school leaders are often waiting for these efforts to make their way into districts, school buildings, and classrooms. While state and district level processes are critical (Klingner, Boardman, & McMaster, 2013), an administrator or school leader can be the impetus for change. In fact, an administrator or other school leader who actively supports the use of EBP is also critical in increasing the use of these practices in our schools

(Domitrovich et al., 2008; Rohrbach, Grana, Sussman, & Valente, 2006). Thus, if an administrator/leader has the necessary knowledge and resources, and supports teachers in learning about and using these resources, chances are greater that all students, including those with ASD, will receive evidence-based instruction.

There are several comprehensive assessment and planning resources that administrators/leaders and classroom teachers can use to guide their assessment, planning, and implementation of EBP, such as the Louisiana Autism Quality Indicators (LAQI) (Lowrey et al., 2010) or the Tier 1 Classroom Checklist-ASD Nest Program (Bleiweiss, Hough, & Cohen, 2013). However, the processes are sometimes extensive and could be perceived as daunting, especially for classroom teachers and administrators/leaders who are frequently overburdened with paperwork, lack of ASD related training, and other administrative challenges.

Development of a Benchmark Assessment Tool

Developing a short, standardized benchmark assessment tool is one strategy that may improve the implementation of EBP practice for students with ASD. Since NCLB (2001), benchmark assessments have been widely used throughout the school year as a way to measure student progress between formative and state assessments (Olson, 2005a; Olson, 2005b). They are typically quick assessments that provide a snapshot of students' abilities on identified skills and targets (Herman, Osmundson, & Deitel, 2010; Olson, 2005a). These benchmark assessments include scoring and administration procedures that maintain validity and reliability in measurement (California Department of

Education, n.d.). Creating a similar standardized benchmark assessment, focused on classrooms rather than students, based on the unified EPB from both the NSP and the NPDC-ASD for administrators/leaders, general, and special educators could possibly address some of the previously mentioned barriers. Two fundamental questions are posed - ‘What are the necessary components of a benchmark assessment tool designed to support administrators, other school leaders, general, and special educators in implementing EBP for students with ASD?’ and ‘Given competing agendas and differences in background experience, can a variety of stakeholders assess the use of these EBP with the same tool?’

The purpose of this paper is to describe a series of studies detailing the development of the EBP Classroom Checklist (EBP CC) for Educators for use in both general and special education classrooms serving students with ASD. This series of studies had several goals: (a) establish the content validity of the instrument through a content analysis design (b) determine the interrater reliability of the benchmark assessment tool when used in a classroom environment by multiple raters, and (c) determine the satisfaction of users upon broader implementation.

Method

The initial design and validation of the EBP CC occurred in three phases. Phase 1 was Design. Phase 2 was Implementation and Modification. Phase 3 was Implementation and Evaluation. Each Phase is described below. Phase 1 and 2 took place in one state while Phase 3 was implemented in a different state. Institutional Review Board approval was secured for all phases of study.

Table 1. Summary of NPDC EBP (2010), corresponding NAC EBP (2009) and the EBP selected for the

Phase 1: Design

Item development. The design of the EBP Classroom Checklist began with a review of the NPDC EBP briefs (2010) and the NAC National Standards Project Report (2009) and all supportive studies cited by each. Decisions on which EBP to include in the benchmark assessment were made as follows. In order to make sure the measurement could be completed effectively during a 15-20 minute observation, EPB selected for the tool were restricted to those that would be observable in the classroom environment regardless of the type of instructional strategy implemented. The focus of the tool would be on observable and/or tangible supports (e.g., visual supports) rather than specific instructional strategies (e.g., discrete trial training). Developing a foundation for instruction including structures such as visual supports, schedules, and work systems is critical to providing instruction to students with ASD (Mesibov, Shea, & Schopler, 2005). In order to maintain this as a benchmark assessment, we are not measuring the implementation of evidence based instructional strategies, rather we are measuring the observable measurable supports that promote, allow, or sustain these EBP. Additionally, recognizing that formal observation of instruction should be at least 20-30 minutes (Zepeda, 2013) and we were targeting the 10-15 minutes recommended for an informal observation (Zepeda, 2013), including specific instructional practices did not meet the intent of this tool (i.e., using informal classroom visits to facilitate collaborative problem solving). Table 1 outlines the evidence-based practices selected for the observation tool.

observation tool.

National Professional Development Center EBP	National Autism Center EBP	EBP Included in the Observation Tool
Prompting	Antecedent Package; Modeling	
Antecedent-based Intervention	Antecedent Package	x
Time delay	Antecedent Package	
Reinforcement	Behavioral Package	x
Task analysis	Behavioral Package	x
Discrete Trial Training	Behavioral Package	
Functional Communication Training	Behavioral Package	
Response Interruption/Redirection	Behavioral Package	
Differential Reinforcement	Behavioral Package	
Social Narratives	Story-based Intervention Package	
Video Modeling	Modeling	x
Naturalistic Interventions	Naturalistic Teaching Strategies	x
Peer Mediated Intervention	Peer training package	
Pivotal Response Training	Pivotal Response Treatment	
Visual Supports	Schedules	x
Structured Work Systems	Schedules	x
Self-Management	Self-Management	
Parent Implemented Intervention		
Social Skills training Groups		
Speech Generating Devices		
Computer Aided Instruction		
Picture Exchange Communication System		
Extinction		

Following the selection of EBP, individual items were created that used the team's field based knowledge of common language (Bos, 1995) accessible to practitioners, administrators, and related service personnel.

Measuring content validity. The next step in the development process was to assess the content validity of the items. To do this, a content analysis design was utilized. A content analysis design provides an

opportunity for experts in a particular field to assess the content of a tool or measure under development. This design provides a quantitative summary of the representativeness and clarity of each item as well as the expert panel's narrative suggestions for improving the measure (Rubio, Berg-Weger, Tebb, Lee, & Rauch, 2003).

Participants. To create a panel of experts for the content analysis, a minimum of three content experts was necessary (Lynn, 1986; Rubio, et al. 2003). A content expert is defined as a professional who has worked extensively with this content and has published in the field. Lay experts were also included on the panel to ensure the practicality of the tool. A lay expert is defined as the people for whom the work is most critical in their day-to-day practice. Ten content experts and ten lay experts were solicited for participation as the expert panel to attempt to create a sample size of twenty that could provide comprehensive information about the measure (Rubio et al., 2003).

Recruitment. Participants were recruited via email. The email outlined the purpose of the study and asked for their participation. It also included directions for completing and returning the scoring form that was sent with the email. As incentive for participation in the study, the email also explained that they would receive a copy of the tool in appreciation of their feedback.

Data collection. A content validity scale titled the Reviewer Response Form was developed. This scale required reviewers to score the items for representativeness (e.g., whether the item addresses EBP for students

with autism and other significant disabilities) and clarity (whether the item listed was clear to the reader and observable).

Representativeness was rated in one of four ways: (a) not representative, (b) requires major revisions to be representative, (c) requires some revision to be representative, and (d) representative. Reviewers also rated the clarity of each item on a similar scale: (a) not clear, (b) requires major revisions to be clear, (c) requires some revision to be clear, and (d) clear. The experts were also given space to make suggestions to improve the item.

In addition to representativeness and clarity, the Reviewer Response Form asked each reviewer to relate each item to a specific factor (physical organization, visual schedules, structured work systems, embedded instructional supports, visual supports, or other). Finally, each reviewer was asked to respond to open-ended questions related to the comprehensiveness of all of the items as a whole. Panelists were asked to specify their recommendations for adding or deleting any item.

Prior to administration with the expert panel, the Reviewer Response Form was piloted with two doctoral students with experience working with students with ASD. Feedback from the two pilot reviewers provided important information about the items in the rating scale and the content analysis design administration process. Pilot reviewers recommended more explicit directions related to completing and returning the instrument. Randomization of the Reviewer Response Form was identified as necessary for later factorial validity indices along with the addition of space for reviewers to include their demographic information. The form was

updated and was distributed to the 20 panelists via email.

The expert panel was given explicit directions for completing and returning the Reviewer Response Form, as well as a suggested time frame for submission. Of the ten content experts and ten lay experts contacted, three content experts (two nationally recognized professors and one state-level consultant) and three lay experts (one teacher, one special education administrator, and one principal) returned the reviewer response form, meeting the minimum guidelines for response rates for a content analysis design as described by Rubio and colleagues (2003). These data were manually transferred from the Word document to the Excel data file created for data analysis.

A coding structure was created to represent the demographic information and questionnaire responses provided by the reviewers. Two individuals entered the data into the file (one read the data while the other typed). Once the data file was complete, the individuals switched roles to check for accuracy (one read the data while the other checked the entries). For the content validity design, data was entered sequentially by section (i.e. representativeness, clarity, factor) to create clarity in the process. To check for transcription errors, every 10th data entry was checked for each of the 6 reviewers. No entry errors were found in this process.

Data analysis. Overall, six panelists returned the Reviewer Response Form. Inter-rater agreement for representativeness of each item was determined by calculating the agreement among the experts. Rubio and colleagues (2003) recommend dichotomizing the scale

for inter-rater agreement (e.g., either representative [3, 4] or not representative [1,2]) for both representativeness and clarity. Agreement for each item is determined by determining the number of experts rating the item representative or clear (3-4n) and dividing that number by the total number of experts (N). The number of items with a reliability score of at least .80 was divided by the total number of items on the scale in order to determine the expert reviewer reliability for the scale. This procedure is recommended for studies with a sample of experts that exceeds five (Lynn, 1986).

Additionally, the content validity index (CVI) of the tool was calculated to determine the extent to which each item and the overall tool represented EBP for students with autism (Rubio, et al., 2003). The CVI for each individual item was calculated by dividing the number of experts rating 3 or 4 on representativeness on the item by the number of experts (3-4n/N). The CVI of the measure was then estimated by calculating the average CVI across the measure.

Finally, the tool was analyzed for its factorial validity index (FVI). To calculate the FVI for each item, the number of experts who correctly associated the item with the factor is divided by the total number of experts (n+/N). The average is taken across items to determine the FVI for the entire instrument.

Results

The results of all reliability measures during the content analysis phase are as follows. In representativeness, 44 of the 46 items had an IRA for representativeness of .80 or higher. Thus, the overall expert IRA for the representativeness of the tool was .96. In clarity, 40 of the 46 items had an IRA for

clarity of .80 or higher making the overall IRA for clarity at .87. In content validity, all but two of the items were rated above the .80 criterion and the overall CVI for the observation tool was .95. In factorial validity, the overall FVI for the measure was .88.

Modifications Based on Content Analysis

The results of the content analysis design meet the minimum levels of acceptability for IRA (.80), CVI (.80) and FVI (.80) as determined by Rubio and colleagues (2003). Representativeness (IRA =.96) and content validity (CVI =.95) were the strongest areas of the observation tool, indicating the experts felt that the items on the measure were representative of evidence-based structures and supports for students with autism.

A review of the items with the lowest inter-rater agreement indicated the items that were very specific to the field of autism (e.g., structured work systems) had the lowest ratings for clarity. Those items were revised in response to the inter-rater agreement issues and to reflect some of the narrative responses from reviewers. Two items in embedded instructional supports were substantially revised as well. See Table 2 for an exemplar of the item revision process throughout the project.

The Factorial Validity Index met the criteria of .80 of acceptability with a FVI of .88. Although this was acceptable, there were some areas that required revision. Analysis of individual items indicated that there might have been some confusion with the categories of factors provided, rather than with the items themselves. It was determined from these results and from narrative responses that fewer, broader categories might provide more clarity.

In addition to the revision of items, format was modified as well. Based on panelist feedback, the items were organized into three broad categories with subheadings. The layout was adjusted until all of the information required was included on one page. The rating scale for the observations was included at the top of the document. In addition, a user's guide was created as a companion document to provide further clarity regarding the tool. This guide included definitions of items as well as exemplars. The updated version of the tool was then determined ready for a pilot implementation study in a classroom environment.

PHASE 2: Implementation and Modification

Initial Implementation Pilot Testing.

Participants. A purposive sample (Oliver, 2006) of three raters completed the observation tool in a brief observation of eight classrooms. Three raters were selected as the number threshold that would provide diverse perspectives in the observation without causing undue disruption in the classroom environment. The first rater was the instrument developer; the second was a doctoral student who was selected based on her experience with teaching students with ASD and with observing evidence-based practices in the classroom; and the third was the school district's autism classroom consultant who regularly observed in students with autism in a variety of classroom environments. Neither the doctoral student nor the autism consultant had any prior knowledge of the tool. The classrooms observed during the pilot were selected based on the following criteria: (a) at least one student with ASD received instruction in the classroom and (b) the classroom teacher was

willing to have observers in the room. The three raters observed together two general education classrooms (one kindergarten, one high school science) and eight classrooms for students with multiple disabilities (four elementary, three middle school, and one high school).

Data collection and analysis. All of the data in this phase of the study were collected on the same day. The instrument developer met with the other two raters at the site of the first classroom observations. They reviewed the observation tool and the procedures in the user guide for twenty minutes. The raters then entered the classroom and remained there for 12 minutes (c.f. Zepeda, 2013). The instrument developer kept time and indicated when it was time to leave the room. The raters were permitted to move around the classroom unless the classroom teacher indicated that the raters should remain in a certain area. In 6 of 8 classrooms, raters were allowed to move around. This procedure was followed in each of the eight classrooms. No discussion of scoring or observations occurred until after all eight observations were complete.

Results. The inter-rater reliability for the raters was found to be $Kappa = 0.501$ ($p < .0001$), 95% CI (0.476, 0.526). An overall inter-rater reliability of .501 met criteria for moderate acceptability; however, statisticians typically prefer Kappa values to be at least .6 before claiming an instrument has a strong level of agreement (Landis & Koch, 1977). While the results of this phase of the pilot testing were very positive, the tool required further revision and pilot testing before it could be considered strongly reliable.

Each of the raters provided optional written feedback that led to other modifications. First, the raters indicated that while the user guide was a helpful reference in training, it was cumbersome to have to refer to a separate document for the rating scale. The scale on the observation tool was edited to include a rubric-style description of each of the ratings. Second, items were revised to improve clarity and limit redundancy. Finally, the layout of the tool was adjusted to clarify where raters were to indicate their responses. After modifications, the tool was ready to be tested again.

Second Implementation Pilot Testing

Participants. The second iteration of the pilot study used the same basic design as the first, but involved three different raters. The instrument developer was one of the raters in this study. The second rater was the supervisor of the classrooms and had previously worked as a speech-language pathologist for students with autism. The third rater was an autism consultant and former classroom teacher. In this iteration only four different classroom environments were available to study and all four were exclusive to students with ASD.

Data collection and analysis. The observation protocol was nearly identical in each version of the pilot, although one notable change was made in the second in an attempt to refine the observation process. The training process was lengthened from twenty minutes to one hour. In addition to reviewing the observation tool and user guide, the participants practiced rating particular situations, discussed the rationale for their decision, and finally determined a normed rating for each scenario.

Results. Fleiss' kappa was again used to analyze the data from the study ($n=192$). The interrater reliability for the raters was found to be $Kappa = 0.684$ ($p < .0.001$), 95% CI (0.550, 0.640). This overall interrater reliability met the standard for substantial agreement and exceeded the acceptability level of .6 that statisticians typically require before an instrument is determined to have a strong level of agreement (Landis & Koch, 1977).

Implications of Pilot Testing. Results of the pilot testing reveal positive indications for the reliability of the instrument. Both the first and second versions of the pilot testing had at least acceptable inter rater reliability results (at .501 and .684). The second iteration of the pilot testing met additional level of rigor by exceeding the .6 level that many statisticians typically prefer (Landis & Koch, 1977). It is promising to note that the level of acceptability increased from the first pilot test to the second. The differences in the classroom demographics of the two iterations of the study indicated that the reliability differences between the two may correspond to the nature of the classroom environment, which was an important consideration for subsequent reliability testing. The second iteration of the pilot also indicated that a more comprehensive training process may have a positive impact on reliability. This training process provided important opportunities for raters practicing responses and developing norms. In response, revisions to the training process will include standardizing this practice by including video models that include guidance and rationales about scoring. The pilot tests also revealed that another expert review of the checklist would be beneficial both to the revision process and to solicit feedback about appropriate

protocols for implementation, including systematic observer training.

Phase 3: Implementation and Evaluation

To complete a larger implementation and evaluation of the tool, a research partnership was developed with a statewide center that facilitated the use of EBP for students with ASD. This project included five facilitators with master's degrees in special education as well as one faculty member with an area of expertise in autism and other developmental disabilities.

The project director and staff met with the initial research team to discuss items on the instrument, clarity of the tool, and to review the user's guide. The project director and staff then correlated the benchmark assessment to their larger, comprehensive tool so that they could use them seamlessly in the classrooms in which they worked. After this training, the tool was updated to reflect clarity issues (e.g., include options for acknowledging supports visible in the classroom that are not part of the instructional activities during the observation) and the rating scale itself. The rating scale was physically shifted from the top to the bottom of the page, the likert-style numbers changed to representative acronyms (e.g., EP for emerging practice), and a brief description of the guidelines for each score was included on the tool. Table 2 provides an item revision exemplar and more detailed information about the changes to the rating scale.

Each facilitator delivered up to 6 checklists in 6 schools within a two-week period and provided feedback about the ease of use, clarity of use, and overall benefits/concerns in using the checklist. Because facilitators were in different parts of the state, reliability

Table 2. Examples from Revision Process

	Version 1 (reviewer response form)	Item Version 2 (pilot testing for implementation)	Item Version 3 (implementation and evaluation)
Item	All students have an individualized work system (IWS) for independent work tasks	Individualized work systems (IWS) are used for independent work tasks in order to communicate answers to four questions – What work? How much work? How do I know when I’m finished? What do I do next?	Individualized work systems (IWS) are used for independent work tasks in order to communicate answers to four questions – What work? How much work? How do I know when I’m finished? What do I do next? Check ✓ if IWS are observed in classroom but are not applicable to observed instruction (i.e., independent work activities not observed)
Rating scale	n/a	1: Not observed 2: Partial Implementation 3: Full Implementation	N/A Not Applicable <i>The practice or support is not applicable to the classroom and/or observation period. A score of “NO”(not observed) should be given if the structure or support should be observed and is not.</i> N/O Not Observed <i>The practice or support is not in place in the classroom. There is no observable evidence that the structure or support is used or is an emerging practice in the classroom.</i> E/P Emerging Practice <i>The practice or support is observable in the classroom but is still emerging, is used inconsistently, or implementation is not proficient.</i> P/I Proficient Implementation <i>The practice or support is observable in the classroom and is implemented with proficiency.</i>

measures were not taken as paired observations were not possible. In total 22 checklists were administered (8 elementary

schools, 7 middle schools, and 7 high schools). Overwhelmingly, facilitators reported the tool as valuable, easy to use, and

meaningful for use in follow-up conversations with administrators and practitioners. Specific comments suggested the EBP CC was quick (i.e., able to complete it in a short amount of time once familiar with the instrument) and helpful in classroom observation (i.e., provided specific things to look for). Comments also suggested the EBP CC seemed more useful for elementary and self-contained classroom than high school general education classrooms, and some items such as “individualized work system” may need more explanation. Comments also indicated the scoring system needed revision (i.e., “P/I and E/P are more difficult to remember and longer to write than one letter, check or other mark. Probably minor issue, but I kept having to look at the scale.”)

After these modifications, the tool was presented to 54 k-12 principals at a statewide principal’s leadership conference. After reviewing the document, administrators were asked if they would consider the tool useful or not useful for their practice. Of the 38 tools received back, 92% (35) were marked “yes, I have a need for this tool in school/district.” Additionally, principals were asked to provide information on items that were not understood or not observable. Responses yielded five items that needed additional clarification (item #5, 9, 16, 28, 23). Two items were included as non-observable (#5, 25). Principals made suggestions for additional items they would like to measure. Of the 38 responses returned, 92% said the measuring scale was clear but, even though it was marked as clear, several comments were made on this item. Table 3 details these comments.

Overwhelmingly principals indicated the need for such a tool in schools. As we

hypothesized earlier, clarity and efficiency are highly prized components of any measurement tool for use by school personnel. To be useful in practice, benchmark measurements must be functional for those consumers for which they are intended. The tool is currently undergoing modifications based on the principals’ feedback as well as the new iteration of the NPDC-ASD 2014 report (Wang et al., 2014). An IRB is underway to engage in additional testing with administrators, other school leaders, general educators, and special educators.

Discussion

Using EBP, educators must ensure that students with ASD, like all learners, are making progress in the general education curriculum (Simpson et al., 2011). However, teachers identify a variety of barriers to implementing EBP including access, confidence, and time (Williams & Coles, 2007). The purpose of this study was to describe the development of a standardized benchmark assessment, the EBP Classroom Checklist for Educators, designed to address these teacher identified challenges.

The EBP CC details foundational practices in practitioner-friendly terms, providing what Bos (1995) describes as common language for school administrators/leaders, and general and special educators. Student directed benchmark tools serve a variety of purposes in schools. Similarly, the EBP CC will likely be used in a variety of ways and for differing purposes. Our goal for the EBP CC is to offer a collaborative benchmark tool that leads to increased use of evidence-based practices for students with ASD.

Table 3. Principal Comments

Comments regarding additional items to include: display students work; add a technology part/computers; if there is an inclusion teacher, is team/co-teaching taking place or is the sped teacher serving as an aide; evidence/reinforcement—a growth versus fixed mindset of intelligence and learning
Comments regarding scale included: when do you use n/a? Under the measuring scale, it talks about Not observed (NO)” clear but too wordy—needs simplification, should E/P & P/I be quantified? For example...is used inconsistently 50-70% of available opportunities. These are random percentages but might make it easier for the observer to have a line of demarcation among the 3 categories.”
Other comments: This tool is time consuming. Administrators have so many tasks that we need something that can be done quickly as a 5-10 minute walk through; Could form be on a spreadsheet so that multiple observations by multiple observers could be combined in order to more easily collect data over time &/or across learning environments?

To this end, the study had three specific aims. These were to establish the content validity of the EBP CC, establish reliability of the benchmark assessment tool when used in a classroom environment by multiple raters, and explore user satisfaction.

The content validity measures suggest the items on the EBP CC are representative of the practices expected in serving students with ASD. Similarly, reliability measures suggest multiple raters can use the checklist with similar results, and in an efficient amount of time. Generally speaking, individuals who administered the EBP CC valued the tool, indicating it met a need in their schools. These same individuals also provided constructive feedback, suggesting the scoring guide needed to be tweaked.

Limitations

Several limitations were noted in the development of the EBP CC. Initially, three content and three lay experts provided feedback. While this meets the minimum requirements (Lynn, 1986; Rubio et al., 2003) additional content experts might have added to or changed the number of items, their representativeness and clarity. Another limitation relates to the level of knowledge by raters in Phase 2. Given that the raters had knowledge of autism and experience with EBP, broader piloting by less experienced teachers and school administrators might have proved beneficial. Additionally, rating a larger set of more diverse classrooms might have better informed modifications. In Phase 3, reliability measures would have improved the findings on the strength of the instrument. Procedural fidelity measures are needed on the training and implementation of the tool.

Implications for Research and Practice

Klingner and colleagues (2013) suggested, “researchers must strategically and systematically scale up implementation of EBPS in collaboration with district partners” (p. 195). However, before moving the checklist back into schools, a critical next research step is to revise the content of the checklist to align with the 2014 EBP report by Wong and colleagues. Upon revision, additional content validity analysis will be needed. Once the content is determined valid, research is needed to standardize implementation in schools.

At the building and classroom levels, administrators, school leaders, or classroom teachers could initiate using the EBP CC. For example, general or special education classroom teachers could use the tool proactively to self-assess and reflect on their existing practices as benchmarks throughout the school year. Teams of general and special educators could also use the EBP CC to guide collaborative assessment and planning. Future research is needed to investigate a variety of questions related to teacher implementation. For example, researchers might study teachers’ ability to use the checklist independently or with very limited support, how the tool influences teacher reflection, and the influence of the EBP CC on teachers’ feelings of efficacy. Researchers should also address the link between the tool and student progress; for example, do students in classrooms where teachers have systematically implemented the items on the checklist make greater progress than those who don’t?

Beginning special educators, especially those servicing students with ASD and other complex learning needs, are faced with a

variety of challenges. Some of these include building collaborative relationships with colleagues, addressing behavior needs of students, and organizing materials and data collection (Israel, Carnahan, Snyder, & Williamson, 2013). The EBP CC could be a powerful tool for these teachers, allowing them to systematically implement EBPs that are the foundation for student success. Future research should address the effectiveness of the EBP CC in systematically guiding beginning teachers in creating classroom systems for students with ASD. For example, researchers might evaluate effectiveness when a teacher moves through the checklist one component at a time versus a teacher who attempts to implement several practices at the same time.

Additionally, administrators and other school leaders could use the EBP CC as a reference tool during brief classroom visits. While this has been indicated as a desired use by administrators, perhaps a more important or valuable application would be to use the EBP CC as the foundation for collaborative problem solving and goal-setting between teachers and administrators or other school leaders. Research is needed to evaluate the effectiveness of the EBP CC in facilitating such collaboration. Additionally, researchers should address the capacity of these collaborative problem-solving efforts in highlighting specific evidence-based practices needed. Based on these specific needs, educators and/or administrators/leaders could access NPDC EBP briefs or NAC National Standards Project for more comprehensive references and supports, and/or plan building or district level professional development related to these practices. Similarly, the EBP CC could be used in districts or buildings to highlight the need for more extensive

assessment and planning using comprehensive tools such as the LAQI (Lowrey et al., 2010) or the Tier 1 Classroom Checklist-ASD Nest Program (Bleiweiss, Hough, & Cohen, 2013).

Kucharczyk and colleagues (2012) described coaching as an important strategy for increasing the use of EBP. Several models have emerged (Israel et al., 2013; Kucharczyk et al., 2012) for coaching teachers of students with ASD and other significant disabilities. The EBP CC could serve as a model for guiding coaching observations and collaborative planning. Future research is needed to investigate the usefulness of the tool within these models. Specifically, research might consider the differences between the coaching outcomes when a specific tool such as the EBP CC is used. For example, researchers could evaluate the usefulness of the EBP CC in guide coach observations, facilitating coach-teacher discussions, or even in setting collaborative goals for teachers and coaches. Researchers might also investigate the EBP CC as a tool for sustaining progress upon completion of coaching, which can often be a challenge (Israel et al., 2013).

Finally, in addition to the school or district level use, the EBP CC could be used to help pre-service educators (administrators and teachers) examine the foundational EBP necessary for teaching students with ASD and other similar needs, a critical first step in

improving education for students with ASD. For example, in their initial classroom observations, pre-service teachers could use the EBP CC to identify practices. These observations could serve as the foundation for reflection on the role of EBP. Research should address the effectiveness of the EBP CC on several levels in pre-service education. For example, researchers could investigate if the EBP CC supports pre-service educators in moving from low levels of understanding (e.g., identification of a specific practice) to higher levels (e.g., analysis and application)? Of equal importance would be to investigate the level of support or contextual factors necessary to encourage beginning special educators who used the EBP CC during their teacher training to use the tool as a foundation for practice in their first years.

Conclusion Comments

School administrators and district leaders have consistently indicated a need for a tool such as the EBP CC, and educators have suggested such tools must be effective and efficient. The purpose of this study was to evaluate the content validity and reliability of the EBP CC. While additional research is needed, initial testing suggests the EBP CC is a feasible tool for establishing the foundational practices necessary for promoting positive outcomes for students with ASD.

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Evaluation of a Biofeedback Intervention in College Students Diagnosed with an Autism Spectrum Disorder

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Abstract: This study was designed to identify the feasibility of using a biofeedback technique with young adults with autism as a means of monitoring stress. Biofeedback has become increasingly popular as a means of reducing stress. Anxiety and associated stresses are commonly comorbid factors associated with autism. Biofeedback has proven successful as an operant conditioning intervention with young children and adolescents. The purpose of this study was to determine if biofeedback can be used as a possible accommodation for individuals with autism who are attending an institution of higher education (IHE). Exploratory data analysis (EDA) was used to identify trends resulting from a 10 week study in which 10 young adults with autism and 47 typical college students monitored heart rate variability for 10 weeks. This study revealed several trends that provide a basis for continued research in the area of biofeedback as a means of accommodation for individuals with autism in postsecondary IHE settings. Information related to new insights in guidance and treatment options for educators and professionals who provide accommodations for individuals with autism in postsecondary education institutions is discussed.

An increase in diagnosis, implementation of early interventions, inclusion-based classrooms and legislative mandates have created a generation of young adults with autism spectrum disorders (ASD) who are applying and being admitted to colleges and universities (Camarena & Sarigiani, 2009; Chiang, Cheung, Hickson, Xiang, & Tsai, 2012; Nevill & White, 2011; Zager & Alpern, 2010). Academic accommodations or adjustments for individuals with disabilities in postsecondary settings are a major component of mandated federal law which

specifically directs IHEs to create modifications in academic program to prevent discrimination based on disability programs for qualified students (Section 104.44 in Section 504 of ADA). All students with disabilities must be provided with accommodations ensuring equal opportunity to meet the standards for academic success.

Although IHEs have provided accommodations for individuals with special needs for decades, students with ASD are an emerging and underserved population in

higher education (Wenzel & Rowley, 2010; Zager & Alpern, 2010). Few colleges and universities are prepared to serve students with ASD (VanBergeijk, Klin, & Volkmar, 2008; Farrell, 2004; Wolf, Brown, & Bork, 2009; Zager & Alpern, 2010). Approximately 43% of young adults with ASD enroll in post-secondary institutions of higher education (IHEs) (Chiang et al., 2012) but in spite of requisite cognitive levels for academic success, many students drop out of school or earn failing grades.

Colleges and universities are faced with multiple challenges when attempting to design accommodations for individuals with autism. In addition to unique sensory, organizational and social challenges, students with ASD are at an increased risk for comorbid conditions such as depression and anxiety. Due to core characteristics of autism such students often refuse to seek help or demonstrate lack of awareness for guidance (Adreon & Durocher, 2007; VanBergeijk et al., 2008). Additionally, Ramsay et al. (2005) acknowledged that individuals with ASD may have difficulty establishing rapport with therapists due to social and communicative challenges associated with ASD. Traditional talk therapy approaches such as cognitive dialectic behavior therapy (CBT) and humanistic approaches often rely on multiple visits with a highly trained and licensed mental health provider and based treatments, often successful with other populations at the IHE level, are frequently ineffective or insufficient due to communication and social skill issues characteristic of individuals on the autism spectrum (Puleo & Kendall, 2010). For college students making the difficult transition to a new environment, schedule, and campus lifestyle CBT and other traditional therapies often prove to be

expensive, inaccessible (on campus), or too socially demanding to be successful. New approaches that provide real-time visual feedback, such as computer-based biofeedback software, may offer plausible alternatives to traditional talk therapy.

In response to these challenges, colleges and universities must be proactive in identifying new and innovative solutions for students with ASD that are affordable, sustainable, and effective. Although professors can become more aware of characteristics associated with the condition, i.e., taking into account the need for maintain routines and minimizing last minute postings, addressing and accommodating the needs of many students with autism exceed the scope and skills of most instructors at IHEs. One self-directed approach which may have promise for promoting successful experiences for individuals on the spectrum is biofeedback, a multidisciplinary method which draws from neuroanatomy, behavioral principles and pathophysiology to reduce or monitor stress (Laibow, 1999). Through biofeedback, individuals learn to modify images of brainwave frequencies produced through an electroencephalograph (EEG) that are identified with stress with the intention of arriving at a calmer mental state.

Stress

Many individuals with autism have poor psychological resilience, i.e., when experiencing stress have difficulty coping and returning to normal functioning. Individuals with ASD are at greater risk for anxiety and are more vulnerable to the stresses associated with college life than the general population (Kerns & Kendall, 2012; MacNeil, Lopes, & Minnes, 2009). Reasons for this increase include poor coping skills for handling the

transition from high school to college, adapting to greater independence as an adult, and the vastly different demands of college, academic and social, compared to high school (Pancer, Hunsberger, Pratt, & Alisat (2000). For students with ASD, these factors often translate into greater anxiety than other student populations due to poor social and communication skills which in the highly social and communication rich environment of a college campus can be isolating and increase anxiety (VanBergeijk et al., 2008). A significant challenge for many college students with ASD is anxiety that can be a contributing factor to addressing the poor postsecondary outcomes at the college and university level (Davis et al., 2011; VanBergeijk et al., 2008). Although no cure is associated with the condition of autism, strategies have been used to reduce stress (Moree & Davis, 2010; Walkup et al., 2008), but the literature reveals few interventions applied to young adults with autism as members of an IHE and none as of yet have been realistic in terms of time, economics, and staffing. In general most universities and colleges are overwhelmed, understaffed and underfunded when addressing the mental health needs like stress of their students (Kadison & DiGeronimo, 2004; Kraft, 2011). If the young adults could address stresses independently through an accessible economical system, some of the pressure associated with the college and university experiences may be able to be reduced in a meaningful way.

Neurofeedback

One of the most noninvasive and cost effective interventions becoming increasingly popular in the treatment of stress related to anxiety and other mental health conditions is neurofeedback, a form of biofeedback, based

on behavior therapy aimed at controlling central nervous system activity. Neurofeedback heightens an individual's awareness of the mind body connection by means of electronic imaging enabling voluntary control over targeted responses. Clinical evidence confirms that several subtypes of neurological disorders are associated with specific visual images or profiles produced through electroencephalographs (EEGs), e.g., OCD, headaches or anxiety (Pop-Jordanov & Pop-Jordanova, 2008). An important application of the visual image is the ability for comparison between an atypical and a typical normative profile. Comparisons between profiles are a means of gathering neurological information which can lead to self – regulation of the behavior profiled.

Self- regulation is realized by means of an operant learning model using real time graphics of electroencephalograph (EEG) parameters (Holtman et al., 2011). EEG measures are transformed into visual or auditory signals and fed back on a screen in real time and compared to a desired standard. Many animated biofeedback programs for children and adolescents are available and typically reward successful attempts immediately with some type of reinforcement, for example, points earned, a smiley face or encouraging words (Holtmann & Stadler, 2006; Nash, 2000). The technique is based on the assumption that self-management of neurological images can ultimately lead to appropriate behavior, i.e., that conditions represented through neuroimaging can be modulated or adjusted to reflect expected behaviors.

An inherent appeal of neurofeedback is that information can be objectively through the

use of quantitative electroencephalography (QEEG), thus reducing subjectivity of visually inspecting a behavioral profile. In addition to being objective, QEEG data analysis is highly reproducible and is automated, i.e., linked to specialized software (Thakor & Tong, 2004).

Findings from studies in associated fields invite renewed research on biofeedback in the area of ASD, for example, the emergence of initial research clarifying the neurobiological basis of ASD. A small but relatively substantial body of work addressing neurological feedback conducted with children and adolescents with ASD has been sufficiently rigorous to be considered as strong evidence for utilizing this approach. Although several methodological flaws are apparent, the results of the study by Jarusiewicz (2002) have been cited as evidence for the efficacy of neurofeedback in ASD in numerous popular scientific publications (as cited in Holtmann et al., 2011). A growing body of functional neuroimaging and neurophysiological data are providing support for a link between dysfunctional behaviors underlying autism in several social cognitive processes, e.g., recognition of emotion, imitation, and prediction of actions (Honaga, Ishii, & Kurimoto, 2010). Findings related to disconnectivity, i.e., problems associated with impairment of cognitive functioning (Barnea-Goraly et al., 2004; Rippon, Brock, Brown, & Boucher, 2007), executive dysfunction (Belmonte et al., 2004) and altered processing of emotions (Koshino et al., 2008) with individuals with ASD contribute to a rationale for further investigation of the potential of biofeedback. Emerging evidence from EEGs, magnetic resonance imaging, and functional magnetic resonance imaging studies are

suggest a potential role of biofeedback as a measurement tool.

Of significance is the concept that the same systems that produce the states of anxiety, such as, panic attacks, agoraphobia, the fear of uncontrollable social situations as well as excessive compulsions involving thoughts or actions (Davis et al, 2011; McCoy, 2012) can be retrained through biofeedback to reduce the body's physiological response to stress (McCraty, Atkinson, Tomasi, & Bradley, 2006). A variety of physical responses can be measured for the purpose of biofeedback, among others, for example, muscle activity, skin temperature, brain blood flow and heart rate variability (HRV) produce information about physiological activity which can enable interpretation and subsequent response by an individual (Association for Applied Psychophysiology and Biofeedback Inc., 2011). Heart rate variability has been used to catalog emotion modulated responses and have demonstrated connections among negative emotions and negative health (Appelhans & Luecken, 2006; Thayer & Ruiz-Padial, 2006).

Documentation has established that chronic, excessive and extreme stress leads to increased anxiety (National Institute of Mental Health, 2012), as well as decreased cognitive function (Kirschbaum, Wolf, May, Wippich, & Hellhammer, 1996). As a result of the high burden of stress and anxiety experienced by many young adults with autism in higher education settings, the need for identification of effective stress management techniques is becoming increasingly clear. Heart Rate Variability biofeedback has been recognized as an approach which not only reduces stress and anxiety, but also (Reiner, 2008) increases

cognitive performance under stressful conditions (Prinsloo et al., 2011).

Exploratory Data Analysis

Exploratory Data Analysis (EDA) approaches data interpretation from the perspective of understanding basic trends, tenets, and themes of data through a highly visual approach. EDA reveals nuances involving a greater holistic understanding of the data and establishing a foundation for specific hypothesis testing (Behrens, 1997). Given the lack of a substantial research base for identifying the feasibility of using biofeedback with young adults on the spectrum at the university level demands exploration and identification of trends to guide future investigations. With so little known about the causes, treatments, and rise in diagnosis of ASD, traditional hypothesis testing with biofeedback would be premature. ASD biofeedback research at this stage may be better served through EDA by establishing foundations upon which to build meaningful models.

Literature on the accommodation experience of college students with ASD, the role of anxiety on quality of life, co-morbidity of anxiety and ASD, the emergence and effectiveness of biofeedback as an intervention for anxiety, combined with the use of EDA as a computational tool for program evaluation, establishes a solid foundation for the research methods included in this paper. The purpose of this study is to apply the utility of an EDA approach as a platform for the evaluation, and analyses of biofeedback as a feasible intervention with students with ASD in IHE settings.

A comprehensive review of over 20 research studies revealed an association between

abnormalities of heart rate variability biofeedback (HRVB) and the presence of anxiety (Cohen & Benjamin, 2006). In addition, recent research in the field of biofeedback has relied on less expensive, more portable and more robust technology than earlier equipment (Coben, Linden, & Myers, 2009; Hammond, 2005; Reiner, 2008) which are less invasive requiring only require finger or earlobe contacts to record physiological data such as HRV.

In an effort to explore the feasibility of using a biofeedback approach to monitor and ultimately reduce anxiety of students with autism, the Disability Resource Center (DRC) at a large university located in the southwestern United States purchased EmWave® Desktop heart-monitoring computer software system. Use of the EmWave® product has established historical precedence in other biofeedback studies (Beckham, Greene, & Meltzer-Brody, 2013; Henriques, Keffer, Abrahamson, & Horst, 2011) and offers a technologically based objective approach for measuring coherence between an individual's psychological and physiological processes. Particular appeal of EmWave® Desktop biofeedback is the nonintrusive form factor of the device, the ability to self-manage use of the instrument, and the automated output of behavioral data. The purpose of this study was to examine the viability of biofeedback as a possible accommodation for individuals with autism who are attending an institution of higher education.

Method

Participants

In January 2012, two groups of students were invited on a voluntary basis to participate in this exploratory study; individuals with

autism who were actively involved with the DRC and individuals enrolled in an introductory psychology course. Advisors with the DRC recruited all students. No incentives were provided for either group.

Participants were typical students enrolled in a beginning level psychology class ($n = 37$) and 10 students with ASD ($n = 10$). Participants were able to withdraw from the study at any time. Both groups displayed a consistent decline in participation with 60% of the initial participants with ASD and 66% of the Typical group engaged for the 10 week study duration. More males ($n = 38$) participated than females ($n = 9$); all students with autism were male. Because analysis was based on archival data, specific demographic information such as race and age are not available with this data set; however, all participants were currently enrolled undergraduate students at the time of data collection.

Procedure

Data from biofeedback sessions based on HRV was collected using the EmWave® Desktop heart-monitoring computer software system via a USB sensor worn by the participant and displayed real-time HRV information in an on-screen graphical format. Participants independently were able to begin and end biofeedback sessions. Complete HRV data was available after every session.

The study was conducted in a private room located in the DRC office suite on campus. All participants using the EmWave software were directed by DRC staff to complete a 10-minute session once a week for 10 weeks with no less than 72 hours between sessions. Students were allowed to meet at times most convenient for their personal schedules during

regular business hours. For the first session, DRC staff assisted participants in loading the software and connecting the USB sensor. After the initial session, each participant completed all sessions independently. Participants recorded the date, length, and HRV scores of every session on a data sheet stored in the DRC. Data was into a single electronic file on the DRCs university server. The ASU DRC and the Institutional Review Board (IRB) of ASU approved the use of this data for analyses.

Design and Analysis

Datasets were analyzed using EDA techniques. Results reported in this study represent information identified through the process of data entry of physical participant information, EDA interpretation techniques, as well as the use of descriptive statistics and graphing techniques.

Findings and Discussion

Three themes were explored; data trends between the two research groups, data trends within each group, and trends across the research study as a whole. Using this framework data was segmented into the first five weeks and second five weeks. Effects between and within the two participant groups were examined to determine trends that may inform a foundation for future research.

Between Group Trends

Presented with individual HRV coherence scores for participants from the ASD group ($n = 10$) and the Typical group ($n = 37$), comparisons between groups and within groups HRV scores offer initial insight into possible use of biofeedback as an intervention. A higher mean score indicates a lower HRV and greater control over anxiety. A review of

the mean time for weekly scores and range of response that users spent in an optimal HRV coherence state for the 10 week duration of the study identified three trends. First, the ASD group mean (47.80) in Week 1 is higher than that of the Typical group mean (45.86) in Week 1. This higher mean remains in effect through the second week of the study. Second, the minimum and maximum scores were both generated by the ASD group. Third, the range of mean scores for ASD ($R = 38.16 - 58.42$) in comparison with the typical group range ($R = 39.41 - 52.40$) appears to show slight variance over the course of the 10 weeks.

The narrow range of scores is consistent with Scolnick (2005) who identified minimal changes in an ASD group using biofeedback. In contrast with Week 1 means, Week 10 means revealed that the ASD mean was lower than the Typical mean. The ASD score in Week 10 is lower than the group's Week 1 score with the opposite finding for the Typical group in which Week 10 score is higher than Week 1. These findings are consistent with existing research documenting an increased risk for anxiety in individuals with ASD (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; MacNeil et al., 2009).

An aspect influencing these findings may be that students in the introductory psychology course were experiencing difficulty, believed they were suffering from anxiety and sought assistance by participating. This interpretation could lead to an elevated initial reading for the typical population and may indicate they are not representative of the typical college student. Similarly, because students with ASD chose to participate they may have been particularly well adjusted to the higher education environment, as evidenced by their

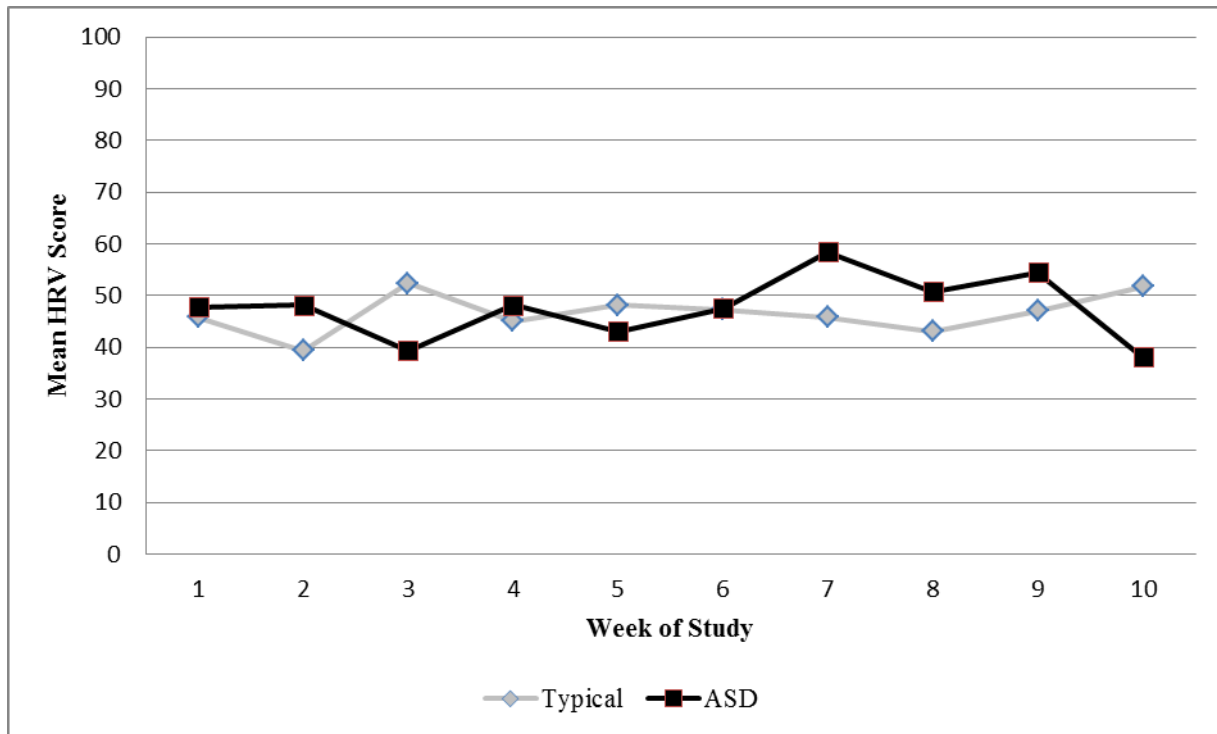
engagement with the disability office, or have already developed coping skills to allow them to persist in college. Due to the limited amount of demographic data on participants in this study determining such factors associated with these findings is not possible, but suggests that future research should include level of anxiety as well as self-referral as factors influencing utility of biofeedback.

Figure 1 connects the individual weekly means for the two groups and provides greater visual clarity on trends that may exist. The line plot in Figure 1 exposes the elevated HRV scores for the ASD group in consecutive weeks 7, 8, and 9. These data are the only weeks for which the ASD group had optimal HRV scores for the majority of their session time. In Figure 1, weeks 7-9 clearly show some of the highest mean scores for the ASD group, and the scores remain above the Typical group for this three week period. The addition of a trend line in Figure 1 also reinforces the narrow range of scores between the two groups with the exception of weeks 7-9 suggesting a pattern of improvement for the ASD participants similar to McCraty et al. (2006) and Thompson, Thompson, and Reid (2010) who found improvements over time in groups using HRV biofeedback interventions.

Within Group 10 Week Trends

Observations from Figure 1 suggest that individuals with ASD in this study may be more likely to present consistent HRV patterns compared to a typical population; the ASD population had a greater number of weeks with majority optimal HRV scores - three weeks as compared to two weeks in the Typical group, and that the ASD group's high scores fell in consecutive weeks in three of

Figure 1. Mean HRV Scores by Week of Study.

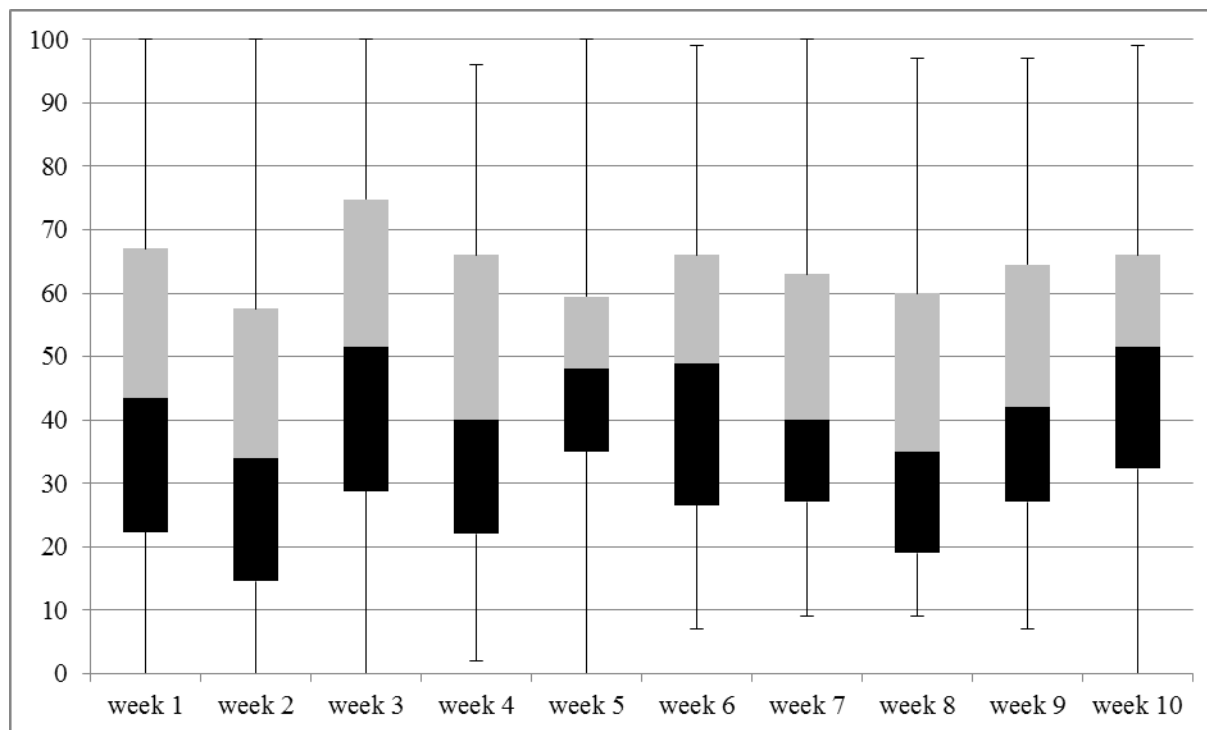


the final four weeks of the study compared to the Typical group with high scores in week 3 and week 10. Although not statistically significant, the consecutive high scores for the ASD group may be evidence that the intervention had taken hold and participants in the ASD group were developing better control of their HRV and associated anxiety.

Although weekly means for the ASD and Typical group are useful in examining preliminary trends, the use of means does not provide a complete picture of all the individual data points and unique participant experiences in this study. To address this limitation, Figure 2 displays a box plot representing the weekly scores of individual participants in the ASD group.

Figure 2 provides insight into weeks 7-9, for the ASD group, i.e., the sessions during which the participants' spent the majority of their feedback in the optimal state. The box plot reveals a change in the minimum values for the final weeks of the study relative to the early weeks of the study. The box representing the median and quartiles also changes dramatically in the final weeks of the study for the ASD group with shrinking quartiles and consistently elevated medians relative to earlier weeks. Week 10, though suboptimal, shows an elevated median value above earlier weeks.

Figure 2. Box Plot of Typical Participant Data by Study Weeks.



Starting in week 7 the ASD group range narrows compared to earlier weeks and may show greater control over HRV or reflect a smaller sample size due to attrition as the study progressed. The median values for weeks 7-10 are some of the highest median values in the study and appear to show an upward trend in the ASD group data at the end of the intervention.

As seen in Figure 3, Box plot data for the ASD group shows a tighter range of scores than the Typical group. One reason for this difference could be the larger sample size ($n = 36$ vs $n = 10$ for ASD) or the greater number of an increase in outliers.

Between Group 5 Week Trends

Because the intervention in this study was designed to observe data reflecting changes in measured anxiety level over time, examination of the data must take into account patterns or trends generated. Inspection of the variability of the data on a week by week basis for both groups would be premature to assign critical importance to specific weeks in isolation. The data was examined for changes over time that did not rely solely on specific weeks to make determinations about change. The framework that ultimately emerged was to divide the data into the first five weeks, weeks 1-5, and the second five weeks, weeks 6-10. Using this new construct allowed for analysis of the change over time without being dependent on singular weeks.

Figure 3. Box Plots for ASD and Typical Groups by First Five Weeks and Second Five Weeks.

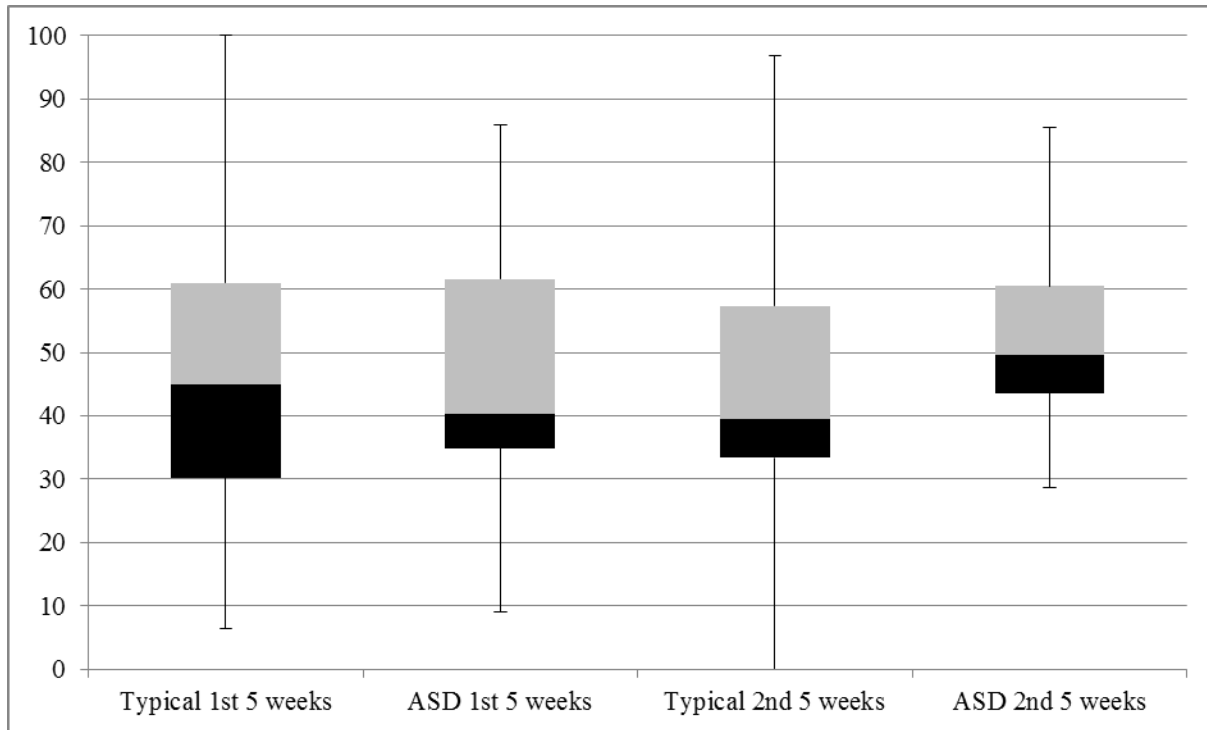


Table 1 provides valuable information to guide the analysis of the data for changes over time while respecting that individual weeks have a high degree of variability. The

mean scores for the first five vs. second five weeks, along with a total mean for the five week periods are included in Table 1.

Table 1. Mean Participant HRV Scores Weeks 1-5 and 6-10

<u>Week</u>	<u>ASD</u>	<u>Typical</u>	<u>Week</u>	<u>ASD</u>	<u>Typical</u>
1	47.80	45.86	6	47.57	47.25
2	48.20	39.41	7	58.42	45.77
3	39.33	52.40	8	50.83	43.14
4	48.13	45.10	9	54.50	47.00
5	43.12	48.14	10	38.16	51.70
Mean	45.32	46.18	Mean	49.9	46.97

The ASD group demonstrated an increase in their mean HRV score from the first five weeks to the second five weeks as did the Typical group. The ASD group's initial mean score for the first five weeks was lower than the Typical group, but this trend is reversed at the end of the second five weeks with the ASD group posting a higher second five week mean score than the Typical group. The study data viewed in first five vs. second five week increments aligns more closely with the positive change in HRV found in Thomson et al. (2010), Reiner (2008), Coben et al. (2009) and McCraty et al. (2006).

Several trends became apparent in analyzing this data. Both groups showed gains in HRV mean scores. The ASD group improved from 45.32 to 49.9 and the Typical group improved from 46.18 to 46.97. The ASD group gain of 4.58 is clearly larger than the .49 gain by the Typical group; however, both of these gains remain small. In the first five weeks, the Typical group shows an even distribution and a large range. In contrast, the ASD group shows an uneven distribution with a narrower range. In the second five weeks the Typical group no longer has a normal distribution, but maintains a large range of scores, but the ASD group has a normal distribution and an even narrower range of scores. The median score in the ASD group increases from the first five weeks to the second, while the median score falls in the Typical group. The findings for these groups may be because of the sample sizes at work, but could also be influenced by a greater control of HRV by members of the ASD group.

The other interesting five week vs. five week trend that Table 1 identifies is the change in median value for the two groups. The median

value climbs in the ASD group from 40.3 in the first five weeks to 49.6 in the second five weeks in contrast to the decline in the median values for the Typical group, which dropped from 44.9 to 39.4, suggesting some evidence across perspectives that the ASD group saw greater improvement than the Typical group.

Trends in Participant Attrition

A unique aspect of biofeedback in this study is that the participants completed their sessions independently and without intervention from staff or other sources. Participants with low scores may have been concerned with low scores mistakenly thinking they were not making progress or they may have believed they no longer needed the feedback. Receiving a positive score might have influenced a participant not to continue because the program no longer served the purpose of relieving anxiety.

Future Direction

This study examined a biofeedback intervention in college students with and without ASD. Prior to this research, no literature existed on the use of biofeedback as an intervention in college students with ASD. Future research should continue to build on the existing literature that clearly demonstrated biofeedback to be a successful intervention in individuals with ASD and should address the specific needs of the college ASD population. Because college students with ASD are an emerging population distributed throughout the world, future research should deliver interventions at multiple institutions in order to generate substantial sample sizes.

Though this study has limitations that restrict the scope of the findings, continued research

in the area of biofeedback as a means of addressing anxiety with college aged students with autism is supported. The data set used in this study represents a rare collection of college student biofeedback data. The trends found in this study suggest future research studies which will need to consider demographic information such as GPAs, SAT scores, or year in college financial situation, and co-occurring health conditions which may facilitate campuses to suggest new avenues for effective intervention. Timing is also an area for future study. The academic year for students provides multiple high stress environments and events, such as, mid- terms and finals or before and after breaks.

A key trend of this research was that results for the ASD group occurred in the final weeks of the 10 week intervention. Weeks 7-10 appeared a critical transition time for the students with ASD in adapting to the biofeedback program. Based on these findings, future research should focus on at least 10 week interventions if not longer. Future research should also explore the combination of CBT and biofeedback in individuals with ASD. Monitoring of participant progress and intervening after high or low scores could improve study dropout rates maintaining sample sizes. Most importantly, future research could use biofeedback in conjunction with other measures of anxiety. A simple self-report

form for participant stress levels could be used to correlate HRV scores and may offer valuable research information.

Identification of important markers such as the student background and environmental and personal stressors are factors to consider for future research. A challenge facing most researchers is that the populations of greatest concern are the hardest to reach. Those students who enrolled in this study chose to participate after an invitation via class lecture or personal conversation. For those students who are isolated as a result of their anxiety additional plans for engaging them in interventions and evaluating the success of those interventions may need to be implemented prior to participating in any type of accommodation.

Visual display and interpretation of data offers researchers a practical, immediate, and functional means to generate a basis for research where little data currently exists. The need to develop sustainable, affordable, and appropriate interventions for college students on the ASD spectrum struggling with anxiety is an immediate need in higher education. This early stage study vetted through EDA demonstrates that biofeedback may be one approach that can be used in meeting the anxiety stressors facing too many students with ASD.

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Effectiveness of Online Information and Support Services on the Education of Parents of Children with Intellectual Disability

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Abstract: The purpose of this study is to determine effectiveness of online informing and support services on the education of parents who have children with intellectual disability. The investigators sought answers to these questions: (a) does E-FISEP lead to significant differences in knowledge levels of parents who have children with intellectual disability? and (b) does E-FISEP lead to significant differences in perception levels of quality of life, self-efficacy, and social support of parents who have children with intellectual disability? Effectiveness of E-FISEP was tested with a pretest-posttest control group experimental research design in which parents who have children with moderate and severe intellectual disabilities participated. This study used the knowledge test, the scale of quality of family life, the self-efficacy scale, and the social support scale. Results showed that Family Information and Support Education Program led to significant differences in parents' knowledge levels, self-efficacy perceptions, and perceptions of information support, which is a subscale of the social support scale. However, the investigators found E-FISEP did not lead to significant differences in perceptions of quality of family life, perceived social support scores, and scores of satisfaction from perceived social support, which the second dimension of the updated parent social support scale. The investigators also identified E-FISEP as not effective on perceptions of quality of family life. Therefore, the conclusion is that E-FISEP: Family Information and Support Education Program is effective on developing knowledge levels and on social support perceptions related to obtaining information and self-efficacy perceptions of parents who have children with intellectual disability.

Statistics and research results announced by the World Health Organization (WHO) for the first decade of the twenty-first century indicate that some kind of deficiency affects approximately 9% of infants, children, teenagers, and young adults (Turnbull, Turnbull & Wehmeyer, 2007). According to

United Nations (2012), more than one billion people, or approximately 15% of the world's population, live with some form of disability in 2014. Persons with disabilities, "the world's largest minority," often face barriers to participation in all aspects of society. Barriers can take a variety of forms, including

those relating to the physical environment or to information and communications technology (ICT), or those resulting from legislation or policy, or from societal attitudes or discrimination. The result is that persons with disabilities do not have equal access to society or services, which include education, employment, health care, transportation, political participation, and justice (United Nations, 2012, para. 2).

These circumstances affect families of children with intellectual disability the most. There is widespread acceptance of the idea that reactions which families of children with intellectual disability display change over time. This is called the Stage Model (O'Shea, O'Shea, Algozzine, & Hammitte, 2001), which Kubler-Ross developed in 1969 (Smith, Gartin, Murdick, & Hilton, 2006). Although there are several different classifications of stage model, the five-stage model is preferred. According to this classification, families of children with any kind of deficiency go through (a) shock, disbelief, and denial; (b) anger and blaming; (c) bargaining, (d) depression and desperation; and (e) acceptance (O'Shea et.al., 2001). Some studies show variations among families' needs during these stages. First, studies on determination of families' needs concluded it was possible to use alternative and different assessment tools (Bailey & Simeonsson, 1988; Turnbull, Turnbull, Erwin, Soodak, & Shogren, 2011; Winton, 1986). Generally, the relevant research has revealed that families need information about and support for their children's characteristics, legal rights, educations, ideal home settings, dealing with problem behaviors, and communicating with their children (Bernstein & Barta, 1988). Families also need training and information

on various relevant issues (Bailey & Simeonsson, 1988). Cavkaytar, Ceyhan, Adiguzel, Uysal, & Garan (2012) examined studies focusing on needs of families of children with intellectual disability and concluded that families need support from specialists and the social environment, especially on diagnosis, characteristics, prognosis, and education relevant to the disability.

Meeting these needs of families is highly dependent on support types provided to families and the participation of families in education and training programs. Heward (2013) divides family participation and services to be provided into two training and support groups. Common family programs include those that train parents as parents, defenders, teachers, volunteers, and sources (Berger, 2008). These programs are conducted at homes, schools, or in the form of family conferences (Berger, 2008; Heward, 2013; Shea & Bauer, 1991).

The U.S. and Europe have great numbers of portals targeted to cover families' informational needs. Similarly, there are websites designed to inform individuals with deficiencies and their families in Turkey; each of these strives to expand family knowledge through web pages, e-bulletins, or brochures that specialists prepare. However, the desired efficacy remains unachieved for several reasons. First, such applications mainly offer one-way communication. Second, compiling efficient content is not possible because of copyright concerns. Third, direct information flow from specialists to meet families' information needs with precision cannot be established. Consequently, the FAMILY INFORMATION and SUPPORT EDUCATION PROGRAM (E-FISEP) has

been designed to address these reasons; this program requires testing of its effectiveness at meeting families' information and support needs. Therefore, conducting a study on "The Effectiveness of Online Support over the Education of Parents to Children with Intellectual Disability" is necessary. The following research proposal stems from this need.

This study aims to test effectiveness of the FAMILY INFORMATION and SUPPORT EDUCATION PROGRAM that was developed as part of the E-FISEP project to train families of children with intellectual disability. Along with pursuing this overall goal, we also seek answers to these questions:

- Does E-FISEP lead to significant differences in the knowledge levels of

parents of children with intellectual disability?

- Does E-FISEP lead to significant differences in the perceptions of life quality, social support, and self-efficacy by parents of children with intellectual disability?

Method

Research Model and Participants

A research model with a pretest/posttest control group was designed to identify effectiveness of the Family Information and Support Education Program (E-FISEP) for parents who have children with intellectual disability. Table 1 presents an overview of the design below.

Table 1. Experimental Design Model of the Research

Group	Pre-test	Treatment	Post test
Experiment Group	O ₁	X	O ₂
Control Group	O ₃		O ₄

The primary universe of this research, which uses an experimental design model, includes the parents of children studying at eight schools for students with moderate to severe intellectual disabilities located in five different cities. Following the obtaining of participant consent to the research, schools were divided into two groups randomly and parents in each group were assigned to the experimental or the control group. Since the numbers of participants in these schools were not adequate, parents who have children with (moderate to severe) intellectual disability continuing their educations at private special

education centers in the same cities were invited to participate in the research. Subsequently, 1000 families were briefed through visits to the experimental and control schools, accompanied by guidance teachers and school administrators.

Families were informed that the research procedure would start immediately for the experimental group, whereas the control group would receive the same training after completion of the study. Families were asked if they would volunteer to participate in the research after the briefings. Ultimately, 331

families in the experimental group and 132 families in the control group volunteered to attend the research sessions. Those in the control group were told they would be included within the E-FISEP learning environment following completion of the experimental procedure and posttests. These volunteer families were first asked to complete consent forms in writing and to answer questions on the pretest form. The parents who had finished the pretests of E-FISEP started the E-FISEP user training program, beginning with explanations concerning the webpage. These parents were informed about the introductory tabs, e-library, and communication pages. Next, they were authorized with user names and codes to log on to E-FISEP. During training, parents were taught about how to switch on a computer, type the E-FISEP link in the address line, surf across E-FISEP pages, sign in with user names and passwords, use the e-learning environment effectively, follow the contents (i.e., assessment, reading, listening, and watching), send and receive e-mails within the system, read and write in the forums, communicate online, sign out successfully, and sign in back again securely, if necessary.

After these explanations, the investigators answered questions the parents raised. Lastly, the parents that completed this training received their user names and passwords and the experimental procedure commenced. Furthermore, parents received a telephone number to call whenever they needed assistance and were reminded about upcoming steps and updates through text messages sent every two weeks, which granted their continuation with E-FISEP.

The experimental procedure lasted eight months between October 2012 and May 2013. However, a significant number of parents in the experimental group could not meet the program requirements and withdrew from the study. In the end, 45 families fulfilled the procedure's relevant responsibilities precisely. Therefore, posttests were applied only to those 45 families and their pretest results were the only results taken into consideration. There must be no significant difference between pretest scores of the experimental and control groups in order to carry out a comparison between the groups after the experimental procedure. This meant that the posttest based on their pretest results was administered to a group of 45 parents in the control group. As a result, all analyses were carried out with 90 parents; 45 parents were in the experimental group and 45 were in the control group.

The study universe for the research consisted mainly of mothers (there were 77 mothers). Small numbers of the participants were fathers (7) and significant others (6). Most participants were high school graduates. As to educational backgrounds of participants, 19 were primary school graduates, 14 were secondary school graduates, 33 had high school diplomas, and 24 had bachelor's degrees. Since all participants have children studying in primary education, the participants' mean age is 38 years. The average monthly income for all participants was close enough not to cause significant life style changes, but the range within the experimental group was somewhat wide.

Data Collection Instruments

E-FISEP achievement test. A total of 160 questions from eight units were combined to develop an achievement test relevant to the

Family Information and Support Education Program, which was designed to educate parents of children with intellectual disability. Experts assessed all questions for (a) clarity, (b) difficulty level, (c) exemplifying the study field, and (d) appropriateness to the target group and study field. After this assessment, 28 questions from eight units were excluded and the total number of achievement test questions was reduced to 132. Later, Turkish language experts examined all questions for spelling or wording flaws and the test was finalized before the reliability study.

Within the scope of reliability study of the achievement test, the investigators carried out item analysis to calculate each item's distinctiveness and difficulty indices. Next, ten questions with various distinctiveness and difficulty levels from each unit (total, 80 questions) were chosen for the achievement test (Cavkaytar et al., 2014).

Beach Center Family Quality of Life Scale.

For this research, the investigators employed the Beach Center Family Quality of Life Scale (BCFQLS) to determine the quality of life for families of children with deficiencies. Developed by the University of Kansas Beach Center on Family and Disability (2003, 2006) to determine the quality of life for families of children with developmental incompetence, the scale consists of 25 five-scale questions and five sub-fields. The higher scores obtained on this scale refer to higher quality of life. Meral & Cavkaytar (2013) completed adaptation of the scale. Total correlation value of the entire scale is 0.94; for the sub-scales, the correlation values are .71 and .95. Correlation values based on individual items range between 0.42 and 0.97. The Cronbach alpha (α) internal consistency coefficient of the whole scale is .92; for the sub-scales, that

coefficient is .71 and .82. The split-half reliability of the scale was calculated to be .88 ($p < .01$). According to the Spearman Brown formula, the scale's split-half correlation is .83.

Revised Parental Social Support Scale. This study employed the Revised Parental Social Support Scale (Kaner, 2010). Kaner (2003) developed the scale to determine how parents of children with incompetence perceived social support and whether they were content with this support; Kaner (2010) revised the scale in terms of psychometric features. With additions that did not exist in the original scale, the revised version includes 48 items and two scales that assess social support qualitatively and quantitatively. The first of these scales is Revised Parental Social Support Scale—Perceived Level of Social Support (RPSSS—PLSS). The second is Revised Parental Social Support Scale—Level of Being Content with the Perceived Social Support (RPSSS—LBCPSS).

As to the reliability analysis of the Revised Parental Social Support Scale, the researchers conducted Cronbach Alpha, Spearman Brown Split-Half test, and item analysis. While Cronbach Alpha internal consistency coefficients of the Perceived Level of Social Support varied between .83 and .95, the same coefficients for the Level of Being Content with the Perceived Social Support ranged from .85 to .86. Likewise, the Spearman Brown Split-Half reliability coefficients of the scale ranged from .86 to .92 and from .84 to .92 for RPSSS—PLSS and for RPSSS—LBCPSS, respectively. Validity of RPSSS—PLSS was first evaluated through explanatory factor analysis. Subsequently, the data obtained was run through confirmatory factor analysis, which indicated the scale was valid.

Criteria-based validity of RPSSS was examined using the Revised Form for Multi-Dimensional Scale of Perceived Social Support. Correlation of the two scales was calculated to be .15-.75 for the quantitative dimension and .25-.72 for the qualitative dimension (Kaner, 2010).

Parental Self-Efficacy Scale. This study employed the updated Turkish version of the Parental Self-Efficacy Instrument for Children with Disabilities-PSICD to identify the self-efficacy levels of parents to children with incompetence. Guimond, Moore, Aier, Maxon, and Diken (2005) developed this scale and Cavkaytar, Aksoy, & Ardic (2014) adapted it. Results of explanatory factor analysis of the scale administered within the validity analyses indicated the scale had a one-dimensional structure.

The Pearson correlation coefficient of the scale obtained after test-retest procedure was $r = 0.79$; the Cronbach Alpha internal consistency coefficient was calculated to be $\alpha = 0.95$. Psychometric features of the scale indicated the scale was appropriate to be used for determining self-efficacy levels of parents of children with moderate to severe intellectual disabilities.

The investigators administered pretests to parents in the experimental and control groups in order to notice any possible changes in knowledge levels, family quality of life, perceptions of social support, and perceptions of self-efficacy of those in the experimental group using E-FISEP, and to carry out comparisons with those in the control group.

As demonstrated in Pallant (2005), non-parametric tests should be utilized when the number in the research sample is below 30

and parametric tests should be employed if the number in the sample is higher than 30. Accordingly, independent samples *t*-test, a parametric test, was used in this study to see if there was a statistical significance between the pretest scores of parents in the experimental group and those in the control group.

The investigators detected no significant difference among pretest scores that both parents in the experimental and control groups received on the knowledge scale developed to determine the effect of E-FISEP on knowledge levels of parents of children with intellectual disability regarding the disability ($t_{(88)} = 1.539, p > .05$). In other words, what parents in both groups knew about their children's disabilities were at similar levels.

The discrepancy among pretest scores that both groups of participants earned on the Beach Center Family Quality of Life Scale (BCFQLS) was analyzed through a *t*-test; results indicated no significance ($t_{(88)} = -1.894, p > .05$). Therefore, it is possible that participants in experimental and control groups of E-FISEP resembled one another in terms of perceptions of family quality of life. BCFQLS has five sub-scales, which are Family Interaction, Parenthood, Emotional Efficacy, Physical Efficacy, and Support Regarding Inefficacy. Likewise, scores of parents in both groups for each of these sub-scales were also determined to display no significant difference. Respectively, related values were as follows: $t_{(88)} = 0.432, p > .05$; $t_{(88)} = -1.148, p > .05$; $t_{(88)} = -0.842, p > .05$; $t_{(88)} = -0.028, p > .05$; and $t_{(88)} = 1.122, p > .05$.

The Revised Parental Social Support Scale was also administered to parents in experimental and control groups. The scale

has two main dimensions: Perceived Social Support and Being Content with Perceived Social Support. The investigators noted no statistically meaningful difference regarding these two dimensions between pretest scores of parents in experimental and control groups. Respectively, relevant values were as follows: $t_{(88)} = -0.401, p > .05$ and $t_{(88)} = 0.392, p > .05$.

The Parental Self-Efficacy Scale was another instrument employed for identifying the effects of E-FISEP over the parents of children with intellectual disability in the experimental and control groups. Likewise, there was no significant difference between pretest scores parents earned on this scale ($t_{(88)} = 0.081, p > .05$).

In conclusion, all analyses indicated no statistically significant difference between scores parents in experimental and control groups earned on each scale.

Data Analysis

Since the research has a pretest/posttest with control group experimental design, data obtained from participants in experimental and control groups needed testing to check if they belonged to the same universe before testing the research questions to choose the most suitable statistical analysis method. Accordingly, the total scores participants earned on the scales employed to collect data were subjected to a Levene Test. This test was applied only to participants' pretest and posttest scores.

A Levene Test analyzed knowledge scale scores that participants in the experimental ($n=45$) and control ($n=45$) groups earned. All data were determined to belong to the same universe and to have equal variance ($F_{(1,88)} = 3.725, p > .05$).

Similarly, participants' pretest scores on Beach Center Family Quality of Life Scale were also run through a Levene Test; results indicated all data had equal variance and belonged to the same universe ($F_{(1,88)} = 1.894, p > .05$). As stated above, BCFQLS has five sub-scales: Family Interaction, Parenthood, Emotional Efficacy, Physical Efficacy, and Support Regarding Inefficacy. Participants' scores on each sub-scale were also subjected to a Levene Test. Results were the same and showed that all data came from the same universe and had equal variance. Respective F values are: $F_{(1,88)} = 2.637, p > .05$; $F_{(1,88)} = 0.308, p > .05$; $F_{(1,88)} = 0.678, p > .05$; $F_{(1,88)} = 1.577, p > .05$; and $F_{(1,88)} = 0.281, p > .05$.

As another scale administered to participants in the experimental and control groups, Revised Parental Social Support Scale has two main dimensions: Perceived Social Support and Being Content with Perceived Social Support. Relevant scores that all participants obtained on both dimensions were examined through a Levene Test. Both dimensions of the scale were observed to have equal variance and to come from the same universe. F values for Perceived Social Support and Being Content with Perceived social Support were $F_{(1,88)} = 0.462, p > .05$ and $F_{(1,88)} = 1.161, p > .05$, respectively. Each dimension of the Revised Parental Social Support Scale has four sub-scales.

- Perceived Social Support Dimension: Contains sub-scales of Social Support, Information Support, Emotional Support, and Care support sub-scales. The scores that participants in experimental and control groups earned on these sub-scales were analyzed through a Levene Test and all relevant data were found to be of the same universe and to have equal

variance. F values for these sub-scales are as follows, respectively:

$F_{(1,88)}=0.972, p>.05$; $F_{(1,88)}=0.929, p>.05$; $F_{(1,88)}=0.780, p>.05$; and

$F_{(1,88)}=0.300, p>.05$.

- **Being Content with the Perceived Social Support Dimension:** This contains sub-scales of Being Content with Social Support, Information Support, Emotional Support, and Care Support. As with the first dimension, the scores that all participants in the study earned on these sub-scales were examined via a Levene Test. Results showed that all data belonged to the same universe and had equal variance. Respective F values for these sub-scales are $F_{(1,88)}=0.159, p>.05$; $F_{(1,88)}=0.005, p>.05$; $F_{(1,88)}=0.614, p>.05$; and $F_{(1,88)}=0.668, p>.05$.

The results of what participants in both groups scored on the Self-Efficacy Scale were also analyzed through a Levene Test, which produced the same results regarding universe and variance ($F_{(1,88)}=3.134, p>.05$).

In this study, pretest scores of all data used for determining effects of E-FISEP on parents of children with intellectual disability were found to belong to the same universe and to have equal variance. Therefore, this study employed a two-way ANOVA analysis, a mixed analysis method used for pretest-posttest with control group experimental designs, to interpret results.

Results

Effect of E-FISEP on Knowledge Levels of Parents of Children with Intellectual Disability

Pretest and posttest scores that the parents in experimental and control groups scored on the knowledge scale were subjected to two-way ANOVA analysis to determine the effect of E-FISEP on knowledge levels of parents of children with intellectual disability concerning the disability. Table 2 displays relevant findings.

Table 2. *ANOVA Results of the Pretest-Posttest Scores on Knowledge Scale*

Source	Sum of Squares	df	Mean Square	F	Sig.
Between-Subjects		89			
Group (Experiment/control)	2816.356	1	2816.356	12.001	.001
Residual	20651.556	88	234.677		
Within-Subjects		90			
Treatment (Pre-Posttest)	952.200	1	952.200	5.924	.017
GroupxTreatment	1017.689	1	1017.689	6.331	.014
Residual	14145.111	88	160.740		
Total		179			

ANOVA Results of the Pretest-Posttest Scores on Knowledge Scale

As Table 2 shows, major/primary effects and common/shared effects are statistically significant ($F_{1,88}=12.001, p<.05$; $F_{1,88}=5.924, p<.05$; $F_{1,88}=6.331, p<.05$). These results support the claim that E-FISEP has positive influence on knowledge levels of parents of children with intellectual disability.

Analysis of findings regarding how parents of children with intellectual disability perceive

family quality of life indicates there is no statistically meaningful difference between the scores parents in experimental and control groups earned on the pretest of the Beach Center Family Quality of Life Scale. Pretest-posttest scores that all parents in both groups earned on the Beach Center Family Quality of Life Scale (BCFQLS) were analyzed through two-way ANOVA. Table 3 depicts these results.

Table 3. ANOVA Results of the Pretest-Posttest Scores on BCFQLS

Sources	Sum of Squares	df	Mean of Squares	F	Sig.
Between Subjects		89			
Group (Experiment/Control)	113.606	1	113.606	0.490	.486
Residual	20419.289	88	232.037		
Within Subjects					
Treatment (Pre-Posttest)	78.672	1	78.672	0.672	.415
GroupxTreatment	361.350	1	361.350	3.085	.082
Residual	14145.111	88	160.740		
Total		179			

ANOVA Results of the Pretest-Posttest Scores on BCFQLS

Examination of results in Table 3 indicates that major/primary influence across groups (experimental/control) and tests (pretest/posttest) and common/shared influence (groupxanalysis interaction) are not significant ($F_{1,88}=0.490, p>.05$; $F_{1,88}=0.672, p>.05$; $F_{1,70}=3.085, p>.05$). Since no influence can be considered statistically meaningful, it is possible to conclude that E-FISEP had no effect on how

parents of children with intellectual disability perceive quality of life. Parents in experimental and control groups of E-FISEP can be said to have similar perceptions regarding family quality of life.

The analysis run on the total score obtained from Beach Center Family Quality of Life Scale shows that E-FISEP has no influence over the quality of life for parents of children with intellectual disability. However, BCFQLS has five sub-scales: Family

Interaction, Parenthood, Emotional Efficacy, Physical Efficacy, and Support for Inefficacy. E-FISEP has been determined to have no influence over families of children with intellectual disability across any of the sub-scales.

Influence of E-FISEP on How Parents of Children with Intellectual Disability Perceive Social Support

In this study, the investigators employed the Revised Parental Social Support Scale to identify the effect of E-FISEP on how parents of children with intellectual disability perceive social support, if there is any. There are two dimensions of RPSSS: Level of

perceived social support and Level of being content with the perceived social support. This section presents the influence of E-FISEP over these two dimensions; then, the effect of E-FISEP over parents with respect to the sub-scales of these two dimensions will be elaborated.

The investigators used two-way ANOVA to see the effect of E-FISEP over parents of children with intellectual disability with respect to the Perceived Social Support dimension of RPSSS. Table 4 depicts the relevant results.

Table 4. ANOVA Results of Pretest-Posttest Scores on RPSSS Perceived Social Support

Sources	Sum of Squares	df	Mean of Squares	F	Sig.
Between Subjects		89			
Group (Experiment/Control)	202.672	1	202.672	0.509	.477
Residual	35033.489	88	398.108		
Within Subjects		90			
Treatment (Pre-Posttest)	48.050	1	48.050	0.241	.625
GroupxTreatment	630.939	1	630.939	3.163	.079
Residual	17554.511	88	199.483		
Total		179			

ANOVA Results of Pretest-Posttest Scores on RPSSS Perceived Social Support

Examination of Table 4 reveals that major/primary and common/shared effects are not statistically meaningful ($F_{1,88}=0.509, p>.05$, $F_{1,88}=0.241, p>.05$, $F_{1,88}=3.163, p>.05$). Therefore, E-FISEP had no significant effect

over participants in terms of RPSSS Perceived Social Support.

Likewise, two-way ANOVA was also utilized to see whether E-FISEP had influence over participants in terms of RPSSS Level of Being Content with the Perceived Social Support. Table 5 presents relevant results.

Table 5. ANOVA Results of Pretest-Posttest Scores on RPSSS Being Content with Perceived Social Support

Sources	Sum of Squares	df	Mean of Squares	F	Sig.
Between Subjects		89			
Group (Experiment/Control)	77.089	1	77.089	1.544	.217
Residual	44276.111	88	503.138		
Within Subjects		90			
Treatment (Pre-Posttest)	200.556	1	200.556	0.964	.329
GroupxTreatment	264.022	1	264.022	1.268	.263
Residual	18316.422	88	208.141		
Total		179			

ANOVA Results of Pretest-Posttest Scores on RPSSS Being Content with Perceived Social Support

Table 5 displays that major/primary and common/shared effects are not statistically significant ($F_{1,88}=1.544, p>.05$, $F_{1,88}=0.964, p>.05$, $F_{1,88}=1.268, p>.05$). In other words, it may be concluded that E-FISEP had no effect on parents in terms of

RPSSS Level of Being Content with the Perceived Social Support.

As to the second sub-scale, Knowledge Support, Table 6 shows the mean values and standard deviations of the scores participants earned on the pretest and posttest.

Table 6. Mean Values and Standard Deviations of Scores Participants Obtained on Pretest-Posttest of Knowledge Support Scale of RPSSS Perceived Social Support

Group	Pre-Test			Post-Test		
	N		S	N		S
Experiment	45	18.64	4.73	45	19.97	3.09
Control	45	18.53	4.92	45	17.86	3.91

Mean Values and Standard Deviations of Scores Participants Obtained on Pretest-Posttest of Knowledge Support Scale of RPSSS Perceived Social Support

According to Table 6, the difference between the mean pretest scores participants in experimental and control groups earned was calculated through the t-test and no

meaningful discrepancy was noted ($t_{(88)} = -0.115, p > .05$). Pretest and posttest scores regarding the Knowledge Support sub-scale of RPSSS Perceived Social Support were analyzed via two-way ANOVA to determine whether E-

FISEP had any effect on how parents of children with intellectual disability perceived knowledge support. Table 7 shows the related results.

Table 7. ANOVA Results of Pretest-Posttest Scores on RPSSS Perceived Social Support Knowledge Support Sub-Scale

Sources	Sum of Squares	df	Mean of Squares	F	Sig.
Between Subjects		89			
Group (Experiment/Control)	55.556	1	55.556	2.412	.124
Residual	2026.689	88	23.031		
Within Subjects		90			
Treatment (Pre-Posttest)	5.000	1	5.000	0.479	.491
GroupxTreatment	45.000	1	45.000	4.309	.041
Residual	919.000	88	10.443		
Total		179			

ANOVA Results of Pretest-Posttest Scores on RPSSS Perceived Social Support Knowledge Support Sub-Scale

Table 7 shows that major effects of E-FISEP were not effective ($F_{1,88} = 2.412, p > .05$, $F_{1,88} = 0.479, p > .05$). However, common/shared effects (group \times analysis interaction) indicate that E-FISEP has positive influence on how parents of children with intellectual disability perceive knowledge support ($F_{1,88} = 4.309, p < .05$). In other words, E-FISEP positively affected how parents in the experimental group perceive knowledge support.

Furthermore, the difference between mean pretest scores that participants earned with respect to the level of being content with the

support they received was also evaluated via t-test. The results indicated no statistical significance ($t_{(88)} = 1.384, p > .05$).

The investigators ran pretest and posttest scores regarding the sub-scale of Being Content with the Perceived Knowledge Support through a two-way ANOVA to determine whether E-FISEP was influential for parents of children with intellectual disability. Table 8 displays relevant results.

ANOVA Results of Pretest-Posttest Scores on RPSSS Level of Being Content with Perceived Social Support, Knowledge Sub-Scale

Table 8 shows that group effect (experimental/control) is statistically

Table 8. ANOVA Results of Pretest-Posttest Scores on RPSSS Level of Being Content with Perceived Social Support, Knowledge Sub-Scale

Sources	Sum of Squares	df	Mean of Squares	F	Sig.
Between-Subjects		89			
Group (Experiment/Control)	194.272	1	194.272	6.098	.015
Residual	2803.756	88	31.861		
Within-Subjects		90			
Treatment (Pre-Posttest)	9.339	1	9.339	0.544	.463
GroupxTreatment	6.050	1	6.050	0.353	.554
Residual	1510.111	88	17.160		
Total		179			

meaningful ($F_{1,88}=6.098, p<.05$). However, the major effect across analyses and common effects are not influential ($F_{1,88}=0.544, p>.05$, $F_{1,88}=0.353, p>.05$). Therefore, we can state that E-FISEP has positive influence on participants in the experimental group in terms of the RPSSS Level of Being Content with the Perceived Support, Being Content with Knowledge Support sub-scale.

Perception of Self-efficacy by Parents of Children with Intellectual Disability

Pretest and posttest scores of participants in experimental and control groups were subjected to two-way ANOVA to observe the effect of E-FISEP on the perception of self-efficacy by parents of children with intellectual disability. Table 9 depicts relevant results.

Table 9. ANOVA Results of Pretest-Posttest Scores on Parental Self-Efficacy Scale

Sources	Sum of Squares	df	Mean of Squares	F	Sig.
Between-Subjects		89			
Group (Experiment/control)	579.606	1	579.606	3.056	.084
Residual	16690.844	88	189.669		
Within-Subjects		90			
Treatment (Pre-Posttest)	2.939	1	2.939	0.032	.858
GroupxTreatment	516.806	1	516.806	5.641	.020
Residual	8062.756	88	91.622		
Total		179			

ANOVA Results of Pretest-Posttest Scores on Parental Self-Efficacy Scale

As Table 9 shows, major/primary effects are not noteworthy statistically ($F_{1,88}=3.056, p>.05$; $F_{1,88}=0.032, p>.05$). However, we can state that common/shared effects (group \times analysis interaction) are meaningful ($F_{1,88}=5.641, p<.05$). That common/shared effects are statistically significant means that E-FISEP has positive influence on perceptions of self-efficacy by parents of children with intellectual disability.

Research results indicate that online family support education programs provided to parents of children with intellectual disability lead to major differences in terms of knowledge levels of families. E-FISEP can also be said have significant positive effects on how parents perceive their self-efficacy.

Discussion

Developed by Cavkaytar, Ceyhan, Adıgüzel, Uysal, and Garan (2014) as part of a project, “E-FISEP: family information and support education program” is an online support program built on the basis of distance education principles for parents of children with intellectual disability. The design of E-FISEP corresponds with target-oriented program models. In this sense, general and specific program aims were established following a needs analysis; next, program learning outcomes were determined. These analyses were the basis for preparation of program content. The design of the E-FISEP learning management system took place within the scope of the content studies. E-FISEP stands as a pioneering application due to its content, learning environment, teaching learning processes, and its assessment and evaluation tools.

Investigators administered E-FISEP achievement tests as pretests and posttests to research participants to determine whether E-FISEP would lead to significant change in knowledge levels of parents of children with intellectual disability. Relevant results indicated that E-FISEP was effective in terms of significantly increasing knowledge levels of the participants who completed the program. Similarly, results support the statement that E-FISEP is an influential program in terms of levels of knowledge support and of being content with knowledge support as part of perceived social support. These results mean that E-FISEP is an effective program in terms of providing knowledge support to parents and expanding their knowledge. “Need for knowledge” outweighs all other consideration with respect to what families of children with intellectual disability need (Cavkaytar et al., 2012). Shea and Bauer (1991) state that resource centers are quite fruitful in terms of meeting families’ social, emotional, and academic needs. Furthermore, family support systems take on major roles during acceptance phases for families of children with special needs (Smith, Gartin, Murdick & Hilton, 2006). However, the numbers of family counseling centers and family support systems in Turkey are far from adequate. This project has shown that E-FISEP can function effectively as an information source to provide families what they need to know.

E-FISEP has significantly improved how participating parents of children with intellectual disability perceive their self-efficacy. Parental self-efficacy is defined as “one’s judgments and beliefs concerning one’s own capacity to fulfill the duties and responsibilities necessary to take care and

raise a child” (De Montigny & Lacharite, 2005). Moreover, parents with higher levels of self-efficacy build more harmonious family atmospheres for their children with special needs (Benzies, Trute & Worthington, 2013) and embrace higher levels of family happiness (Dunst & Trivette, 2009). Mothers with higher levels of perceived self-efficacy are also known to establish appropriate environments for their children, to be less punishing, to be more sensitive to signs babies send, to be active communicators, to have higher levels of responsibility (Coleman & Karraker, 2000), to be sensitive and sincere when communicating with their children, and to act responsibly (Teti & Gelfand, 1991). Therefore, parental self-efficacy matters more for children with intellectual disability because the contribution of parents to the growing of these children would be exponential. Thus, as part of this project, E-FISEP was prepared based on findings obtained as a result of needs analysis of parents of children with intellectual disability, which was conducted to determine the fields where parents seek assistance in contributing to growth of their children.

The content of E-FISEP offers information about various topics relevant to the needs of parents of children with intellectual disability, such as (a) the nature of intellectual disability, (b) developmental characteristics of their children, (c) the acceptance period of intellectual disability, (d) personal development, (e) social support networks beneficial to parents, (f) health issues for individuals with intellectual disability, (g) skills for working children with intellectual disability, (h) management of child behaviors, (i) supporting children with intellectual disability for their futures, and (j) answers concerning legal regulations for

children with intellectual disability. By contrast, the inability to find specialized help due to a lack of specialists seems the most serious issue in terms of accessing information during those times when such information is most needed. Still, current innovations in info-communication technologies help facilitate access to information. In this sense, online learning settings are preferable because they have few time limits on availability. The spread of self-learning applications has led to growing numbers of such applications on the Internet. E-FISEP is primarily a user-controlled program, to the extent that Internet and computer technologies permit. Inclusion of individuals within the learning process maintains the continuum and enhances motivation in education programs developed for adults. The numerous learning tools that are especially available within E-FISEP offer families opportunities to pick up resources that best suit their preferences. The visuals in the units include videos that show specialists giving information about their fields of study. Audio recordings are readings of relevant parts. Visual presentations are in the form of slides. There are also electronic books, which are written forms of the subjects supported by pictures and drawings. Thus, parents participating in this program learn everything that is necessary about their children through every possible means, in ways that appeal to all human senses as much as computer and Internet technologies allow. Through these methods, parents not only augment what they know but also apply the lessons to daily lives with their children. This is how this program has increased parental self-efficacy.

Research findings revealed no change in terms of family quality of life following termination of E-FISEP. Family quality of life

means “to have the minimum conditions to be able to meet one’s needs, to be able to do things that matter for the members of the family, and to enjoy living together as a family” (Park et al., 2003). In this sense, family interaction, parenthood, emotional efficacy, financial/physical/material efficacy, and support for inefficacies constitute sub-fields of family quality of life. The components of family quality of life are the fundamental needs of a family. Considering that only one member of each family participated in E-FISEP, this was insufficient to cause positive changes across these sub-fields. In fact, behaviors and attitudes of all family members have common effects on a family’s quality of life, and the entire family functions as a whole based on the system approach. In this regard, psychological, economic, and sociocultural factors are also vital to family quality of life. However, information based support cannot improve psychological and socio-cultural components of family quality of life on its own. By contrast, programs with psycho-educational qualities that consider psychological dynamics and support have greater impact on family quality of life. Therefore, a lack of programs with psycho-educational qualities counts as a reason for the ineffectiveness of E-FISEP on family quality of life.

Research findings indicated E-FISEP does not have influence on taking or being content with social, emotional, and care supports defining perceived social support. Participating parents did not use the synchronized communication settings (forums, chats, e-mails) developed as part of E-FISEP. This may indicate that families are not ready to use social media offered within E-FISEP effectively. The fact that families make limited use of synchronized

communication settings may be noted as a reason families do not receive effective levels of social support and why they feel less content with the perceived social support, which is similar to findings concerning family quality of life.

In sum, the results yielded that current information technologies can be an effective source in terms of meeting knowledge-based needs of families of children with intellectual disability. Of course, there have been several limitations during the development and application phases of E-FISEP, prepared for the families of children with intellectual disability. For instance, the participating families had to be chosen from those living where the researchers lived.

This research is limited to the provinces of Eskişehir, Ankara, İstanbul, İzmir, Denizli, and Manisa. Moreover, effectiveness of E-FISEP is limited to the findings relevant to 90 parents (45 experimental and 45 control) who were able to take the pretest and the posttest. Difficulty in finding parents who were Internet users was another significant limitation of the study. Mothers tend to provide the most care and take most responsibility for children, especially in families with children with intellectual disability. Generally, these mothers have low-level educational backgrounds and Internet and computer technologies are beyond their reach due to economic problems. Both factors reduced the numbers of participants.

For future studies, it is reasonable to suggest the addition of psychosocial support programs to the existing module, and the conducting of effectiveness studies with respect to other dimensions of social support and quality of

life perception scales that E-FISEP did not improve in this research. Moreover, E-FISEP can serve as an information source for families and can be used with a larger participant group bearing different qualities immediately after a child is diagnosed with intellectual disability. It may also be possible to adapt E-FISEP to other countries and cultures on an international level, and to

implement it in other Turkish speaking countries.

Developed originally for parents of children with intellectual disability, E-FISEP can also serve as a resource for other programs to be devised for other types of disabilities, within the scope of future research.

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This study was supported by grants from The Scientific and Technological Research Council of Turkey (TUBITAK), 110K255 and Anadolu University, 1005E102. This study could not have been completed without the parents. The principal investigator would like to give the main credit to the families of children with intellectual disability: "Thank you for your participating and support our Project. Special thanks to project group; Omer Garan, Avşar Ardiç, Mine Sönmez, Onur Özdemir, Seray Olcay, Veysel Aksoy, Yasin Özarslan, İrfan Süral, Özlem Ozan from special education and distance education at Anadolu University. Finally, this study would not have been completed without Anadolu University. Thanks to my colleagues Serap Cavkaytar, Turgay Ünal, Ufuk Küçükcan, Çağatay Tok, Selçuk Kırar for technical support. And thanks to project assistants Ayşe Tunç, Gözde Tomris, Gizem Yıldız, Mustafa Uluyol. Correspondence concerning this article should be addressed to Atilla Cavkaytar, Anadolu University, Faculty of Education, 26470, Eskisehir, TURKEY. E-mail: acavkayt@anadolu.edu.tr

The Revised Life Centered Career Education Curriculum Program for Students with Autism Spectrum Disorders and Developmental Disabilities

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Abstract: There is a lively discussion occurring in the current special education literature regarding functional life skills curriculum development for students with moderate and severe developmental disabilities who are accessing the general education curriculum. In this paper, the authors discuss how to blend the functional Life Centered Career Education (LCCE) Curriculum Program for Students with Autism Spectrum Disorders (ASD) and Developmental Disabilities (DD) into the general education curriculum. An example of blending an aligned Individual Education Plan (I.E.P.), to LCCE Competencies, and to CCSS will be outlined. Descriptions of LCCE instructional materials (in preparation) and reading-free assessment (pictorial knowledge and performance-based) materials (in preparation) will be provided. This functional life skills curriculum fully supports federal legislation that requires students with significant disabilities to be a part of the systemic accountability measures of the No Child Left Behind as well as to be involved in the general education curriculum.

For many years, functional life skills have played a vital role in the special education curriculum development process for students with moderate and severe developmental disabilities. A cursory review of the educational literature reveals that many researchers and practitioners believe that functional life skills should still be a required component of special and general education curricula. The Career Education (1970s) and the Transition from School-to-Work (1980s) movements of the late twentieth century laid the foundation for the development of the popular functional life skills curriculum approach. This curricular approach has had such a significant and enduring impact on special education outcomes for students with

moderate and severe developmental disabilities. These persevering reform initiatives were aimed at further intensifying the preparation of students with disabilities to graduating from high school and to transitioning into living and working successfully into their home communities (Brolin, 1992). Therefore, it became the intent of the functional life skills curriculum to provide these students with the skills necessary to promote their independence and highest possible quality of life (Knowlton, 1998).

Over the past two decades, significant transition research has supported the effectiveness of these functional life skills

curriculum programs for improving students' ability to live and work independently in their current and future ecological environments (Ayres, Lowrey, Douglas, & Sievers, 2011; Patton, Cronin, & Bassett, 1997). It has also been long recognized that some of these same functional life skills can and do occur in general education-based curriculum standards (Cronin, 1996). Ayres et al. (2011) provided a review of studies focusing on functional life skills and general standards that were successfully taught to individuals with severe disabilities to enable them to participate more independently in their environments.

A review of the history of special education curriculum development discloses three other curriculum approaches developed along with the functional life skills curriculum approach for teaching students with disabilities (The National Alternate Assessment Center, 2006). These four approaches include the following:

1. The developmentally appropriate approach during the 1970s was considered the first special education curriculum. Its approach examined the normal sequence and process defined for typically developing children and applied these same learning principles to students with disabilities (Bricker, Siebert, & Casuso, 1980).
2. In the 1980s, the functional life skills approach was inspired by the Career Education and Transition Education Reforms. The purpose of this curriculum was to blend functional life skills into the academic skills for purpose of preparing students for making the successful transition from school to the adult outcomes of living and working (Brown, Branston, Hamre-Nietupski, Pumpian, Certo, & Gruenwald, 1979).

3. By the 1990s, the ecological-social approach was the preferred practice. Its framework was structured to identify and teach the steps, activities, and skills that students with disabilities need to learn to support their full participation in current and future home, school, work, and community environments. This curricular approach offered more access to the general education classroom for instructional opportunities (Browder, Wakeman, Flowers, Rickelman, Pugalee, & Karvonen, 2007).
4. The inclusive access approach to standards-based general education curriculum began just after the turn of the century with the influence of the federal legislature (IDEA, 2004; NCLB, 2002) and is still in practice. It focuses on providing students with disabilities access to the general curriculum, common core standards, and general education curriculum materials content (Wehmeyer, Lattin, & Agran, 2001).

These curricular approaches were developed following the provisions set forth in the federal laws (PL 94-142, its amendments, IDEA, and its reauthorizations).

Curricular Shift for Moderate & Severe Developmental Disabilities

For many years, the instructional practices reported for students with moderate and severe developmental disabilities in most educational settings included developing and implementing I.E.P. goals that blended research-based functional life skills with the general academic skills (Pugach & Warger, 2001). Recently, however, several studies have reported that a major curriculum shift has been occurring in some special education classrooms and in the general education

classrooms. In many of these classrooms the traditional functional life skills curriculum is being replaced with the more general education or standards-based curriculum and it's accompanying instructional activities (Ayres et al., 2011; Alwell & Cobb, 2009; Spooner, Dymond, Smith, & Kennedy, 2006). In many cases, the functional life skills curriculum has been completely excluded.

A major concern expressed with the exclusiveness of this approach is that the general academic standards-based curriculum alone may not enable students with moderate and severe developmental disabilities to be prepared to live productive, independent lives as adults. Additionally, interviewed parents have expressed concerns about their children being only exposed to the general standards-based curriculum without a consistent focus on functional life skills (Olson, 2004).

Blending Functional Life Skills with General Standards-Based Curricula

As a result of the effectiveness of the career education and transition education movements, teachers have become aware of the value of life skills instruction across the curriculum but in many instances have found it difficult to find time in their daily schedule to provide instruction in functional life skills. This difficulty has resulted in the demise of functional life skills instruction in general education for student with disabilities. An additional difficulty has resulted with teachers not being aware of how to connect or link functional life skills into their academic curriculum.

Procedures are available and are described in the literature to help teachers connect or link the functional life skills to the standards-based general education curriculum. The

major procedures recommended: (a) embedded instruction (Hunt, McDonnell, & Crockett, 2012; Spooner et al., 2006; Westling & Fox, 2009; Jenkins, Antil, Wayne, & Vadas, 2003; Copeland & Cosbey, 2009; McDonnell, Thorson, & McQuivey's, 2000); (b) infusion (Brolin, 1978; Cronin & Patton, 1993); (c) balancing the curriculum (Downing & Peckham-Hardin, 2007; Browder et al., 2007); and (d) blending the curriculum (Ryndak, 2003).

While this limited review acknowledges that the current setting for students with moderate and severe developmental disabilities is typically their access to general education, it also notes that this practice separates these students from receiving functional life skills instruction. Even though standards-based curriculum and functional life skills materials and instruction need not be mutually exclusive, they can be taught collectively and in a parallel manner in the general education classroom. Downing and MacFarland (2010) reported students with moderate and severe developmental disabilities in general education settings can and do successfully learn both academic and functional life skills when given quality instruction and support.

The Life Centered Career Education (LCCE) Curriculum Autism Spectrum Disorders (ASD) and Developmental Disabilities (DD) program is a functional life skills approach that can assist practitioners blend general standards-based curriculum successfully through the I.E.P. goals.

The Life Centered Career Education (LCCE) Curriculum Programs

Donn Brolin developed the Life Centered Career Education (LCCE) Curriculum Program in 1978 and it was published by The

Council for Exceptional Children (CEC). In 2012, the curriculum was updated and became available online, and its name changed to the Life Centered Education (herein referred to as the “LCE”) Curriculum Program (CEC, 2012). In 1996, a second curriculum program is the Life Centered Career Education: Modified Curriculum for Individuals with Moderate Disabilities was developed by Robert Loyd and Donn Brolin and published by CEC; CEC stopped publishing this curriculum when it updated activities for the new LCE program.

The LCE Curriculum was developed to prepare students with mild disabilities to successfully meet the demands of adult living and working. Its twenty-two competencies and one hundred and two (102) functional subcompetencies are designed to infuse its scope and sequenced curriculum life skills into the academic curricula all framed by each student’s Individual Education Program goals. This program has both a knowledge-based and performance-based assessments, as well as, competency instructional units for use in all ecological settings. The new LCE portal (CEC, 2012) can be viewed on the CEC website.

This paper’s emphasis is the second program, the Life Centered Career Education: Modified Curriculum for Individuals with Moderate Disabilities (Loyd & Brolin, 1996). This curriculum utilizes the same process to align the Individual Education Program goals while ecologically blending functional life skills with the standards-based general academic curriculum.

When Brolin developed this idea of a career education program in the 70s, his primary intention was to capture the essence of the

functional life skills that special education teachers had been teaching for years and to be able to write them down into a scope and sequence matrix. In a personal communiqué to the author he remarked, “This curriculum is not new, I am just putting together what special education teachers had been telling me are best practices and developing it into a curricular matrix format--the LCCE Curriculum framework’ (1982).

Life Centered Career Education (LCCE) Curriculum: Autism Spectrum Disorders (ASD) & Developmental Disorders (DD) (Loyd & Brolin, 1996)

The author developed the Life Centered Career Education: Modified Curriculum for Individuals with Moderate Disabilities in 1996; it is also published by The Council for Exceptional Children (CEC). It has been recently revised and the purpose of this newly revised LCCE ASD & DD Curriculum Program (Loyd & Angus, in preparation) is to present students with the important functional life skills that align themselves with academic skills which then can prepare these individuals with ASD and DD to have the necessary skills to function successfully with and without support as adults in the four career roles (i.e., citizen, employee, family member, and participant in avocational pursuits). Acquisition of these career roles leads to a realized and greater level of quality of life being attained. This next section will discuss the LCCE ASD & DD Curriculum Guide and how practitioners use life skills curriculum framework.

LCCE ASD & DD Curriculum Guide (in preparation): Matrix--Domains, Competencies, Subcompetencies, Objectives, Activities

The educational framework for the LCCE ASD & DD Curriculum (see Figure 1) is identical to the LCE Curriculum for the mildly disabled. These curriculum programs only vary in: (a) the level/name of the competencies, subcompetencies, objectives, and activities; (b) the specific number of competencies, subcompetencies, objectives, and activities; (c) the Knowledge Battery is pictorial; (d) the Performance Battery is a reading-free format; (e) the Competency Instructional Units utilize a reading-free format; (f) the FUNs (Family Unit Notebooks) are a new product to the LCCE series; and (g) LCCE ASD & DD is not yet available on an electronic format nor has it been revised.

Domain. The major component of this curriculum is the 20 competencies (see Figure 1) that fall under one of three curriculum domain areas: Daily Living Skills, Personal-Social Skills, and Occupational Guidance and Preparation. All of the LCCE Curriculum programs use the same curriculum domains. Each domain is comprised of at least six to eight competencies. The total number of competencies per domain makes up the total content and skills for determination of what is required to have achieve competence in that domain area. No revisions were made to the domains.

Competencies. Based on years of continued research, the major 22 (LCE) and 20 (LCCE) skills or competencies have been identified as critical for students to acquire for successful adult outcomes. LCCE project staff has conducted frequent field survey reviews of these critical skills (competencies) to validate their necessity for acquisition to achieving

adult outcomes. These competencies provide practitioners both instructional and assessment functional life skills content. The competencies provide these two levels of assessment: on the first level, the competency level itself, a determination can be made about the extent a student has achieved or attained a specific competency. At the secondly level, at a domain area level, it can be determined just how much of the domain the student has achieved or acquired. What follows are the competencies that have been added by the authors to the revised LCCE ASD & DD Curriculum (Loyd & Angus, in preparation):

- Competency #15: Exploring & Locating Employment Training Job & Placement Opportunities;
- Competency #16: Making Job Training & Employment Placement Choices;
- Competency #17: Applying for & Maintaining Employment Training & Job Placements;
- Competency #19: Matching Physical-Manual Skills to Work Training & Employment Choices.

Subcompetencies. Each of the 20 major competencies is further broken down into the specific steps to determine how the competency is to be achieved and accomplished. The newly revised LCCE ASD & DD Curriculum includes a total of 77 subcompetencies (see Figure 1) compared to 75 from the original curriculum program. What follows are the subcompetencies that have been added by the authors to the revised LCCE ASD & DD Curriculum: (a) Subcompetency #6: Telling Time Subcompetency #54; and (b) Demonstrate Time Management.

These subcompetencies provide practitioners both instructional and assessment functional life skills content. The subcompetencies provide these two levels of assessment: on the first level, the subcompetency level itself, a determination can be made about the extent a student has achieved or attained a specific subcompetency. At the secondly level, at a competency level, it can be determined just how much of the competency the student has achieved or acquired.

Objectives. These 77 subcompetencies have also been task analyzed into the behavioral objectives (see Figure 2) that are required to achieve/accomplish each specific subcompetency. It is assumed students who have been taught to perform these objectives successfully have been able to successfully perform the subcompetency. There is in total over 1200 objectives for the 77 subcompetencies in LCCE ASD & DD. So when it is determined that a student can achieve all objectives then it can be determined that the student has accomplished the subcompetency.

Activities. Activities (see Figure 2) are provided for each subcompetency objective. The activities are the vehicles by which teachers shape the competencies. These suggested activities are not arranged in hierarchy, although some consideration has been to the difficulty levels. More appropriate instructional functional life skills activities may be inserted, depending on the characteristics of the students and the availability of resources. The activities are divided into two categories: one list of activities to be used in the school settings and a list of activities for use in community

settings. In each setting and for each activity the student is encouraged to request support and/or seek assistance as needed.

LCCE: ASD & DD Curriculum Based Instructional & Assessment Materials

The LCCE ASD & DD Curriculum has also developed assessment and instructional materials to accompany the functional life skills curriculum. These materials are unique in that they offer comprehensive, curriculum-based instructional and assessment (CBA) measures of life skills competence. The Competency Rating Scale (CRS) is included in the LCCE ASD & DD Curriculum Guide (1996) will be discussed below, currently the other materials are in the field testing process. The other assessment instruments, the Pictorial Knowledge Battery (PKB) and Performance Assessment Batteries (PAB) are developed and are being field tested. They are both similar in structure to the LCE assessments. The Competency Units are completed as well and in the field testing process. The Family Unit Notebooks (FUNs) are currently been developed but are activities have been included in the lesson plans.

LCCE: ASD & DD Competency Rating Scale (CRS)

The CRS is a valuable instrument because it provides a method to assess each student's subcompetency level from a knowledgeable rater (usually one or more teachers, although student and parent input should also be included). Through observation and interviews, this informal and brief assessment process has a relatively high degree of validity. The CRS may be used at all age levels. The instrument and its manual are contained in the curriculum guide.

Figure 2. LCCE Curriculum: ASD & DD Curriculum Guide presents the competencies, subcompetencies, objectives, school activities, and community-based activities of this functional life skills program.

Domain: Daily Living Skills

Competency 1: Managing Money & Time

Subcompetency 5: Perform Banking Skills

Objectives	Classroom Training Activities	Home-/Community-Based Training Activities
1. Understand the differences between banks and credit unions.	<ul style="list-style-type: none"> • Teacher introduces banks and credit unions. • Teacher discusses services provided by banks and credit unions and the benefits of each. • Students and teacher discuss the differences between the two. • Students write their likes and dislikes about the two. 	<ul style="list-style-type: none"> • Students visit local banks and credit unions. • Adult/peer discusses with student the differences between the two.
2. Open checking account.	<ul style="list-style-type: none"> • Teacher discusses the benefits of opening and having a checking account. • Students visit local bank or credit union and representative discusses the benefits of having a checking account and the various types of checking accounts available. • Students practice printing full name, address, birth date, telephone number, and names of reference. • Students practice using the above information and their ID information to an account application for opening a checking account at school bank. • Student opens school checking account. • Student seeks help from teacher. 	<ul style="list-style-type: none"> • Student visits local bank or credit union with an adult/peer to discuss with the representative about the different types of checking accounts, the benefits of each, and the steps to open and keep a checking account. • Student knows and practices writing full name, address, birth date, telephone number, and names of reference. • Student recalls the information above and his/her ID information to fill out an account application to open a checking account at a bank or credit union with adult/peer. • Student opens checking account with representative's, adult's, or peer's assistance if needed. • Student seeks assistance from adult/peer.
3. Open savings account.	<ul style="list-style-type: none"> • Teacher discusses the benefits of opening and having a savings account. • Students visit local bank/credit union and representative discusses the benefits and process of opening and having a savings account. • Student practices copying information from ID card to account application for opening a savings account at school bank. • Student opens savings account. • Student seeks help from teacher. 	<ul style="list-style-type: none"> • Student visits local bank or credit union with an adult/peer to discuss with the representative about the benefits of opening and having a savings account and the steps to do so. • Student knows and practices writing full name, address, birth date, telephone number, and names of reference. • Student recalls the information above and his/her ID information to fill out an account application to open a savings account at a bank or credit union with adult/peer. • Student opens savings account with representative's, adult's, or peer's assistance if needed. • Student seeks assistance from adult/peer.

LCCE: ASD & DD Curriculum Guide

LCCE ASD & DD Pictorial Knowledge Battery (PKB)

The LCCE ASD & DD PKB, a pictorial knowledge battery, was developed for a reading-free format to assess students'

knowledge of the major functional skills in the curriculum. It uses objective questions to assess students' knowledge in these critical areas. Primarily a screening instrument, the PKB is designed to pinpoint specific

competency deficiencies. Scores are provided at both the competency and domain level. The PKB is available in parallel forms (A & B) each with 150 multiple choice questions. Scores cover nineteen of the twenty competencies. Administration of PKB is student friendly. Tests can be given in part or in sections and need not be given all at one setting. The examiner can assist in marking the correct responses. After scoring the PKB record the student's PKB scale scores on the profile record called the Student Competency Assessment Record Modified (SCARM).

LCCE ASD & DD Performance Assessment Battery (PABs)

PABs provide a more realistic approach to assessing student's actual abilities and skills beyond the type of information that is gained from the more objective PKB. The PABs sample the student's ability to perform a variety of skills which are required for daily living, personal-social, and occupational functioning. PAB items require the students to demonstrate/perform an activity reflecting adequate command of the LCCE ASD & DD competencies and subcompetencies. Nineteen competency tests are contained in the PABs. PABs have two parallel forms (A & B) each with five major questions developed at the competency level for all of its subcompetencies. Forms A & B of the PABs were developed for the first nineteen competencies. Competency twenty of LCCE ASD & DD does not lend itself to the development of a performance base assessment. The examiner reads the five questions that are included on the PABs and asks the student perform each activity for each question. Tests can be given in part/sections and need not be given at one setting. Responses are noted on the scoring sheets along with suggested correct responses for the

activities and space provided to make comments to explain performance score. After scoring the PAB record the student's PAB scale scores on the profile record called the Student Competency Assessment Record Modified (SCARM).

LCCE ASD & DD Competency Units

The instructional competency units use the systematic unit approach to teaching each of the 77 subcompetencies contained in the revised version of the LCCE ASD & DD Curriculum. The format of the 19 Competency Units is almost identical to the LCE structure. These competency units use a student and teacher friendly format that is easy to adapt and modify. An overview profile sheet for each subcompetency within the competency unit is provided which indicates the number of guest speakers required, community activities planned, and listing of instructional materials, posters, and handouts included in the subcompetency unit. Lesson plans follow this structure: (a) LCCE objectives; (b) lesson objectives; (c) instructional resources; (d) lesson introduction; (e) school/community activity/task/time; (f) lesson plan evaluation; (g) career enhancement/community integration. Instructional resource materials include fact sheets, checklists, and family unit notebook (FUNs) activities. The lesson plans are scripted and have specific goals and activities for teacher preparation. Each competency unit comes with its own set of materials for duplication or list of resources necessary for instruction. All units were developed with basic idea of universal design of learning principals being applied to the functional living skills blended into the academic skills. The 1500 plus lesson plans have been developed to be easily blended in with other content areas. Many lesson plans require a

cooperative learning approach to instruction. Each lesson plan includes several assessments as well as home and community involvement.

LCCE ASD & DD Blending Academic

Content

LCCE Curriculum blending is a process that allows students to receive the appropriate combination between LCCE competencies with general academic skills in appropriate educational settings that address their I.E.P., instructional, and assessment needs. The authors have developed an alignment chart for the LCCE ASD & DD Competencies and the CCSS.

The following blending example is for a seventh grade student's I.E.P:

- Morgan's I.E.P. I.E.P. Goal: By the end of the seventh grade school year, Morgan will improve reading comprehension and increase her understanding of vocabulary by 80%.
- CCSS.ELA-LITERACY.RI.7.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of a specific word choice on meaning and tone.

- Benchmark Goal: Morgan will read a short paragraph and correctly answer 2 out of 3 questions by the end of the first 9 weeks.

- LCCE Competency: 12: Exhibiting Independent Behavior

Instruction in language arts class could be designed based on the LCCE Subcompetency 48: Demonstrate Self-Determination. Specific content skill instruction in vocabulary could be based on the various self-determination skills.

Summary

The Life Centered Career Education: Modified Curriculum for Individuals with Moderate Disabilities (Loyd & Brolin, 1996) has been newly revised this year. The authors have developed the instructional and assessment materials to complement Brolin's LCE Curriculum Program. This new LCCE Curriculum ASD & DD (Loyd & Angus, in preparation) is available for those students with moderate and severe developmental disabilities who need functional life skills.

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Creating Circles of Natural Social Supports: Impact on Adult with Autism Spectrum Disorder's Quality of Life

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Abstract: A Circle of Supports is an intervention used to promote social inclusion by establishing levels of social supports for an individual with special needs. This study examined the frequency and maintenance of levels of social relationships in a Circle of Supports created in childhood for an individual with autism spectrum disorder. The male subject was five years old in the initial phase of the research and 22 years old in the follow-up phase. Aligned with an AB design, the researcher conducted a non-experimental retrospective single-subject case study using interviews, observations, and archival data. The implementation of a Circle of Supports increased the levels and number of social relationships in childhood giving the subject access to opportunities for social participation and the development of social skills. Even after the subject exited school, the social relationships that were developed in childhood and the levels of natural supports were maintained while the number of paid supports decreased. Investigation of natural social supports can contribute to the development of effective interventions targeting quality of life for individuals with ASD.

Supports based on the needs of individuals with autism spectrum disorders (ASD) should be planned for and provided throughout the life span (Kamio, Inada, & Koyama, 2013). The growing number of individuals with ASD becoming young adults illustrates the importance of supports aimed particularly at this life stage, where the maintenance of social interactions is crucial (Interagency Autism Coordinating Committee, 2012; Orsmond, Shattuck, Cooper, Sterzing, & Anderson, 2013). Unfortunately to date, there is a lack of research focused on young adults with autism regarding quality of life (QoL) social interventions. Social intervention and support is necessary as ASD is a complex

neurodevelopmental disability characterized by challenges in social interaction (American Psychiatric Association, 2013). One means through which social participation and quality of life for adults with ASD appear to be facilitated is through informal support from social networks. This article presents the findings of a retrospective case study (Stodden, Yamamoto, Fold, Kong, & Otsuji, 2013) investigation into the frequency and maintenance of natural social supports and participation in a Circle of Supports created in childhood for an individual with ASD. Investigation of natural social support can contribute to the development of effective interventions targeting quality of life for

individuals with ASD throughout their life span.

Quality of Life

The social challenges apparent in childhood with ASD continue throughout adulthood and can have a significant impact on quality of life (Billstedt, Gillberg, & Gillberg, 2007; Orsmond et al., 2013; Seltzer et al., 2011; Shattuck et al., 2007; Shattuck et al., 2012). Quality of life is a construct that includes domains such as social inclusion, interpersonal relations, emotional well-being, and personal development in addition to physical well-being, material well-being, and legal rights (Verdugo, Navas, Go'mez, Schalock, & Anderson, 2012). Maslow's (1954) mainstream theory, which parallels other human developmental psychology theories, hypothesizes that our need for social belonging comes right after physiological and safety needs. More current theoretical views also emphasize "participation" as a desirable outcome in life (Orsmond et al., 2013; World Health Organization, 2001). Participation is essential to growth and development and directly relates to a person's health and well-being (Hilton, Crouch, & Israel, 2008). Jennes-Coussens, Magill-Evans, and Koning (2006) and Kamio et al. (2013) compared quality of life in individuals with ASD and neuro-typical adults. These researchers found in both groups a significant relationship between social networks and quality of life scores suggesting viewing a social network as supportive is associated with greater overall QoL. Renty and Roeyers (2006) found perceived informal social support was the most important quality of life component in adults with ASD. In a review of literature, Burgess and Gutstein (2007) also noted social support as possible predictors for quality of life for individuals with autism. In a

systematic review of 14 empirical studies, Tobin, Drager, and Richardson (2014) found that supporting social functioning and social participation is a route to help individuals with ASD form relationships and establish natural support networks that contributes to quality of life. Working to provide opportunities for social support is of key importance as social skill heavily impacts outcomes in many areas of functioning.

Need for Social Support

The need for social support is evident in the research where studies including adolescents and adults with ASD have examined peer relationships and patterns of participation in social activities (Tobin et al., 2014). These studies suggest that adults with ASD often experience social isolation (Orsmond, Krauss, & Seltzer, 2004) and the rates for social participation are low. For example, in a survey of 450 adults with autism, 31% percent had no social involvement outside of their family (Barnard, Harvey, Potter, & Prior, 2001). Similarly, Seltzer and Krauss (2002) surveyed 405 individuals with autism and found only 22% socialized with non-family members and only 14% socialized with someone from school. In a study by Renty and Roeyers (2006), participants with ASD reported that they counted on social support from their mothers, followed by friends, siblings, fathers, other family members and partners. Mu'ller, Schuler, and Yates (2008) found, through interview data about social experiences and effective social support, many adult participants with ASD talked about isolation and reported having no friends. Renty and Roeyers (2007) conducted a study that investigated perceived and received social support and found that informal social support from friends and family was very important for men with ASD

in terms of bolstering individual functioning. Lasgaard, Nielsen, Eriksen, and Goosens (2010) found adolescents with ASD were lonelier than a control group but perceived social support from family, peers, or friends was protection against this loneliness. Likewise, Jantz (2011) investigated adults on the autism spectrum and found participants tended to have few relationships with individuals who were not family members, and reported a high degree of loneliness. Orsmond et al. (2013), using data from the National Longitudinal Transition Study 2, examined rates of participation in social activities among young adults who received special education services for autism and found they were significantly more likely to never see friends, never get called by friends, never be invited to activities, and be socially isolated. In Europe and Canada, studies also reveal that fewer than half of adults with ASD participate in social events in the community or in recreational activities that would provide social opportunities (Billstedt et al. 2007; Eaves & Ho 2008; Howlin, Mawhood, & Rutter, 2000).

Social Supports

The research identifying many adults with ASD experiencing social isolation and a lack of friendships calls for the development of social supports early in life to help reduce isolation, potentially improving quality of life (Gifford-Smith & Brownell, 2003). Informal natural support and participation with groups is shown to have potential for supporting development of social skills and social functioning (Carter, Sweeden, & Kurkowski, 2008). Natural supports are defined as relationships and associations typically developed in the community that enhance inclusion, a sense of belonging, and contribute to quality of life (Carter & Hughes,

2005). These include, but are not limited to: family relationships; friendships in the neighborhood and community; associations with students and employees in regular classrooms and workplaces; and associations developed through participation in clubs, organizations, and other civic activities.

Social challenges are related to poorer than expected outcomes across a variety of areas in adulthood, and provision of support for social participation should be a priority (Carter & Hughes, 2005). Learning more about social support is important not only because of the impact on quality of life, but also because increased social participation provides opportunities for adults with ASD to build social skills (Schall & McDonough, 2010). Orsmond et al., (2013) report that supporting social participation in adulthood for individuals with ASD requires resources that provide social opportunities and call for continued efforts to develop and evaluate interventions, supports, and programs to enable young adults with ASD to participate in social activities with peers and in the community. Howlin and Yates (1999) note informal supports are neither very expensive nor very time-consuming and can make a significant difference for adults with ASD. In a study conducted by Jantz (2011), individuals with ASD talked about the desire for groups designed with a social focus providing opportunities to develop friendships and participate in community social activities. Müller et al. (2008) found informal supports described as helpful in facilitating social interaction include predictable highly structured, small group interactions.

Davis (2005) reported starting at birth, we create an intricate network of people in our

lives; friends and/or family to support us. This group is referred to as our Circle of Supports or Friends. A Circle of Supports is an intervention used to promote social inclusion by establishing a social support network for an individual with special needs. In a school setting, a Circle of Supports facilitates inclusion of students with special needs with their typical peers in the school community. In a community setting, a Circle of Supports facilitates inclusion of individuals with typical peers in social activities within the community. A circle includes a network consisting of the focus individual with social difficulties and typical peers. Individuals involved in the support circle work together to (a) discuss challenges in terms of social interaction, (b) set goals to improve social relationships, (c) meet on a regular basis to plan social opportunities to reach goals, and (d) carry out social activities within the community. The purpose of the network is to prevent isolation, establish friendships, and encourage social interactions and community participation. (Barrett & Randall, 2004; Frederickson, Warren, & Turner, 2005).

There is literature relating to the development and implementation of this approach but there is little evidence regarding effectiveness (Barrett & Randall, 2004). Newton, Taylor, and Wilson (1996) proposed a number of hypotheses to account for the reported anecdotal success of the circles approach. They hypothesized providing a framework for support and active intervention is a way of enhancing and mobilizing a community's impact on an individual. Additionally, they hypothesized discussing honestly and openly an individual's challenges, isolation, and lack of friendships encourages empathy and provides a model for a healthy relationship.

Whitaker, Barratt, Joy, Potter, and Thomas (1998) set up a circles for seven young individuals with ASD. The participants ranged in age with the majority in mainstream general education settings. Evaluation involved collecting participants' subjective experiences about the approach. The adult facilitators reported increased social integration and peer acceptance for the focus children. Peers, themselves, mentioned their enjoyment and satisfaction at helping others along with their personal growth. The vast majority of circle members indicated they would continue their involvement in the circle. The circles provided a means of mobilizing support of a very practical nature, at a very limited cost, and with few negatives for participants.

Method

Research Design

Aligned with an AB design, the researcher conducted a non-experimental retrospective single-subject case study using interviews, observations, and archival data. The aim was to examine the impact of a Circle of Supports social network created in childhood for an individual with ASD on the frequency and maintenance of social relationships and levels of supports. Retrospective case studies are a type of longitudinal case study design with three common factors: (1) the data is collected after the significant events have already occurred, (2) researchers have access to both first-person accounts and archival data, and (3) the final outcomes are already known when data collection occurs.

In this retrospective case analysis, the researcher formulated the hypothesis to frame the study, then identified three key data intervals to analyze the data that details the experience of the participant. The data points

were: (1) baseline information, (2) introduction of the independent variable (implementation of Circle of Supports) and the impact on the dependent variable (social relationships and levels of supports) in childhood, and (3) impact of implementation of Circle of Supports in childhood on social relationships and levels of supports in adulthood. The researcher was interested in examining the amount of social support in an individual's environment as it is an objective indicator of quality of life (Bastiaansen, Koot, Ferdinand, & Verhulst, 2004; Hansson, 2002).

Participants

This study included a primary and secondary participants. The participants were located in an urban Midwest setting. All participants volunteered to participate and were not selected in a randomized or predetermined method. To protect the identity of the participants in this study, no names are utilized. All participants were Caucasian non-Hispanic or Latino.

Primary participant. The primary participant was a male who was five years old in the initial phase of the research and 22 years old at the follow-up phase. The participant lives with his college-educated professionally-employed parents. He was diagnosed medically and received special education services for ASD until he was 21 years old. At age four, with the use of the Childhood Autism Rating Scale (CARS) tool completed by the primary healthcare provider, a teacher, and the parents it was determined by a private psychologist that the child met the cutoff for ASD at the moderate range. The child was mainstreamed in general education classroom throughout his school years. The participant was selected based on parental concerns that he had no friends and was not

participating in any social activities with same-age peers at the beginning of the research.

Secondary participants. The secondary participants consisted of the primary participant's father, two same-aged school peers who participated in the Circle of Supports, and one community member. Both of the same-aged peers were male and the community member was a female who belonged to the primary participant's church group.

Research Questions

In this investigation, to control for assumptions and biases, the researcher was explicit about the research questions.

1. What were the levels of social supports and number of relationships before a Circle of Supports was created in childhood for the individual with ASD?
2. What were the levels of social supports and number of relationships after the creation of a Circle of Supports was established in childhood for the individual with ASD?
3. Were the levels of social supports and number of relationships established in childhood maintained in adulthood for the individual with ASD?

Dependent/Independent Variables

The dependent variable was the number of social relationships and levels of supports. The independent variable was the creation of the Circle of Supports. At the beginning of the study, the parents expressed concern that the child with ASD did not have any friends and did not participate in social activities. The parents explicitly identified the numbers of supports available to the child based on Snow's (1994) descriptions of four different

circles of relationships within Bronfenbrenner's (1994) Ecological Social Theory.

Bronfenbrenner's (1994) social theory postulates that individual's development and growth occurs within the context of socially organized ecological systems of relationships that form his or her environment. To grow, individuals first require access to an environment and then to the individuals within the environments. A Circle of Supports occurs within Bronfenbrenner's ecological systems referred to as microsystems and mesosystems. The microsystem, the layer closest to the individual, contains the environments and people with which he/she has direct contact. The microsystem encompasses the relationships and interactions an individual has with his or her immediate surroundings such as family, school, neighborhood, and community environments. This core environment stands as the individual's venue for initial learning and reference point for the social world. The mesosystem connects two or more systems in which an individual lives and provides the connection between the structures of the individual's microsystem. For example, a mesosystem includes the connection between parents at home with teachers at school.

The relationships or supports noted in the Circle of Supports are based on those that everyone has in their lives. Snow (1994) categorized relationships and supports into four levels which include the circle of intimacy, friendship, participation, and exchange. In the center of each Circle of Supports is the individual.

1. The Circle of Intimacy is made up of individuals who share heartfelt emotions. In these relationships, individuals see

each other on a regular and sometimes daily basis. These include immediate family members and close intimate friends. This first level of support, based on Bronfenbrenner's microsystem, generally occurs in the environment in which the individual directly lives. This level is where individuals typically encounter the most social interactions.

2. The Circle of Friendship is made up of individuals who go out to dinner, see a movie, and generally see each other on a regular basis. These include extended relatives and friends. This level of support, based on Bronfenbrenner's mesosystem, is where interactions begin to occur between the microsystems. The mesosystem could include experiences at home related to experiences at school.
3. The Circle of Participation is made of individuals who participate together in life activities such as school, clubs, organizations, athletic teams, work, and church. These individuals see each other when participating in the particular activities.
4. The Circle of Exchange is made up of individuals who are paid to be in a life. These include doctors, dentists, psychologists, teachers, social workers, therapists, and barbers.

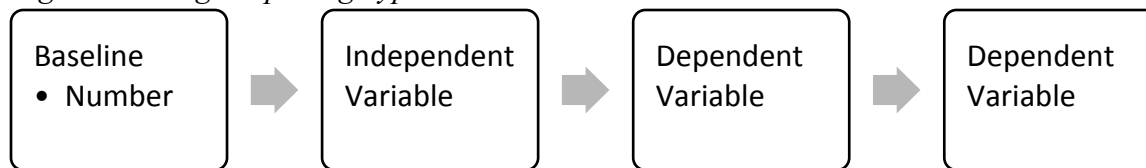
Through analysis of interview transcripts, the researcher sought to capture and understand the actual experiences, perceptions, and impact of a planned Circle of Supports on the individual with ASD's social relationships and levels of supports.

Hypotheses

The researcher created a directional hypothesis to document activity rather than discover phenomena (Brantlinger, Jimenez, Klingner, Pugach, & Richardson, 2005) based

on baseline data. The intent was to identify relationships between variables.

Figure 1: Design depicting hypothesis.



The researcher hypothesized the creation of a Circle of Supports intervention would have the following effects:

Hypothesis 1: An individual with ASD's participation in a Circle of Supports intervention will increase the number of social relationships and levels of support in childhood.

Hypothesis 2: After participation in a Circle of Supports intervention in childhood, the number of social relationships and levels of supports will be maintained in adulthood.

Data Collection Methods

The strategy was to retrospectively review and analyze data provided by the primary participant and the secondary participants who were social supports to the individual with ASD. This data was gathered by the researcher two years after the primary participant graduated from high school. The purpose of this research was to identify and understand the influences of the creation of a Circle of Supports network in childhood on the levels and number of social relationships for a young adult with ASD. The researcher conducted two semi-structured one hour interviews with the primary participant and the participant's father. Additionally, all of the other secondary participants participated in a one-hour semi-structured interview. The

interviews were audiotaped and transcribed by the researcher. The researcher then utilized member checking and reviewed the transcriptions with participants to check for accuracy (Denzin & Lincoln, 2000).

Additionally, the researcher took field notes and observed the participant during two one-hour social activities. The researcher reviewed and coded the verbatim transcripts moving from detailed coding to grouping codes into analytical categories (Merriam, 2009). The categories provided information on (a) documentation of number of relationships and levels of supports during pre-intervention conditions, (b) documentation of number of relationships and levels of supports after intervention during childhood, and (c) documentation of number of relationships and levels of supports in adulthood. The researcher engaged in validation strategies utilizing triangulation (e.g. interview transcripts, field notes, and social observations).

Case Description and Findings

Pre-Intervention Baseline

When the primary participant was age five and in kindergarten, his parents expressed concerns about his lack of social connections.

After school one day, one of the 12 boys in the class handed out birthday

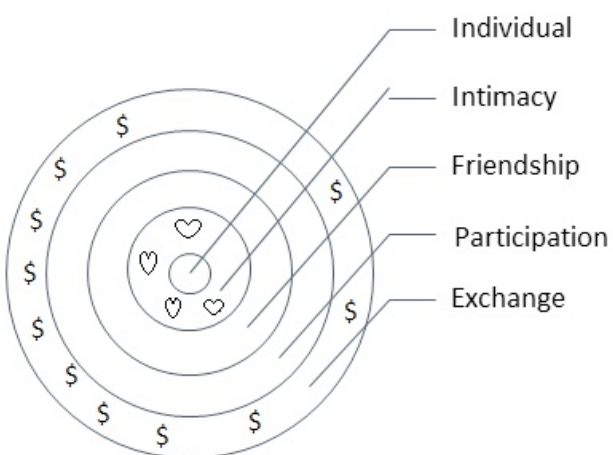
party invitations to the boys in the hall putting on their coats. I heard the boy tell my son that he was sorry that he wasn't invited to his birthday party. He told my son that his mom had only given him ten invitations. My son had no idea what had just happened but it broke my heart. It was at that point that I realized that my son had never been invited to a peer's birthday party (parent, personal communication, April 4, 2012).

After expressing parental concerns about the lack of social opportunities for their son, the school team met and participated in person centered planning. This planning process revealed that the individual with ASD's social supports were limited to family and paid staff.

The facilitator asked us how many hours per week our son was playing with peers at home or in the neighborhood. We were embarrassed to admit it but our son had never had a

friend from school over to our house. There were no kids in our neighborhood for him to play with either. At the meeting the facilitator had each of us create our own Circle of Supports. As a group, we then created my son's Circle of Supports and compared ours to his. The group was loud and enjoying themselves as we created and discussed our own social support circles. It got quiet in the room as we created my son's circle. The mood in the room changed. The Circle of Supports identified for my son were pretty much the people who were sitting in the meeting. There was us [his family] and the school staff along with some private therapists who were working with him. I felt very sad and thought when he is out of school, it is going to be just us (parent, personal communication, April 4, 2012).

Figure 2: Pre-intervention circle of supports.



During the initial planning process, the school team created a Circle of Supports graphic organizer to collect data on the number of social supports available for the primary participant. Generally, a Circle of Supports for an individual without disabilities reveals supports in all four circles. However, the circles for the young child with ASD participating in this study revealed relationships only in circle one and four. The child was an only child and had his mother and father represented on his circle of intimacy along with a grandmother and an aunt. Circle four, the circle of exchange, exploded with the individuals being paid to be in the child's life. These included 11 supports consisting of the school staff (teacher, paraprofessional, speech and language pathologist, occupational therapist, and school psychologist) and the child's private psychologist, speech and language pathologist, occupational therapist, doctor, dentist, and barber. Circle two and three had no supports available and thus the child was not having opportunities to create connections to others and develop natural social supports or friends.

We were apprehensive about our son's involvement in extracurricular activities because of what other people might think. Even when we just took him to the grocery store we would get stares and non-verbal judgment. Our biggest concern was what other people might think about our parenting skills. This preconception pretty much paralyzed us into not signing our son up for activities outside of the school setting. After seeing his Circle of Supports graphic organizer, we realized this is not about us and our pride. What we realized is that what we choose to do or not to do was

going to impact his life (parent, personal communication, April 4, 2012).

Intervention

The team proposed the creation of a Circle of Supports social network to expand the individual's opportunities for social participation in the school setting and gained buy-in from the school's administrator. The teacher, along with the school guidance counselor, explained the concept of friendship to the child's entire kindergarten class. This consisted of defining the term friend and a class discussion of what friends do and what makes a good friend. Peers were encouraged to share their own experiences of friendships (Whitaker et al., 1998). The students each created and examined their own Circle of Supports graphic organizer. Afterward, the teacher led a discussion about individual strengths and differences. The guidance counselor talked about acceptance and how the class could ensure everyone had supports at all levels on their circles. The Special Education teacher then explained autism and the mother discussed her son's strengths and needs. Afterward, the teacher presented the idea of a Circle of Supports club to help the primary participant and asked who would be interested. All of the students in the class raised their hands to signal interest. The teacher sent a note home to peers' parents to give consent for their child to voluntarily participate. The teacher explained that the group would meet on a weekly basis for approximately 20 minutes, and if they ever felt that they would like to opt out of the circle at any time they were free to do so. The class then had their first initial circle meeting where they discussed the following:

1. The teacher solicited volunteers to give an explanation for their reasons for participating in the club.
2. The group established a name for itself without using the focus child's name as part of this.
3. The group brainstormed some rules for the club.
4. The circle agreed on some realistic aims and activities that they wanted to participate in with the focus child.
5. The peers made commitments and signed up for activities to participate in with the focus child.
6. The teacher set the next meeting time.

In addition to what was happening at school, the family worked with the child's private psychologist to implement strategies to increase the frequency and number of social interactions with peers in the home setting. The family implemented a ten hour per week peer intervention schedule with regular peers coming into the home to play after school and on the weekends. Four regularly scheduled peers came home after school to play with the primary participant Monday through Thursday for two hours. Additionally every weekend a two-hour play date was set up with different peers from the class. One of the two peers interviewed for this research was part of the in-home play date schedule and spent every Thursday afterschool in kindergarten through grade two at the primary participant's home.

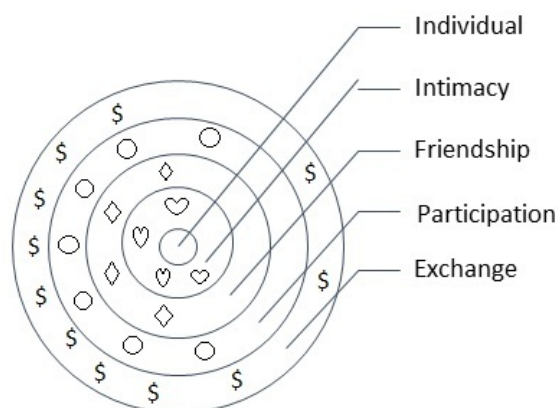
I think my parents volunteered me to come over to his house one day a week to save the cost of a babysitter. When I first started going over, his mom pretty much was playing with me. He was playing by himself with his Thomas the Tank engine trains. His mom always had lots of fun things

planned. After a while, he started getting more comfortable with me and his mom would go do other things. We loved to draw together. He was a really good artist and so was I (peer 1, personal communication, April 10, 2012).

The parents also signed up their son for some recreational department sport teams, Boy Scouts, and religious education at their church.

After our meeting with the school, we slowly got over our reluctance and enrolled our son in some community activities. One day in Boy Scouts a guest speaker talked to the boys about recycling. I didn't think he was getting anything out of the conversation. But when the speaker asked him what he might do to recycle – He answered "Make a swing out of a tire like my neighbors." Several of the boys gave him high fives and he smiled. On skit night, I didn't want him participating because I thought he might jump off of the stage which he likes to do. The leader said he was part of the group and would be participating. He did jump off the stage but not one parent or Boy Scout even mentioned it. Instead, several of the boys commented to me about what a good climber he was because he had been able to climb to the top of a rope ladder at camp. None of them could accomplish this feat due to fear. These boys did not realize my son lacks fear. These boys look beyond his disability and celebrate his accomplishments (parent, personal communication, April 11, 2012).

Figure 3: Post-intervention circle of supports.



After implementation of the Circles of Supports, another graphic organizer was utilized to collect data on the number of social supports available for the individual. Where before there were only two levels of circles represented on the graphic organizer, after intervention there was representation in all four levels. The circles of friendship and participation increased due to the peer supports provided within the school and through the peer play and activities the family signed the child up to participate in. There were now supports available where the individual with ASD had opportunities to create connections to others and develop natural social supports.

Adulthood

The researcher was interested in learning the perspectives of the participants on the maintenance or carry-over of the efforts in creating Circles of Supports into adulthood. The researcher asked the parent if all of the extra time and energy they put into the intervention was worth it and were they still seeing the benefits of the supports.

I know autism is considered a social disorder but my son is more social than

me. He has an enviable social life and continues to be involved with his peers from childhood and new peers he has been able to make with the social skills he has acquired. After graduation, he has stayed connected with friends from school on Facebook and social media. Most of them are away for college now. He is still very active with athletics and now that he is out of school he is involved in sports with Special Olympics. We complained a lot when he was little about all of the time we invested in play sessions and having so many friends over. We started having New Year's Eve parties when the kids were young. We were envious that all of the other parents were out while we had all of their kids at our house. It is so great to see it was worth the effort. A common misconception is that individuals with autism consciously choose to isolate themselves, and are thus incapable of friendship. Our son never preferred to be alone, he just didn't have the skills to engage. By having peers over when he was little he gained the skills he needed to develop relationships with those around

him (parent, personal communication, April 4, 2012).

The other peer interviewed for this research was also part of the in-home play date schedule and spent every Tuesday afterschool in kindergarten through grade three at the primary participant's home.

I liked going to his house because his mom baked cookies for us. I remember when I first started going to his house he really didn't seem to want to play with me. He would build things with Legos or play with his train set alone. He was really good at putting together puzzles and at video games. I asked him to show me how to play the video games and he would. After coming to his house for a while, I got comfortable with him and he got comfortable with me. He would hang out with me at school and even though he didn't like to play basketball he would watch me play. When I was in high school, he came to every one of my basketball games. We still hang out when I am home from college. I pick him up and we go to the beach. We stay in touch on Facebook. We will always be friends (peer 2, personal communication, April 8, 2012).

The participating community member had been part of the primary participant's circle of support for an extended period of time. The primary participant had started religious education at church in kindergarten and gone through the program until eight grade. At that time, several members of the church formed a small community of faith for individuals with

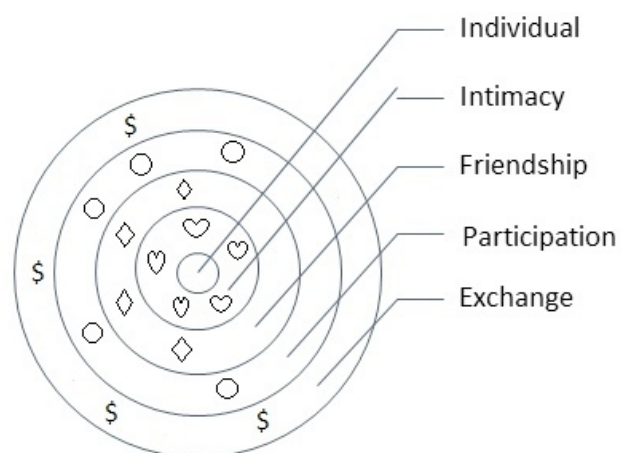
special needs to foster inclusion in assemblies of worship.

As part of my ministry, I participate in a program for individuals with disabilities who want to continue in their faith development. We are a small intimate group with 12 members. We support five individuals with special needs and seven of us are catechists. He is part of our group. We started as a middle school group but then the kids became high school students so we changed our focus to high school and kept the group intact. Before you knew it, our kids were adults so we became the adult group. This group has become family. We do activities outside of the church setting. Last week we went to a maple syrup farm (community member, personal communication, April 14, 2012).

The primary participant helped to create his adult Circles of Supports graphic organizer utilized to collect data on the number of social supports available for the individual. There was representation in all four levels of supports. As an adult, the primary participant has numerous supports available and opportunities to create new connections. The majority were natural social supports as the number of paid supports had decreased dramatically from 11 to 4.

I like to go out and do things. I like to go to movies and out to eat. I get bored being home alone. I like sports and going to games. I have lots of friends. I like to take the bus places. (primary participant, personal communication, April 4, 2012).

Figure 4: Adult circle of supports.



Summary of Findings

The results of the case study examination showed the number of social relationships and the levels of supports were increased with the implementation of a Circle of Supports in childhood. By expanding the number of social relationships for the individual in this study, he gained opportunities for social participation and the development of social skills. Even after the primary participant exited school, the relationships that were developed in childhood continued and the increase in social relationships and levels of supports were maintained in adulthood. The number of paid supports decreased with the number of natural supports increasing as an adult for the primary participant.

Limitations

Using a model presented by Stodden, Yamamoto, Folk, Kong, and Otsuji (2013), the author exercised the application of quality indicators designed by the What Works Clearinghouse (WWC) panel of experts on single-case design in this study (Kratochwill et al., 2010). That being said, the author concedes there are a number of

methodological issues. Examples include those inherent in most qualitative designs and single-subject case study which are concerns regarding the small sample size, the selection of the participants, the role of researcher and researcher bias, and the rigor of the methodology. There was a long time period between the two measurement points which means there was a greater possibility that an event might have influenced the findings. Maturation can play a major role in longer-term studies as natural physiological and psychological changes take place over time. This single-case based evaluation of the intervention provides valuable preliminary data, but additional research utilizing stronger research controls with increased participants is necessary for further evaluation of the intervention.

Conclusion

The findings from this research raise awareness of the impact of planning Circles of Supports for young children to support them socially and contribute to their quality of life as they become adults with ASD. Further investigation of natural supports and

social relationships may contribute to the development of effective interventions targeting quality of life for individuals with ASD throughout their life span. This research is important as many individuals with ASD possess fragmented circles or a lack of supports in varied environments. Circle of Supports can alleviate social challenges for the individual and their family and help support the ability for individuals to develop meaningful social relationships and friendships.

Friendship is about choice and chemistry and cannot even be readily defined, much less forced. This is precisely its magic. Realizing this, we can acknowledge without any sense of inadequacy that we are not, nor do we need to be, friendship sorcerers (Van der Klift & Kunc, 2002, p. 23).

Friendship cannot be forced but we can provide natural supports and opportunities for friendships to develop. Creating a Circle of Supports is a place to start. While the creation of a Circle of Supports can be time intensive in the beginning as relationships develop, this retrospective case study has shown that the

time invested can result in naturally sustaining supports and friendships.

He does really well with the support of his family and friends. With his friends he is able to make connections, develop relationships, and have fun. As a parent, it's such a weight off my mind to know that he has these supports around for when I am no longer here. He is learning to operate without the security his family has always provided. This wasn't about an investment of money – it was about an investment of time. It was time-consuming at the beginning and we wondered if it would pay off. But we mobilized support at a very practical nature. We put away our pride and started by asking for help. The benefit of all of this is that he has created true friendships. I am so glad we did this for him. Can you imagine a life without friends? I can't. Everyone needs friends! (father, personal communication, April 11, 2012).

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