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THE EFFECTS OF THE VIDEO MODELING PRODUCT GEMIINI© ON VERBAL RESPONSE PRODUCTION OF INDIVIDUALS WITH AUTISM SPECTRUM DISORDER WHO ARE NONSPEAKING OR MINIMALLY SPEAKING

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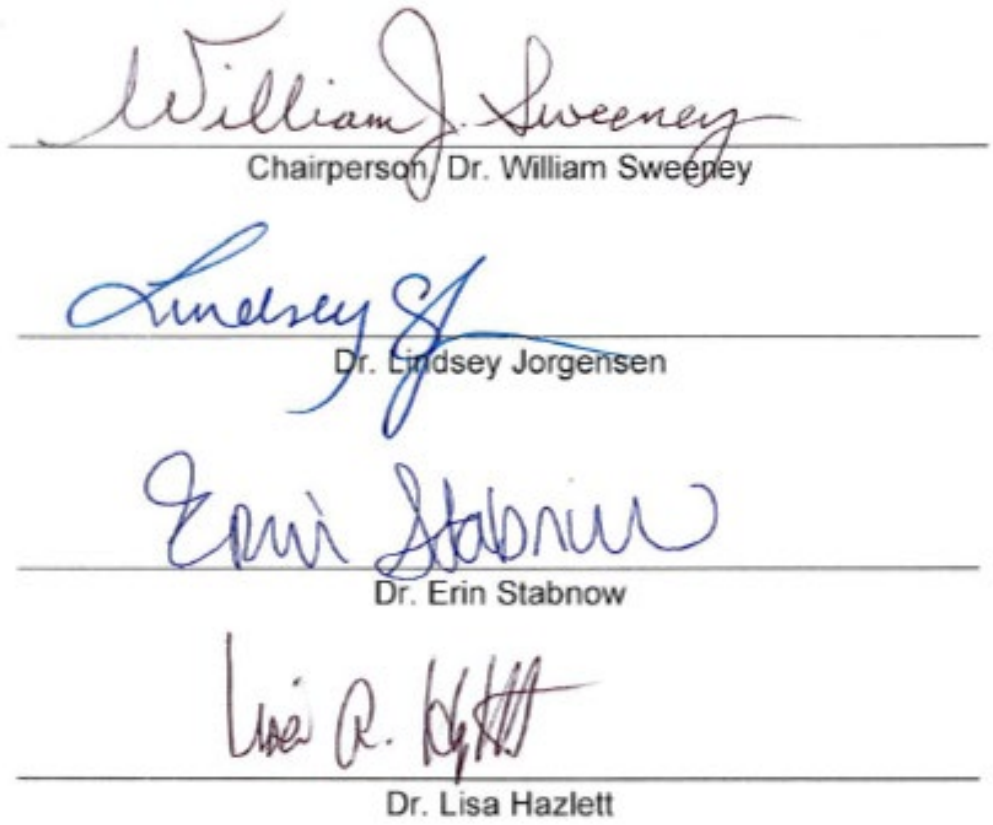

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ABSTRACT

The current study evaluates the effectiveness of the commercial video modeling program *GemIIni*© (*GemIIni*© Educational Systems, 2012) in increasing expressive spoken language production in individuals who exhibit characteristics of autism spectrum disorder and are considered nonspeaking or minimally speaking. Based upon the principles of Applied Behavioral Analysis, video modeling has been identified as an evidence-based practice in teaching skills to students with disabilities. In this study, the criteria for using a single-case alternating treatment design embedded within an AB experimental design was implemented to evaluate the effect of the video modeling system on the number of responses produced.

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-My parents: Thank you for loving me and instilling the love of learning in me.

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Contents

List of Tables

List of Figures

Chapter 1

Introduction

Research looking at expressive response production instruction for individuals with autism spectrum disorder (ASD) who are nonspeaking or minimally speaking is limited and mainly focused on those under the age of five.

Public Law 108-466, the Individuals with Disabilities Educational Improvement Act (IDEIA) of 2004, is a federal law that provides partial funding to states to educate students receiving special education services. Of the 7.3 million students receiving special education services during the 2021-2022 school year, 12 percent of the population was identified as exhibiting ASD (Irwin et al., 2023).

A brief introduction addresses the cost and prevalence of ASD in the educational system, intervention strategies, technology used to support the expressive communication skills of individuals with ASD, and the need for the present study. Finally, the research questions and definitions of terms are presented.

According to *The Condition of Education 2018,* the number of students receiving these services and the cost of their education is increasing (p. 74). the IDEIA states that students with ASD deserve access to high-quality, research-based interventions that help keep them in the least restrictive instructional environment while meeting their learning needs (Public Law 108-446, Individuals with Disabilities Educational Improvement Act, 2004).

As recently as 2021, research indicated that ASD affects approximately one in 44 children aged eight years, according to estimates from CDC's Autism and Developmental Disabilities Monitoring Network (Autism and Developmental Disabilities

Monitoring Network, 2021). Boys are four times as likely to be diagnosed with ASD than girls (Autism and Developmental Disabilities Monitoring Network, 2021). According to Zhou et al., research suggests autism-related proteins in the brain may be more tightly regulated in the female brain, possibly helping to prevent the development of autism in females (2019). Weaver noted that in most females, higher levels of estrogen could be protecting them from Autism as too much testosterone could explain some behaviors frequently associated with ASD, such as fixating on particular objects (2011). The ADDM network reported that 35 percent of children with ASD were classified in the range of intellectual disability, which is considered an intelligence quotient (IQ) of less than 70 (Autism and Developmental Disabilities Monitoring Network, 2021).

Rose et al. (2016) estimated that between 25 and 35 percent of individuals with ASD appear nonspeaking or minimally speaking. This lack of expressive verbal communication is after receiving several years of educational opportunities and interventions. Limited knowledge is known about individuals with ASD who are nonspeaking or minimally speaking. This lack of information is partly due to the high variability of this population, which is not defined by a single set of defining characteristics or skills and deficits (Rose et al., 2016).

The DSM-5's diagnostic criteria for ASD requires persistent deficits in each of three areas of social communication and interaction, as well as two of four types of restricted, repetitive behaviors. Deficits in social communication and interaction include deficits in social-emotional reciprocity, deficits in nonverbal communication behaviors used for social interaction, and deficits in developing, maintaining, and understanding relationships. Restricted, repetitive patterns of behavior, interest or activities, as

manifested by at least two of the following: stereotyped or repetitive motor movements, use of speech or speech; insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal and nonverbal behavior; highly restricted, fixated interests that are abnormal in intensity or focus; an/or hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment (American Psychiatric Association, 2013). These characteristics are very individualistic and are not exhibited in the same way with individuals diagnosed with autism. Autism is individualistic in nature, and it is the broad characteristics of this disability across a spectrum of behaviors, intellectual attributes, and communication problems that characterize autism as a spectrum disorder.

Autism intervention studies developed from using global outcomes measures, such as IQ scores, to more comprehensive ranges of measurements, including expressive and receptive language. In some cases, studies attempted to measure the change in skills or behaviors targeted explicitly by the interventions (Dawson & Osterling, 1997; Howlin et al., 2009). The following research discusses a variety of interventions for individuals with ASD, beginning with Applied Behavioral Analysis (ABA) (Goods et al., 2013), followed by communication studies addressing specific Augmentative and Alternative Communication (AAC) (van der Meer & Rispoli, 2010; Virués-Ortega, 2010) and Picture Exchange Communication System (PECS) (Gordon et al., 2011; Howlin et al., 2007).

One intervention strategy proven effective at improving skill deficit areas commonly affiliated with ASD is applied behavior analysis (ABA) (Duffy & Healy, 2011; Virues-Ortega, 2010). Various interventions reported in the literature on ABA addressed increased spontaneous communication in individuals diagnosed with ASD. Speech often is targeted using several procedures, including discrete-trial training (Goldstein, 2002), time delay/prompt fading (Charlop et al., 1985; Charlop & Walsh, 1986; Matson et al., 1990; Ross & Greer, 2003), milieu language teaching (Mancil et al., 2009), fading and fluency training (Krantz & McClannahan, 1993, 1998). Interventions can appear as peer-mediated or adult-mediated. According to research findings, many individuals with ASD may fail to develop speech and language skills (Duffy & Healy, 2011).

A strategy to provide individuals exhibiting minimally speaking performance a means to communicate is to use AAC approaches (Mirenda, 2003), most often a picture symbol system (Mirenda & Erickson, 2000) or a speech-generating device (SGD) (Lancioni et al., 2007). Although AAC intervention studies demonstrate improvements in communication (Lancioni et al., 2001), few show changes in spoken language. There is a good reason that previous efforts appeared to focus primarily on AAC: speech is likely to remain challenging for some individuals with ASD, whereas they may experience more immediate communicative success with AAC (Bondy & Frost, 1994a; Carbone et al., 2006; Lancioni et al., 2001; Lord & McGee, 2001). The main goal of AAC interventions is to improve expressive communication using AAC. However, some (Schlosser & Wendt, 2008) reported collateral improvements in speech following AAC (Mirenda, 2003). For example, collateral gains in speech were reported for some

students following intervention with the Picture Exchange Communication System (PECS), a visually based, augmentative communication system in which individuals exchange pictures to communicate with others (Carr & Felce, 2007; Flippin et al., 2010). In such cases, various augmentative and alternative communication strategies facilitate spontaneous communicative behaviors that differ from vocal speech, including pointing to desired objects or manual signing (Duffy & Healy, 2011).

The PECS studies review measured speech outcomes but did not specifically target speech as a part of the intervention (Gordon et al., 2011). Studies directly targeting speech in school-age individuals with ASD and minimal expressive vocabularies are challenging to find. For example, Rogers et al. (2006) directly taught participants speech skills using the PROMPT method, but individuals were all below the age of six years. Since many individuals with ASD spend most of their days in educational settings, practical, efficient, and evidence-based classroom intervention tools are vital to addressing the social-communication needs of students (Bellini & Akullian, 2007).

The research appears to indicate that PECS training did not significantly enhance speech development (Gordon et al., 2011). Despite claims that PECS can improve individuals' use of speech, the Howlin et al.'s 2007 study failed to demonstrate any increases in spoken language or scores on the language test. The individuals studied continued to show significant impairments and abnormalities in communication (Howlin et al., 2007).

When developed in the laboratory, evidence-based interventions can take more than 15 years to become widely implemented in the community (Morris et al., 2011). Thus, researchers are increasingly developing and testing interventions in school-based settings, with the additional goal of sustaining the intervention beyond the set study period (Interagency Autism Coordinating Committee, 2017). Two recent studies demonstrated similar outcomes obtained in the community and the lab. Both studies implemented Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER) aimed at improving core impairments in social communication (Chang et al., 2016; Shire et al., 2017). Both studies noted the sustainability of the intervention over a short-term follow-up related to outcomes obtained by the participants. These and other findings by the Interagency Autism Coordinating Committee highlight the effectiveness of teacher-implemented interventions in improving one of the core features of ASD in school settings and paving the way for more school-based intervention research (Chang et al., 2016; Interagency Autism Coordinating Committee, 2017; Shire et al., 2017).

Without spoken language, individuals can quickly find themselves excluded from the day-to-day happenings in society. A student's K-12 education spans over a decade of the student's life and is the foundation for adulthood. During the 2018-2019 school year,10.5 percent of students who were provided services under IDEIA, Part B (those ages 6 through 21) were identified as exhibiting the characteristics of ASD (Office of Special Education Programs, 2020). Estimates are that 25 to 30 percent of individuals with ASD begin school as nonspeaking or minimally speaking (Anderson et al., 2007).

Individuals with ASD who are nonspeaking or minimally speaking are traditionally excluded from research designs due to difficulties in gaining standardized assessment data from the population. Professional research on individuals with ASD and communication skills often focuses on individuals five years of age and younger (Goods et al., 2013; Rogers et al., 2012; Vismara et al., 2009).

Authorities estimate that 30% of individuals with ASD appear nonspeaking or minimally speaking (Anderson et al., 2007; Tager-Flusberg & Kasari, 2013). This limited verbal communication occurs after several years of educational opportunities and interventions. Little knowledge about individuals with ASD who are nonspeaking or minimally speaking (Boucher et al., 2008; Tager-Flusberg et al., 2005). This little knowledge is partly due to this population's high variability, which is not defined by a single set of defining characteristics or skills and deficits. In part, because of their developmental functioning abilities, individuals with ASD exhibit extreme challenges in providing reliable or valid assessments (Tager-Flusberg & Kasari, 2013).

Even after years of intervention, estimates indicate that more than one-third of individuals diagnosed with ASD will remain nonspeaking or minimally speaking throughout their lifespan (National Research Council 2001; Rose et al. 2016; Tager-Flusberg & Kasari 2013). The failure to develop expressive verbal communication can interfere with development in many areas, including academics, behavior, socialization, independent living, and later employment (Koegel et al., 2020). The 2017 Interagency Autism Coordinating Committee strategic plan highlighted the need to study individuals with ASD who have minimal verbal abilities, identifying this most severely affected subgroup of ASD as grossly underrepresented in the behavioral intervention literature

(Interagency Autism Coordinating Committee, 2017). Engaging in academic or social experiences often appears extremely difficult when a student is nonspeaking or minimally speaking when educated in a traditionally verbal educational environment. It can be difficult, if not impossible, to formatively assess students who have no way of expressing the knowledge they possess (Kasari et al., 2013). Finding out what the student is interested in and motivated by can become a multi-professional team task when a student cannot share his thoughts. Without spoken language, academic and everyday life can appear complicated, if not impossible, to navigate for an individual with ASD who is nonspeaking or minimally speaking.

Within educational research, work with expressive language interventions appears to end after the individual turns five (Tager-Flusberg & Kasari, 2013). Research in the field of ASD has grown over the past 20 years; however, the vast majority of studies focused primarily on one of two subgroups: young toddlers and preschoolers (Boucher et al., 2008; Goods et al., 2013; Rogers et al., 2012; Tager-Flusberg et al., 2005; Tager-Flusberg & Kasari, 2013; Vismara et al., 2009) or older higher functioning, verbal children (Boucher et al., 2008; Tager-Flusberg et al., 2005; Tager-Flusberg & Kasari, 2013). This focus on these two groups of students exhibiting characteristics of ASD is primarily because of the ease of evaluating these individuals using standard assessment tools (Tager-Flusberg & Kasari, 2013).

Due to the wide-spanning nature of the skill deficit areas often associated with ASD, a range of interventions is critical (McGrew et al., 2016). The Interagency Autism Coordinating Committee describes developing interventions for individuals who are minimally speaking as appearing very challenging educationally. Digital-based

technology interventions for individuals with ASD continue to increase in accessibility, breadth, and depth of use (Interagency Autism Coordinating Committee, 2017). Another research strategy with empirical backing for teaching individuals with ASD is video modeling (Gelbar et al., 2012). Scientific evidence also increased regarding the effectiveness of technology-based or technology-enhanced interventions (Interagency Autism Coordinating Committee, 2017). Technology-based interventions exhibit the most potential to benefit individuals with ASD in many ways, including by helping them improve their social and communication skills and greater independence. All benefits of technology-based interventions can improve individuals' overall quality of life (Interagency Autism Coordinating Committee, 2017; Odom et al., 2015).

The technology used for intervention and instruction is increasing at a breathtaking rate for all students, especially those with ASD (Odom et al., 2015). Few individuals in first-world countries are untouched by some form of technology; they wear it on their wrists, carry it in their pockets or purses, go to sleep and wake up to it, and may even depend on it to keep their heart beating at the right pace. An example of this phenomenon is the quick increase of technology in teaching strategies and interventions used to support individuals with ASD in recent years (Grynszpan et al., 2014; McCleery, 2015; Odom et al., 2015).

Rayner et al. (2009) research on video-based intervention found the concept an effective option for instructing individuals with disabilities in various socially significant behaviors. Emphasis appeared in the relevant reviews and studies (Ayres & Langone, 2005; Bellini & Akullian, 2007; Buggey, 1995, 2007; Delano, 2007; Dowrick, 1999; Hitchcock et al., 2003; McCoy & Hermansen, 2007; Mechling, 2005; Sturmey, 2003) are

related to applications of these procedures for participants diagnosed with ASD. Video-based intervention appears as a broad term used to encompass procedures involving presenting video footage as the independent variable for intervention. Thus, video-based intervention includes approaches such as computer-based video instruction (Mechling et al., 2005; Wissick, 1996, p. 494), video modeling (Haring et al., 1987; Sigafoos et al., 2007), video priming (Schreibman et al., 2000), interactive video instruction, also known as video prompting (Cannella-Malone et al., 2006; Payne & Antonow, 1982), and video self-modeling (Buggy et al., 1999; Buggy, 2005). Studies report that one of the advantages of video-based intervention is minimizing distractions by requiring students to look at a small area on the computer or device screen. Research has highlighted the efficacy of video technology for individuals with strong visual processing abilities, a strength of many individuals with ASD (Mechling, 2005; Rayner et al., 2009).

Individuals who are nonspeaking or minimally speaking are often given any one of a wide variety of augmentative and alternative communication tools. These tools include, but are not limited to, the Picture Exchange Communication System (PECS) or a high-tech tablet with a communication application program (Duffy & Healy, 2011). Still, nothing is guaranteed to produce successful outcomes for every student. Most importantly, nothing can replace spoken language. Speaking is the most important of the four foundational language learning skills (Ur, 1996, p. 120). Spoken language allows a person to retrieve and access every word he knows in a given language. Spoken language through speaking produces minimal to no delay in conversation and is always accessible by the individual (Zhang, 2009).

As the application for mobile devices and the on-demand video market continue to grow with technological advances, the pre-made video modeling market is expanding (Odom et al., 2015). *Google Play*™ applications like *Autism Help* by *Class 5320* (Gallardo Montes et al., 2021) focus on daily tasks and routines, while *ExerciseBuddy*® by *ExerciseBuddy, LLC* (Bittner et al., 2018) provides video modeling of single stretches and exercises. *MeMinder* by *CreateAbility Concepts Inc*., *iModeling* by *AutismAssociationn of South Australia*, and *MyPicturesTalk* by *Grembe Inc*., all *iTunes*® application products, allow for the creation of videos tailored to the individual user. Commercial programs for social skills instruction include *Watch Me Learn*®, an on-demand and DVD-based platform of video modeling videos with a social-skills focus, and *Model Me Conversation Cues*® (Whittington-Barnish, 2012), an application, software, and video platform video modeling instruction, including conversation skills. As well as *Superheroes Social Skills* (Radley et al., 2021), a computer-based program with videos for social skill instruction. *Speech Blurbs* by ©*Blub Inc*. (Gallardo Montes et al., 2021) is a speech and articulation development application that uses the device's front camera to engage the learner in speech practice.

Another commercial video modeling intervention incorporating video modeling and word production is *GemIIni© Systems* (Gilmour, 2015). Based out of Spokane, Washington, *GemIIni©* claims to be appropriate for usage by parents, therapists, and schools worldwide (*GemIIni©* Educational Systems, 2012). The *GemIIni©* program is a video modeling intervention developed by two parents to engage autistic kids, teach them word identification, and enhance their speech output. The program, which spans

many levels ranging from letter pronunciation to initiating requests, uses video clips that should be screened discreetly multiple times daily (Gilmour, 2015).

The *GemIIni*© videos zoom on the speaker to clearly show how the tongue and the lips move to articulate any specific letter. Though the intervention is criticized for encouraging parents to let their autistic children spend prolonged periods glued in front of TVs and electronic devices such as tablets, some researchers argue in favor of the novel program that replaces regular speech therapy (Gilmour, 2015).

The company backs much of the support for the *GemIIni*© program, with limited independent research on the effectiveness of this commercial product in improving expressive language (Collet-Klingenberg, 2015; Gilmour, 2015). The Wisconsin Department of Health Services Treatment Intervention Advisory Committee is an outside opinion supporting the product. The committee found *GemIIni*© to be a well-established or vigorous evidence practice and a proven and effective treatment (Collet-Klingenbeg, 2015). With a standard subscription price of 98.00 dollars a month, the importance of a high-quality product is vital for parents and professionals alike (*GemIIni*© Support, 2021).

Significance of the Study

Many individuals with ASD are nonspeaking or minimally speaking (Tager-Flusberg & Kasari, 2013). More significantly, many individuals with ASD are nonspeaking or minimally speaking after age five (Anderson et al., 2007; Tager-Flusberg, 2014; Tager-Flusberg & Kasari, 2013). Limited research appears in the professional literature on individuals older than five who are nonspeaking or minimally speaking. Very few products are available for instruction in expressive spoken language

production. Though often promoted, *GemIIni*© is a product that appears to possess limited outside research on its effectiveness. This study is significant due to the evaluation of the effectiveness of an instructional strategy used in teaching a communication skill that possesses social significance and increased independence with students who exhibit characteristics of ASD and appear to be nonspeaking or minimally speaking.

Purpose of the Study

Based on the research and regulations with IDEIA (Individuals with Disabilities Educational Improvement Act, 2004), ESSA (Every Student Succeeds Act, 2015), and Common Core State Standards (Bellanca et al., 2012), a balance must occur between academic standards-based achievement and functional skills achievement for students with cognitive disabilities. Limited research is available for successful strategies for expanding the expressive vocabulary of older students with ASD who appear to be nonspeaking or minimally speaking.

This study aims to determine the effectiveness of the commercial video modeling program *GemIIni*© (*GemIIni*© Educational Systems, 2012) in increasing expressive spoken language production in individuals who exhibit characteristics of ASD and are considered nonspeaking or minimally speaking.

Research Questions

1. What effect will the *GemIIni*© video modeling system exhibit on the number of responses exhibited by students who are nonspeaking or minimally speaking produce?

2. To what extent are the behavior and measurement system definitions for verbal response production a reliable measurement procedure?
3. To what extent will the procedural integrity measures of *GemIIni*© ensure fidelity of the intervention implementation?
4. To what effect will the *GemIIni*© video modeling system exhibit on the perceptions of consumer satisfaction of the classroom teaching staff?

Definition of Terms

The following definitions are provided to ensure uniformity and understanding of these terms throughout the study. The researcher developed all definitions not accompanied by a citation.

Autism Spectrum Disorder (ASD) is defined by the Individuals with Disabilities Educational Improvement Act 2004 (IDEIA):

> A developmental disability affecting verbal and nonverbal communication and social interaction, generally evident before age three, adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual response to sensory experiences. **(**Heward et al., 2017, p. 221)

Dialectical differences: language diversity or variation that reflects the shared regional, social, or cultural/ethnic factors. These dialectical differences due to language, culture, ethnicity, and geographical region may appear as communication difficulties when they are just dialectal variations. Individual

dialectical differences must be carefully identified and considered (Velleman et al., 2010).

Discrete Video Modeling (DVM): is a form of video modeling used to teach expressive language through a sequence of evidence-based, applied behavior analytic and speech tactics. These include repetition and massed trials, stimulus differences, generalization, multiple cues, peer models, and focus on salient speech features such as a close-up video presentation of the hyper-articulated words presented (Gilmour, 2015). For example, hyper-articulation is exemplified by the exaggerated articulation of words, such as drawing out the *th* sound in South Dakota.

Echolalia: the repetition of others' speech, is a common observation in individuals with autism spectrum disorder (Blackburn et al., 2023).

Every Student Succeeds Act 2015 (ESSA): This act aimed to replace and update the No Child Left Behind Act (NCLB), which was signed into law in 2002. Like NCLB, ESSA reauthorized the Elementary and Secondary Act of 1965. ESSA has the explicit goal of thoroughly preparing all students for success in college and careers. ESSA aims to provide all children with significant opportunities for a fair, equitable, and high-quality education and close educational achievement gaps (Every Student Succeeds Act, 2015).

Individuals with Disabilities Educational Improvement Act 2004 (IDEIA): IDEIA ensures that all individuals with disabilities receive a free, appropriate public education within the least restrictive environment that meets their educational needs. Each individual's education program requires an

individualized curriculum, instruction, goals, and assessment procedures to address the individual's unique learning styles, strengths, and needs (Individuals with Disabilities Educational Improvement Act, 2004; Every Student Succeeds Act, 2015).

Intellectual Disabilities (ID): (formerly known as mental retardation) is defined by the American Association on Intellectual and Developmental Disabilities (2021) as:

"a disability characterized by significant intellectual functioning and adaptive behavior limitations as expressed in conceptual, social, and practical skills. This disability originates during the developmental period, which operationally as before the individual attains age 22" (Schalock et al., 2021, p.1).

Inter-observer agreement: Cooper et al. (2007) define inter-observer agreement (IOA) as "the degree to which two or more independent observers report the same observed values after measuring the same events" (p. 113).

Minimally speaking: equivalent to "minimally verbal." The change of this term is seen as more politically correct because it does not eliminate other forms of communication as appropriate communication approaches for an individual who does not speak verbally.

Minimally verbal: Produces less than 20 functional spoken words (Tager-Flusberg & Kasari, 2013).

Nonspeaking: equivalent to "non-verbal." The change of this term is seen as more politically correct because it does not eliminate other forms of

communication as appropriate communication approaches for an individual who does not speak verbally.

Nonverbal: Produces no functional spoken words (Kasari et al., 2013).

Procedural integrity: Cooper et al. (2007) define procedural integrity as "the extent to which the independent variable is implemented or carried out as planned" (p. 235).

Social validity: Social validity demonstrates the importance of the changes in behavior as related to the community (Alberto & Troutman, 2013; Johnson & Pennypacker, 2009; Kazdin, 2011).

Video modeling: The process of recording the performance of targeted behaviors, anticipating that the observer will cognitively internalize and later reproduce the observed behaviors. Video modeling typically involves presenting a video recording of models engaged in a specific series of scripted actions and/or vocalizations. After multiple viewings, the child is directed to engage in scripted behaviors (Bellini & Akullian, 2007; MacDonald et al., 2015). In other words, video modeling is an instructional technique in which individuals view a short video of a model (e.g., adult, peer, self) performing a sequence of steps to make up a target skill or behavior. The individual is then directed to complete the steps viewed (Gardner & Wolfe, 2013).

Limitations and Delimitations of the Study

Several factors may affect the study results or how they are interpreted, which could limit the validity and generalizability of the study results.

1. Due to the unique sample available for the study, results are difficult to generalize beyond specifics of the population from which the sample is drawn.
2. Differences in student intellectual performance may make it difficult to generalize the results in this study.
3. Multiple professionals working with the students and collecting data may influence the reliability of the study and the fidelity of the results, given the professionals' perception of the intervention.
4. This study will assess using *GemIIni©'s* discrete video modeling strategy for spoken language production. Hence, interpreting the findings requires caution since generalization to other video modeling instructional strategies needs further differential research to compare the results to other video modeling interventions.
5. Different characteristics related to intellectual disabilities are determiners of special education services and the educational needs of the participants.
6. Self-contained special education classrooms are different due to the nature of the students served and the needs of their students. Therefore, the highly structured setting, with individualized instructional plans, differs significantly from the more traditional curriculum and settings experienced by students in general education.

Organization of the Study

The study is divided into five chapters. Chapter 1 presents the introduction, statement of the problem, purpose, significance of the study, and limitations and delimitations. Chapter 2 reviews related literature related to video modeling interventions and current research regarding sight word strategies for individuals with intellectual disabilities. Chapter 3 includes the study design, rationale, and methodology. An analysis of data and findings is presented in Chapter 4. Finally, a summary of the results, conclusions, discussions, and recommendations for practice are presented in Chapter 5.

Chapter 2

Review of Related Literature

From the 2009-2010 through the 2019–2020 school year, the number of students ages three through 21 who received special education services under IDEA increased from 6.5 million, or 13 percent of total public-school enrollment, to 7.3 million, or 14 percent of total public-school enrollment. During the 2019-2020 school year, six percent of students ages 3–21 served under the Individuals with Disabilities Education Act were identified as having an intellectual disability, while 11 percent were identified as having autism (Office of Special Education Programs, 2020).

First described in 1943 by Leo Kanner of Johns Hopkins Hospital, autism was added as a disability category under the Individuals with Disabilities Education Improvement Act (IDEIA) during the 1990 reauthorization of what at the time was the Individuals with Disabilities Education Act (IDEA) (PL 101-476). Autism is defined as a developmental disability affecting verbal and nonverbal communication and social interaction, generally evident before age three, which adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual response to sensory experiences **(**Heward et al., 2017).

Until 2013, the IDEIA disability category of autism was broken into four related pervasive developmental disorders known as autistic disorder, Asperger's disorder, childhood disintegrative disorder, or pervasive developmental disorder not otherwise specified (PDD-NOS) per the DSM-IV (American Psychiatric Association, 2000). The

Diagnostic and Statistical Manual of Mental Disorders (DSM) is the handbook used by health care professionals in the United States and throughout much of the world as the authoritative guide to the diagnosis of mental disorders. In 2013, the American Psychiatric Association removed Asperger's Disorder from the DSM, offering instead the new DSM-5 diagnosis: autism spectrum disorder. The disorder has been reclassified as part of the DSM-5 Autism Spectrum (Gamlin, 2017). The DSM-V combines the four related disorders into a single diagnostic category: autism spectrum disorder (ASD) (American Psychiatric Association, 2013).

In December 2021, the Centers for Disease Control and Prevention (CDC) released new data on the prevalence of autism in the United States. This surveillance study identified one in 44 individuals as having ASD (Autism and Developmental Disabilities Monitoring Network, 2021). With the number of individuals with autism on the rise, the number of individuals with autism who are nonspeaking is also rising.

Nonspeaking and Minimally Speaking

One of the core deficits in individuals diagnosed with ASD is communication impairment. It is estimated that while 70% to 75% of individuals with ASD learn to communicate with spoken language, approximately 25% to 30% of individuals with ASD remain minimally speaking, even after years of intervention. Exact numbers are unknown mainly due to research studies often excluding these individuals due to their limited verbal abilities (Anderson et al., 2007; Kasari et al., 2014; Tager-Flusberg & Kasari, 2013).

In another study, Boucher et al. (2012) estimated that thirty to fifty percent of individuals with ASD never develop functional speech. This study argued that a large proportion of individuals who are considered deeply involved in their ASD do not develop language or acquire only a few functional words or signs (Boucher et al., 2008). A significant challenge to research in this area is a lack of consensus regarding how to define ‘minimally speaking’ (minimally verbal). Many definitions have been implemented, including specific cutoff scores on standardized instruments, parent estimates of vocabulary, and the number of words used during an observational assessment or across multiple language samples (Tager-Flusberg & Kasari, 2013).

In 2016, Bal et al. concluded that future studies of individuals who are considered minimally speaking must carefully consider the methods used to identify their sample, acknowledging that definitions including individuals with ‘some words’ may yield larger samples with a broader range of language and cognitive abilities. Broady defined minimally speaking samples as appearing particularly important to sort out factors interfering with language development in the subgroup of individuals whose expressive impairments are considerably below their estimated nonverbal cognitive abilities (Bal et al., 2016).

Describing individuals with few spontaneous functional words as minimally speaking acknowledges that many individuals may produce some words; however, these words may be rote, routinized, or restricted to specific contexts limiting their communicative function. Very little is known about the communicative or global development of individuals with ASD who are school age but have minimal expressive language due to the limited literature examining this specific subgroup. In a review of

studies, including individuals with ASD who are minimally speaking, authors Pickett et al., 2009 identified 167 participants who acquired speech skills from age five through thirteen. This finding demonstrates that individuals who are minimally speaking are missing essential core skills in their school years, but it is still unclear what factors may influence these gains.

Individuals with ASD who are considered minimally speaking are often assumed to have a significant intellectual disability and often are excluded from analyses due to challenges in completing standardized testing protocols. Research aimed at increasing understanding of this subgroup is emerging (Koegel et al., 2020); however, the many methods used to define minimally speaking status make it difficult to compare studies (Bal et al., 2016; Green et al., 2010). Understanding how different instruments and definitions are used to identify individuals who are minimally speaking affect sample composition is critical to advancing research on this understudied clinical population (Bal et al., 2016).

In April 2010, the National Institutes of Health (NIH) convened a multidisciplinary workshop to discuss the state of the empirical knowledge about and research opportunities regarding the substantial subgroup of individuals with ASD who do not develop spoken language by five years of age. The participants reviewed the current state of scientific knowledge, highlighted critical gaps in knowledge, and identified research opportunities to address knowledge gaps (Kasari et al., 2013).

Recommended Assessments

Kasari et al., 2013, recommended that assessments of individuals with minimal verbal skills should include a combination of standardized and experimental measures. However, few measures are appropriate for assessing older, minimally speaking individuals with ASD. Standardized assessments allow the comparison of norms to other samples for research purposes (Kritikos et al., 2018). Experimental measures, or more individualized approaches, can address the specific needs of individual individuals; these measures may be directly related to the proposed research study goals (Choate et al., 1995; King-Sears, 1994; Shinn, 1989). For example, standardized assessments may provide slight variation in a sample of individuals with few words, and individuals may not perform well under standardized testing conditions. Individuals with ASD who are minimally speaking frequently show poor effects on standardized direct assessments, despite showing evidence of skills in other non-testing contexts (Dawson et al., 2007; Kasari et al., 2013). Research measures may yield more information on core areas of impairment, including language (Sullivan et al., 2013; Tager-Flusberg & Kasari, 2013,) social behavior (Kasari et al., 2013; Sullivan et al., 2013), repetitive behaviors (Kasari et al., 2013), and assessments of related areas of impairment may provide important insight into individual's language ability (Kasari et al., 2013; Sullivan et al., 2013), including nonverbal cognition and prelinguistic abilities such as imitation, intentional communication (especially joint attention) and play skills (Kasari et al., 2013; Sullivan et al., 2013; Tager-Flusberg & Kasari, 2013).

In 2013 and 2014, two randomized controlled trials were published, examining the influence of targeted language interventions for individuals with ASD who are minimally speaking (Kasari et al., 2014; Paul et al., 2013). With a small sample, Paul et al. (2013) compared two language interventions, finding gains for both groups in parent-reported communication. Kasari et al. (2014) documented increases in socially communicative utterances for school-age individuals with ASD who were minimally speaking. Kasari found superior gains for those randomized participants who exhibited access to a speech-generating device (2014). Together, these studies provide evidence that individuals with ASD who are minimally speaking can make gains in spoken language through targeted interventions (Shire et al., 2015).

Verbal Language After the Age of Five

Most intervention studies aimed at teaching beginning speech and language skills to individuals with ASD focus on preschool age or younger (Goods et al., 2013; Rogers et al., 2012; Vismara et al., 2009). The focus on ages 18 months to five years is logical, given this age range, which appears present during the period when the need for direct language intervention becomes apparent. In addition, intensive interventions are implemented early to prevent further language development gaps. Though some research indicates that speech and language are acquired after this critical age, such evidence is limited and often. It often does not specify the methods used to promote such late speech/language acquisition (Pickett et al., 2009).

Remaining nonspeaking past the age of five is considered a poor indicator of future language development (Billstedt et al., 2007; Picket et al., 2009). Although there are reports of individuals older than five years acquiring speech, including Picket et al.

(2009), the characteristics of successful individuals older than this age level and the interventions used are not fully understood. Individuals with ASD often fail to develop useful speech. If they do not develop useful speech by age 5, the prognosis for future development is viewed as poor (Mirenda & Mathy-Laikko, 1989). It is estimated that 25–30 percent of individuals with ASD are minimally speaking at school entry (Anderson et al., 2007; Lord et al., 2004).

Some cases of later speech development are reported (DeMyer et al., 1973; Rutter et al., 1967). Through March 2008, a review of studies including individuals with ASD who are minimally speaking by authors Pickett et al. (2009) identified 167 participants who acquired speech skills at five and age thirteen. Most cases of reported late speech development occurred in the younger age groups (DeMyer et al., 1973; Rutter et al., 1967); no case older than 13 was reported (Pickett et al., 2009). This finding demonstrates that individuals who are minimally speaking are acquiring essential skills in their school years, but it is still unclear what factors may influence these gains.

The failure to develop spoken language by age five has been shown to increase the likelihood of a poor long-term prognosis for social and adaptive functioning skills (Anderson et al., 2007; Kasari et al., 2014). Though the window of opportunity may be small, individuals can learn spoken language after the age of 5 years (Wodka et al., 2013). A review of language acquisition studies in individuals with ASD reported on 167 individuals who started speaking after the age of five years (Pickett et al., 2009).

According to Pickett et al., 2009, there are individuals with ASD who graduated from high-quality preschool programs without showing significant change, failing to acquire spoken language skills. Their ability to communicate remains extremely limited,

and although there is anecdotal evidence that a small minority of these individuals start speaking after five years, most do not (Tager-Flusberg, 2014).

Many individuals who acquired spoken language did so between five and seven years of age and had nonspeaking IQs greater than fifty. These individuals often received behavioral interventions, targeting the production of sounds and words, and learned to produce single words to request needs and wants. Only one-third who began to use spoken language progressed to word speech. Because participant and outcome descriptors were often limited, the extent to which word production was communicative and socially directed to others is unknown (Kasari et al., 2014).

The absence of speech or other means of communication with others often can have severe consequences for these individuals and those supporting them. Frequently individuals who do not display an effective form of communication also exhibit multiple behavioral and medical needs. Commonly these individuals carry the most significant emotional and financial burdens for themselves and their caregivers as they often are the most significant safety concerns and are most in need of care throughout their lifetime, with minimal possibility of independence (Tager-Flusberg & Kasari, 2013)

Spontaneous communication is defined as creative, generative, and conventional (Ivey, 2009). Spontaneous communication is also defined as communicative behaviors that occur without prompts, instructions, or other verbal cues (Chiang & Carter, 2008). Using such a conceptualization, individuals diagnosed with ASD are said to lack spontaneity in their interactions as they are observed to rely on prompts (Duffy & Healy, 2011).

Applied Behavioral Analysis Interventions

Autism intervention studies developed from using global outcomes measures, such as IQ scores, to more comprehensive measurements, including expressive and receptive language (Dawson & Osterling, 1997; Howlin et al., 2009). In some cases, studies attempted to measure the change in skills or behaviors targeted explicitly by the interventions (Jocelyn et al., 1998). Furthermore, few studies began including naturalistic communication measures, including but not limited to observing spontaneous communication and language (Aldred et al., 2004). In addition to increasing the face validity of the research, the practice of demonstrating the change in specific behaviors is likely to help pinpoint precisely how an intervention is working (Kazdin & Nock, 2003).

Behavioral interventions are often sorted into two broad categories: focused intervention practices and comprehensive treatment models (CTMs). Focused intervention practices are instructional or therapeutic approaches applied to an individual's goals (e.g., making social initiations with peers, reducing self-injury). This practice is designed to produce outcomes explicitly related to the goal and is implemented over a relatively short period, usually until an individual meets their specific goal. CTMs address broader outcomes (e.g., increases in cognitive abilities, adaptive behavior, and social and communication skills). CTMs consist of many-focused intervention practices organized around a conceptual framework, documented through treatment protocols, and exist over a more extended period (Interagency Autism Coordinating Committee, 2017; Lovass 1987)

Due to the increasing prevalence of ASD, the need for effective, evidence-based interventions has grown exponentially. One intervention strategy proven effective in improving areas of skill deficit commonly affiliated with ASD is applied behavior analysis (ABA) (Virues-Ortega, 2010). ABA, and the interventions developed from its principles, are some of the most often cited evidence-based interventions designed to treat those diagnosed with ASD (Gitimoghaddam et al., 2022). Forty-five years and thousands of research studies validate the efficacy of ABA across the lifespan of the individuals (Handleman & Harris, 2005). ABA is the science of understanding and improvement of human behavior. What sets ABA apart from other similar fields is ABA's focus, goals, and methods (Cooper et al., 2020).

ABA focuses on behaviors of social significance and works to intervene to improve the behaviors under study while demonstrating a connection between the interventions and the behavioral improvements. ABA uses the methods of scientific inquiry to provide a systematic approach to understanding natural phenomena and developing technology for improving behavior. Behavioral analysis is the philosophy of the science of behavior and has three major branches. ABA, a branch of behavioral analysis, can be traced back to the 1950s (Cooper et al., 2020). Baer, Wolf, and Risley (1968) recommended that ABA should be a) applied, b) behavioral, c) analytic, d) technological, e) conceptually systematic, f) effective, and g) capable of appropriately generalized outcomes. Cooper et al., 2020 add the following characteristics to support behavioral analysis as a valuable and essential source of knowledge for achieving improvements a) accountable, b) public, c) doable, d) empowering, and e) optimistic.

ABA emerged from the extensions of operant conditioning and the experimental analysis of behavior to diverse applied settings and populations across the lifespan (Cooper et al., 2020; Kazdin, 2011). ABA intervention techniques used to change behavior draw heavily on operant conditioning. The methodology to evaluate these techniques relies on single-case designs. The single-case design takes the connection between operant conditioning and a methodology of evaluation and extends it past any substantive focus, theoretical views, or discipline. Single-case designs are rooted in specific research areas within psychology. They can be traced to the work of Skinner, a scientist who studied behavior and the antecedent and consequent events that influenced behavior. As early as the 1950s, the experimental analysis of behavior and single-case designs are identified with operant conditioning research (Kazdin, 2011).

Contemporary issues within the treatment and human behavior intervention include accountability in providing services and greater interest in evaluating programs, therapies, and interventions in applied settings. Heightened interest has been taken in identifying treatments and interventions based on strong empirical evidence. Evidence-based interventions (EBIs) are used in various fields committed to drawing on their evidence base, including education and speech and language rehabilitation. Rigorous and well-controlled research is required to establish evidence-based interventions (Kazdin, 2011). Single-case experimental designs were part of early efforts to specify what this research would include (Chambless & Ollendick, 2001). The move to EBIs supports the importance of evidence-based interventions and has been a part of a broader movement for increased accountability in intervention work. The emergence of

EBIs has pushed clinical interventions to be practical in everyday settings, making single-case research especially relevant in applied settings (Kazdin, 2011).

Various interventions reported in the literature from Applied Behavior Analysis (ABA) increased spontaneous communication in individuals diagnosed with ASD. Speech is often targeted using several procedures, including time delay/prompt fading, milieu language teaching (Charlop et al., 1985; Charlop & Trasowech, 1991; Hwang & Hughes, 2000; Kaiser et al., 1992), precision teaching (Kubina et al., 2002), and script fading (Brown et al., 2008; Gallant et al., 2017; Krantz & McClannahan, 1993). Interventions can be peer-mediated or adult-mediated.

Augmentative and Alternative Communication

One approach to providing minimally speaking individuals a means to communicate is to use augmentative and alternative communication (AAC) approaches (McLeod, 2018), most often a picture symbol system (Bondy & Frost, 2002) or speech-generating device (SGD) (Van der Meer & Rispoli, 2010). Although AAC intervention studies demonstrate communication improvements, few demonstrate spoken language changes. For example, the Picture Exchange Communication System (PECS) is a visually based, augmentative communication system in which individuals exchange pictures to communicate with others (Bondy & Frost, 1994b; Kasari et al., 2014).

There is a good reason that previous efforts focused primarily on AAC: speech will likely remain challenging for some individuals with ASD, whereas they may exhibit more immediate communicative success with AAC (White et al., 2021). The central goal of AAC interventions is to improve expressive communication using AAC. However, some research studies reported collateral improvements in speech following AAC

(Brady et al., 2015; Paul, 2008). For example, collateral gains in speech were reported for some students following intervention with PECS (Carr & Felce, 2007; Flippin et al., 2010). In such cases, various augmentative and alternative communication strategies (AACs) may facilitate spontaneous communicative behaviors that differ from vocal speech, including pointing to desired objects or manual signing (Duffy & Healy, 2011).

The systematic review completed by Wendt, O., and Boesch, M. (2010) documents PECS effectiveness for exchange-based outcome variables, but its effects on speech remain unclear. Studies targeting speech in school-age individuals with ASD and minimal expressive vocabularies are challenging to find. For example, Rogers et al. (2006) directly taught participants speech skills using the PROMPT method, but individuals were all below the age of six years. Since many individuals with ASD spend most of their days in educational settings, practical, efficient, and evidence-based classroom intervention tools are vital to addressing the social-communication needs of students (Bellini & Akullian, 2007).

Gordon et al., 2011 found PECS training to not significantly enhance speech development as they did not observe any effect of the intervention on the general use of speech. However, for those individuals who were already using some speech or vocalization, PECS provided a structure for them to use this mode to communicate without prompting (Gordon et al., 2011). Despite claims that PECS can enhance individuals' use of speech, the Howlin et al.'s 2007 study failed to demonstrate any increases in spoken language or scores on the verbal language tests. The individuals studied continued to show significant impairments and abnormalities in communication (Howlin et al., 2007).

Since 2013, the Interagency Autism Coordinating Committee noted a substantial increase in behavioral intervention students and advancements in intervention science. One of the improvements the department noted is related to the diversity of the study participants, as researchers strive to include populations previously excluded or overlooked in ASD research, specifically minimally speaking individuals. Due to the variety of the deficiencies often associated with ASD, various interventions are critical. The Interagency Autism Coordinating Committee describes developing interventions for individuals who are minimally speaking as appearing very challenging. Digital-based technology interventions for individuals with ASD continue to increase accessibility and breadth of use (2017).

Video Modeling

Another research-proven strategy for teaching individuals with ASD is video modeling (Gelbar et al., 2012). Scientific evidence increased regarding the effectiveness of technology-based or technology-enhanced interventions. Technology-based interventions exhibit the great potential to benefit individuals with ASD in many ways, including by helping them improve their social and communication skills and gain greater independence; all benefits can improve individuals' overall quality of life (Interagency Autism Coordinating Committee, 2017).

Technology usage for intervention and instruction is increasing at a breathtaking rate for all students, especially those with ASD (Ran et al., 2021).

An example of this phenomenon is the quick increase of technology in teaching strategies and interventions used to support individuals with ASD in recent years (Odom et al., 2015; Shic & Goodwin, 2015; Valencia et al., 2019). Technology-based

interventions and tools may be particularly well suited to a population that may inherently struggle with face-to-face interactions and often has an innate interest and natural skill set in technology (Kuo et al., 2014; Odom et al., 2015).

Research on video-based intervention found that the concept as an effective option for instructing individuals with disabilities in a range of behaviors considered socially significant (Ayres & Langone, 2005; Bellini & Akullian, 2007; Buggey, 1995, 2007; Delano, 2007; Dowrick, 1999; Hitchcock et al., 2003; McCoy & Hermansen,2007; Mechling, 2005; Rayner et al., 2009 Sturmey, 2003). Among the relevant reviews and studies, the emphasis is related to the applications of these procedures for participants diagnosed with ASD. Video-based intervention is a broad term used to encompass procedures involving presenting video footage as the independent variable for intervention. Thus, video-based intervention includes approaches such as computer-based video instruction, video modeling, video priming, video prompting, and video self-modeling (Rayner et al., 2009).

Among evidence-based practices, video modeling met the National Autism Center (NAC) criteria in 2009 (Acar & Diken, 2012). Video modeling is a frequently investigated intervention in the special education research literature and is identified as an evidence-based intervention. Video modeling is designed as a video-recorded model engaging in a specific series of scripted actions and/or vocalizations. After multiple viewings, the child is directed to engage in scripted behaviors (MacDonald et al., 2015; Mason et al., 2012). This method takes advantage of the effectiveness of modeling and visual strategies for improving skills and using an efficient delivery modality of video playback

with the anticipation that the observer will cognitively internalize and later reproduce the observed behaviors (Bellini & Akullian, 2007).

Digital technology development has made video modeling an effective, practical, and popular option for students with disabilities (Prater et al., 2012; Wilson, 2013). Various formats appear successful for video modeling delivery, including laptops, desktop computers, televisions, smartphones, tablets, and iPods (Gardner & Wolfe, 2013; Mason et al., 2012).

The feasibility of using video modeling increased with the reduced cost and increased efficiency of video technology. Schools are increasingly providing tools such as USB-ready video cameras for staff use. Research shows that the cost of implementing video modeling (training, implementation, and materials) is one-half the cost of the same modeling delivered live (Wilson, 2013). As a cost-effective intervention, a single video can promote multiple target behaviors in a rapid-fire method (Charlop-Christy et al., 2000).

Thought as a beneficial learning tool, video modeling combines observational learning that appears to be a frequent strength of individuals with ASD, who are responsive to visually cued instruction. As well as an empirically supported intervention for individuals with ASD, video modeling interventions facilitate independence, are individualized, provide consistent implementation, and appear cost-effective. A vital asset considering the heterogeneous population of individuals with ASD is the ability to adjust video modeling to meet the individual needs of a student (Bellini & Akullian, 2007; Hume et al., 2009; Kroeger et al., 2007; Mason et al., 2012; Morlock et al., 2015). In a review of video modeling, Acar and Dieken (2012) found it as a best-practice

intervention for teaching various skills and behaviors to individuals with ASD and other intellectual disabilities.

Increased student independence is a benefit of video modeling and appears as one of the few interventions fostering independence for individuals with ASD. Video modeling encourages independence by shifting the intervention stimulus from adult instruction to a format requiring minimal prompting. This intervention allows the modeling itself, rather than the adult, to become the stimulus that evokes the desired response from the student. During the initiation of the intervention, the student may require some support and instruction; however, in time, the video model becomes an independent task initiated by the student (Hume et al., 2009).

By designing and recording for an individual student, video modeling is quickly individualized for students with a broad range of ages, interests, and abilities. Implementing factors are malleable, including the video modeling's setting, content/materials, length, focus, model type, and the number of participants (Hume et al., 2009).

With minimal demands on staff, video modeling allows a student's educational team to consistently teach a target skill throughout the school day. Video modeling provides repeated exposure to the same-modeled behavior within the same context. This repeated exposure makes the stimulus predictable, allowing students to focus on the model's behavior. Such consistency is often vital for students with ASD, who often can become distracted by the live instruction's unpredictable, less consistent, and multimodal nature. As students master the modeled skills, video modeling is

expandable to scaffold the student's skills to handle more complex contexts and behaviors (Wilson, 2013).

Individuals with ASD exhibited a variety of skill areas, including functional, communication, and social skills that are positively affected by video modeling in various settings, including home, clinic, and school (Delano, 2007; Rayner et al., 2009; Shukla-Mehta et al., 2010). Most school-aged children with autism receive most of their ASD-related services through the public education system (Interagency Autism Coordinating Committee, 2017).

Skills gained through video modeling are often generalized and maintained across settings, materials, and people (Delano, 2007; Rayner et al., 2009). Video modeling is a socially valid and noninvasive intervention procedure with a high degree of practicality based on consistency, ease of use, and availability of technology (Delano, 2007). Video modeling works well due to the fascination with screen media common to many individuals with ASD (Mineo et al., 2009). Research shows video modeling as a successful intervention for a wide variety of students, including a variety of disabilities, of a variety of ages, and with a variety of skill areas. Video modeling improves skills in individuals with ASD, including social, communication, adaptive, and play skills (Shukla-Mehta et al., 2010).

Video modeling teaches various functional daily living skills to students with intellectual disabilities and ASD (Gardner & Wolfe, 2013). In young children, general play skills and solitary pretend play skills are positively impacted by video modeling (Acar & Diken, 2012; Dupere et al., 2013; MacDonald et al., 2009). Kroeger et al.

(2007) found initiating and maintaining social interactions to improve with video modeling.

Video modeling is not limited to just populations of children in early childhood programs (Morlock et al., 2015). Several studies demonstrate video modeling as an effective strategy for older children with ASD (Allen et al., 2010; Bellini & Akullian, 2007; Morlock et al., 2015; Peishi & Spillane, 2009). Video modeling is not only a promising intervention strategy for students with ASD but also a practical and efficient tool well suited for the school setting (Cihak et al., 2010; Nikopoulos & Keenan, 2007). Allen et al. (2010) found video modeling helpful in teaching vocational skills. Video modeling also benefits the teaching of social skills (Acar & Diekn, 2012; Gardner & Wolfe, 2013). Video modeling also increases social skills in children and young adolescents with ASD (Bellini & Akullian, 2007; Peishi & Spillane, 2009). Mason et al. (2012) taught college-age students communicative social skills through video modeling.

Studies of video modeling's effectiveness with individuals with ASD span a broad range of ages (i.e., 3-20 years) and settings (i.e., school, clinic, community, and home), with some studies combining video modeling with other strategies such as instructional prompts or tangible reinforces (Bellini & Akullian, 2007; Shukla-Mehta et al., 2010). Video modeling is an intervention strategy that effectively improves the social and communication skills of individuals with ASD. (Acar & Diken, 2012; Bellini & Akullian, 2007; Peishi & Spillane, 2009; Wang et al., 2011). Video modeling improves the recognition of expressive words for students with disabilities (Gilmour, 2015). Another area of social skills successfully taught to children with ASD using video modeling is the ability to name facial expressions (Akmanoglu, 2015). Video modeling is not only a

promising intervention strategy for students with ASD but also a practical and efficient tool well suited to the school setting (Cihak et al., 2010; Nikopoulos & Keenan, 2007).

Research indicates that individuals of all ages with ASD learn best through visual means. Adults with ASD, including Temple Grandin, confirm the use of the visual thinking type through their noted reliance on visually based information (Grandin, 2009). Visually based approaches may support individuals with ASD in overcoming pervasive difficulties. These strategies respond to the stimulus over selectivity by assisting individuals in focusing and maintaining attention to relevant stimuli. They can enhance the individuals' abilities to independently complete unfamiliar or complex directions by condensing the content to only essential information. The permanent nature of visually based strategies allows individuals to review cues, decreasing reliance on teacher prompts and increasing independence. When taught using visually based strategies, many individuals with ASD maintain and generalize newly learned skills (Ganz et al., 2011).

Another explanation for the success of this intervention with individuals with ASD is that video modeling provides a means of instruction that does not require the face-to-face interaction that may appear aversive to individuals with ASD. A review of the existing video modeling literature suggests that various combinations of these factors may increase individuals’ motivation and, thus, their attention to the intervention (Bellini & Akullian, 2007).

Throughout the literature review, various interventions appeared associated with overcoming late speech development. Given the likelihood that more intensive and more focused training may appear more successful, the prognosis for late speech

development in individuals who are nonspeaking or minimally speaking may seem better than historically thought to be the case (Pickett et al., 2009; Tager-Flusberg & Kasari, 2013).

One commercial video modeling product is *GemIIni©.* First sold commercially in 2014, *GemIIni©* is a web-based library of video modeling clips that allow professionals to create customized video playlists. *GemIIni©* is based on ABA principles and using video modeling as its foundation. As of 2020, *GemIIni©* reported a library of 150,000 videos online supporting more than 50,000 families in 37 countries (*GemIIni©*, n.d.).

Considerations

Although video modeling is an effective and efficient instructional technique for many children with ASD, some individuals exhibit difficulties learning with video modeling. When using video modeling, Gardner and Wolfe (2013) stressed the importance of considering the type of model used in the video, whether it is a familiar adult, unfamiliar adult, peer, or self.

The relatively low incidence of individuals with ASD, who are nonspeaking or minimally speaking, provides limited access to a study population. The unique characteristics each person with ASD brings to the learning environment may provide unforeseen results. The importance of empirical investigation of interventions supports the use of research methodology with the ability to accommodate these distinctive research challenges in an applied environment. A single-case research design methodology will allow for the systematic study of the intervention in an applied setting to assess the effectiveness of the intervention, *GemIIni©*, a video modeling-based program with the goal of increasing verbal response production.

Chapter 3

Methodology

Chapter 3 is organized around the methods and procedures that guide this research study. Included are the following sections: the purpose of this study, research questions, and the methods of analysis of the research. The student population, setting, dependent measures, general and intervention procedures, and the methods of analysis are also reviewed in this chapter. Additionally, inter-observer reliability and procedural integrity measures address the reliability of the measurement procedures and the fidelity of the implementation of the intervention procedures, respectively. Finally, consumer satisfaction procedures are described as a measure of social validity. The primary objective of this study is to identify the effectiveness of video modeling on verbal word production.

Research Questions

The research questions explored in this study are derived from a review of the literature on video modeling, significant disabilities, and verbal language development. Specifically, the research questions evaluated are as follows:

1. What effect will the *GemIIni*© video modeling system exhibit on the number of responses exhibited by students who are nonspeaking or minimally speaking produce?
2. To what extent are the definitions of the behavior and measurement system for verbal response production a reliable measurement procedure?

3. To what extent will the procedural integrity measures of *GemIIni*© ensure fidelity of the intervention implementation?
4. To what effect will the GemIIni© video modeling system exhibit on the perceptions of consumer satisfaction of the classroom teaching staff?

Participants

Three middle school-age students who receive their education in a self-contained special education classroom for students identified with intellectual disabilities will participate in this study. All three students are considered eligible individuals based on the Individuals with Disabilities Educational Improvement Act (PL: 108-446). The students are young adults diagnosed with intellectual disabilities and ASD. Within the school setting, all three individuals use a high-tech augmentative and alternative communication application on individual iPads®. The images on the program are color-line drawings or photographs. The individuals produce some verbal sounds as a form of expressive communication, but most communication is limited to echolalia and delayed echolalia. To protect the identity of the study participants, pseudonyms are used. Jane is the first participant, a 13-year-old female; the second participant is Conn, a 12-year-old male; the third participant is Tom, a 12-year-old male.

Human Subjects and Informed Consent

The primary researcher completed the CITI Human Subject's Training on January 20, 2019. Documentation of completion of this training is on file in the Office of Research at the University of South Dakota and is included in Appendix A. Human Subjects approval will also be obtained from the Office of Research at the University of

South Dakota, the school district participating in the research project, and the school principal (see Appendix B).

Parental Consent

Parental consent will be obtained by sending a consent form to the parent(s)/guardian(s). The researcher discussed the nature of the study with the parents over the telephone. Prior to the beginning of data collection and after receiving Human Subjects' approval from the Office of Research at the University of South Dakota, signed parental consent will occur. The form is sent home and returned to the researcher, verifying the parents' consent for their son or daughter to participate in this study (see Appendix C). The informed consent includes information about the study and contact information of the primary researcher, the researcher's advisor, and the research compliance office at the University of South Dakota.

Subject Assent

Due to the severity of their disabilities, the students participating in this study are unable to provide assent. After obtaining parental consent, the researcher will present the study to the participant's Individual Education Plan/Special Education team for comment and review as an alternative to formal participant consent.

Setting

The study was conducted in a classroom for students with intellectual disabilities in a public middle school. The students enrolled in this setting are middle-school-age students working on developing functional skills related to independence in academics,

vocational, domestic, recreation and leisure, communication, and social and community living.

The age range of subjects is from 12-14 years. These students attend school full-time, seven hours daily, Monday through Friday, for 36 weeks each calendar year. The public middle school is in a mid-sized Midwestern town. Based on data from the *Iowa School Performance Profiles,* the total enrollment for the district was 14,238 in 2021. The district reported that 14.1% of its student population is on an Individual Education Plan (IEP) (Iowa School Performance Profiles, 2021).

Many students enrolled in this school reside within one of the three secondary school boundary areas making up this urban community. This study's subjects participate in their educational services within one of two self-contained special education classrooms. The classrooms consist of a certified special education teacher and paraprofessionals. The classrooms are supported by speech and language pathologists, an occupational therapist, and a physical therapist based on student-specific needs.

The self-contained special education classroom has a prescriptive structure as one of its key instructional features. A visual word/picture schedule is displayed on the front dry-erase board to let the students know what activities to expect throughout the day. In conjunction with the large classroom schedule, individual student schedules are provided in the format most accessible to each student. Each student's personal schedule and work system allow them to earn individualized reinforcers for completing

tasks and/or appropriate skills such as effective communication, ignoring distractions occurring in the classroom, or compliance with directives.

The students work individually, in pairs of two or three students to one staff, or in a large group setting throughout the day. The classrooms contain shelves, an *InterWrite*™ board, a desktop computer, and a teacher's desk. The middle school classroom possesses a horseshoe table at the front for instruction and group work and a specified area for teaching leisure skills, including books, puzzles, and games. The classroom structures provide opportunities for students to learn functional academic skills and domestic and pre-vocational tasks. Throughout the school day, students are instructed on these skills through independent work, group lessons, direct instruction, discrete trial training, prompting, repetition, guided to unguided instruction, and other instructional strategies based on applied behavioral analysis. The iPads® in the classrooms are used for augmentative and alternative communication, teaching opportunities, and as reinforcers for appropriate work completion, communication skills, ignoring distractions, and compliance with staff directives.

Research sessions throughout this study were conducted in a partitioned-off space in the back of the classroom, separate from the rest of the classroom. The partitioned-off space allowed for minimized distractions for the subjects. The area consists of a large table and two chairs placed at the table. The work area is cleared of all materials besides the iPad® being used in the study, data collection forms, and a writing utensil. A digitized video recording device is present during each research session.

During the baseline phases of the experiment, the researcher will complete one data collection trial each day. The word list for each day's trial will come from one of three videos' word lists. The researcher will use a deck of playing cards with the face cards removed and the ace representing the number one. The playing cards ace (one), four, and seven will represent video one, labeled "video 1: vocal imitation stage 3 part 2", while the playing cards two, five and eight will represent video two, labeled "video 2: vocal imitation stage 3 part 3" and playing cards three, six and nine will represent video three labeled "video 3: vocal imitation stage 3 part 4." A single suite of the deck of cards is shuffled and cards are selected at random to create the order the three videos' word lists will be presented, allowing for all three videos' words lists to be presented three times.

During the intervention phase of the experiment, the researcher will complete data collection trials after the daily viewing session of the randomly assigned one of three videos. This time the full deck of cards minus the face cards will be used to create the randomized order, ensuring each video is presented twelve times during the intervention phase.

The students view the video modeling video clips on their school iPads® for less than 10 minutes during each viewing. If a student is absent, the primary observer notes this on the fidelity record sheet (Appendix E). Classroom staff members encourage the students to watch the videos by directing them to the iPad® screen. Classroom staff members do not prompt the students to talk during the videos, nor do they reinforce any

of the content during and after the viewings. These procedures related to the viewing of the video clips are outlined in Appendix G.

The video modeling clips are part of a commercial video modeling product known as *GemIIni©.* First sold commercially in 2014, the program stated that as of 2020 it had 150,000 videos online and had supported more than 50,000 families in 37 countries. From the base rate of $98 a month, the company offers bundle discounts for multiple months and financial aid to families. It also offers a seven-day free trial. The *GemIIni© Mobile* companion application is available for *Android™*, *Apple iOS™*, and *Kindle™* platforms. This web-based application allows a user to access the program across electronic devices online as well as offline (*GemIIni©*, n.d.; *GemIIni©* Educational Systems, 2012; *GemIIni©* Support, 2021).

Figure 1

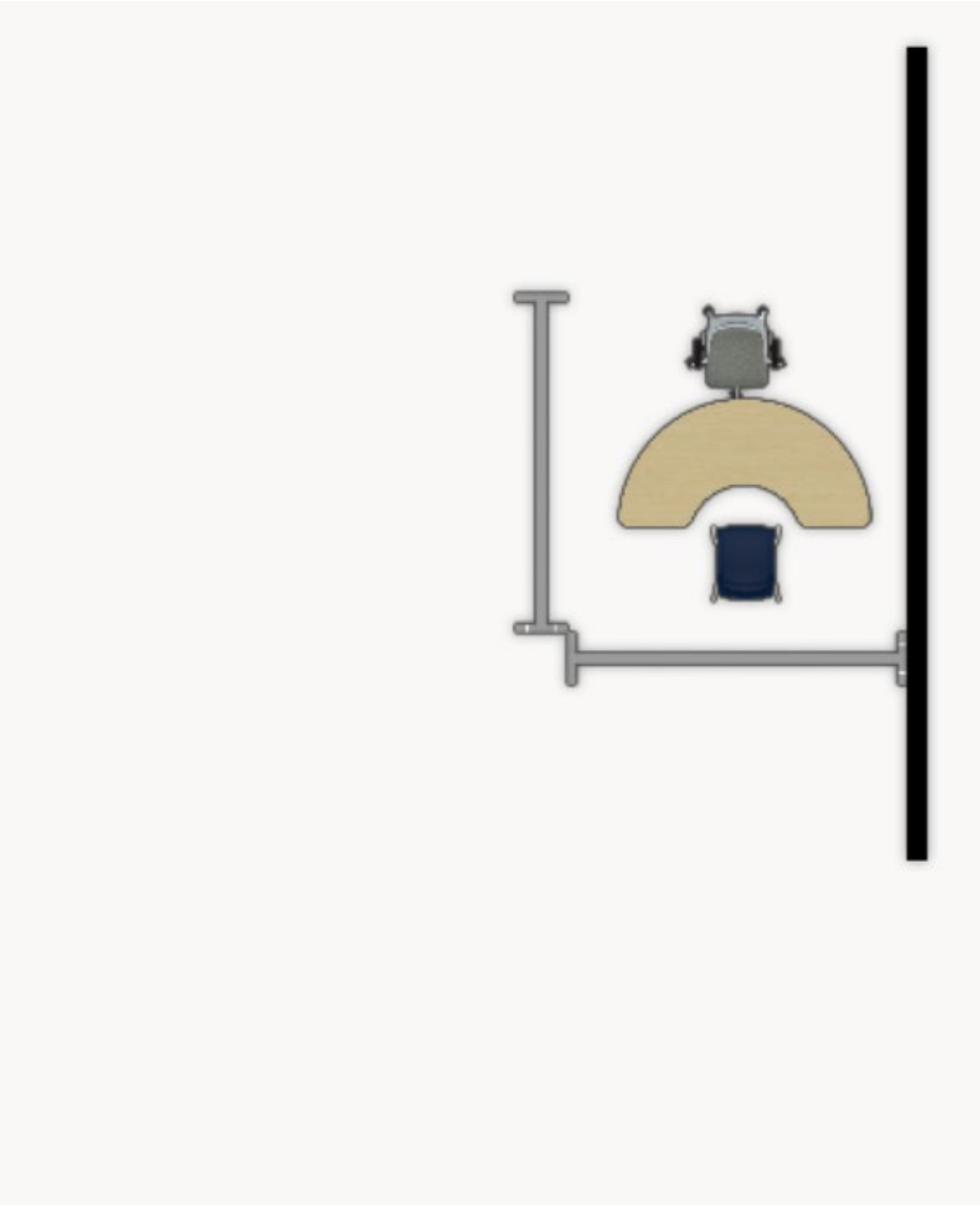


Diagram of the setting of research sessions.

Dependent Variables

The researcher completes data collection trials after each of the daily viewing sessions each day of the data collection window. The researcher sits across the table from the subject; the only items present are the researcher's data collection form and writing utensil. The subject is prompted to imitate one response at a time, in the order listed on the data collection form. The format for this prompt is "(Subject's name) [pause] say (the response)." The researcher allows the subject a 5-second response time following the provided verbal prompt. If the subject said the word correctly and independently within 5 seconds, the researcher records a plus (+) next to the corresponding response on the data collection sheet. If the subject did not respond within 5 seconds or responded incorrectly, the researcher records a minus (-) next to the corresponding response on the data collection sheet (Appendix F). The procedure is repeated for each of the 20 responses from the list presented to the subject in this manner.

The dependent variable is identified as the number of responses produced after the viewing session each day during the respective experimental conditions. Students display response production behavior when they repeat the desired response after the researcher prompts. For example, "(Student's name) [pause] say (the response)." Data analysis in single-case designs uses data collected and presented graphically for analysis (Cooper et al., 2020; Gay et al., 2012).

Students are prompted to imitate one response at a time throughout the study. The format for this prompt is “(Student’s name”) say (the response).” The student is given five seconds of wait time to begin to respond after the researcher initiates the prompt. The researcher will use the second hand of a clock to track the time allowed. A correct response corresponds with the teacher’s-initiated prompt. If a student gives a response that does not correspond with the initiated prompt, it is considered an incorrect response. If a student does not respond or appears to refuse to respond, the response is regarded as an incorrect response. During the intervention phase of the experiment, the researcher completes data collection trials after the daily viewing session of the randomly assigned one of three videos. The researcher will use a deck of playing cards with the face cards removed and the ace representing the number one. The playing cards ace (one), four and seven will represent video one labeled “video 1: vocal imitation stage 3 part 2”, while the playing cards two, five and eight will represent video two labeled “video 2: vocal imitation stage 3 part 3” and playing cards three, six and nine will represent video three labeled “video 3: vocal imitation stage 3 part 4.”

A correct response occurs when the student says the word cued in a manner that is distinguishable to the primary observer and independent observer. The subject does not need to precisely say the correct word if the observer understands the intent of the response corresponding to the original stimuli item. An incorrect response is any response that does not resemble the word cued to a non-familiar listener. An example of a correct response is when the individual says/baɪ/ when prompted, “(Student’s name) say buy.” An example of an incorrect response to the same prompt is when the individual says /dʌ/ (da as in padaka). Verbal praise is given after each correct

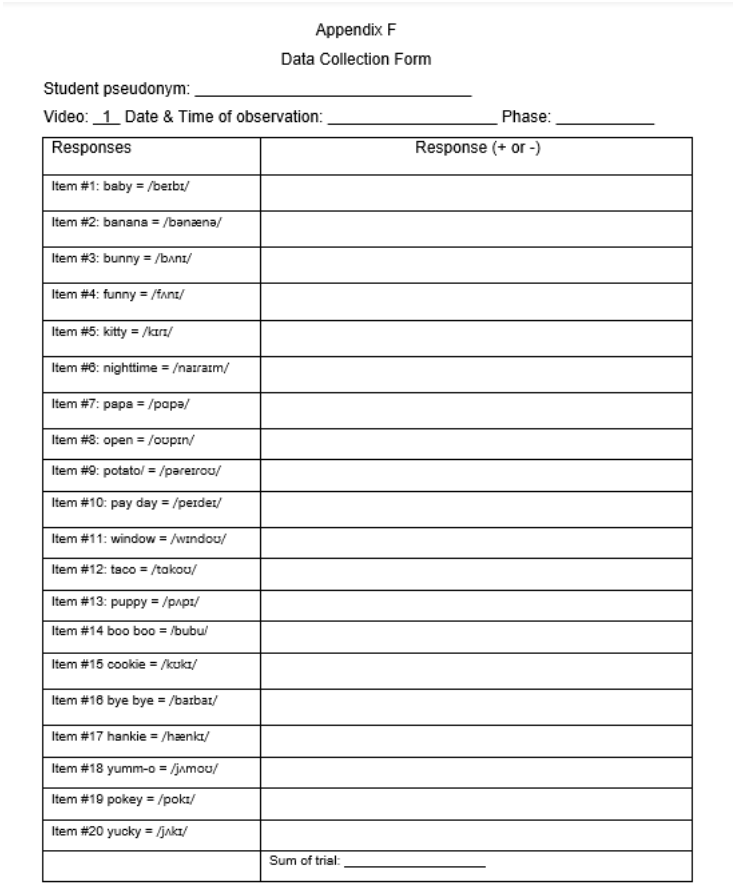
response. Each of the 20 responses from the list is presented to the student in this manner. The term “response” is used rather than a corresponding word, as some responses may appear more than one word in length, while other responses may appear as only one word. Therefore, the term response provides a more accurate description of the response to the stimulus item.

Students are prompted to imitate one response at a time throughout the study. The format for this researcher-given prompt is “(Subject’s name”) [pause] say (the response).” The researcher allowed the subject a 5-second response time following the provided verbal prompt. The researcher will use the second hand of a clock to track the time allowed. If the subject said the word correctly and independently within 5 seconds, the researcher records a plus (+) next to the corresponding response on the data collection sheet (Appendix F). An example would be if the researcher said, “Joe (pause) say baa = /bɑ/,” and within 5 seconds, Joe responded, “baa = /bɑ/”. If the subject did not respond within 5 seconds or responded incorrectly, the researcher records a minus (-) next to the corresponding response on the data collection sheet (Appendix F). An example would be if the researcher said, “Joe (pause) say baa = /bɑ/,” and Joe responded, “moo = /mu/.”

Each of the 20 responses from the list is presented to the subject in this manner. The number of responses produced for any given data point is the sum of the correct responses or (+) signs made for each student out of the 20 responses possible. This data is recorded as a frequency measure related to the 20 items prompted by the researcher. These instructional procedures are continued over several sessions till

steady state responding is established. These procedures are outlined in Appendix J. After the completion of each trial, the data point is recorded in an Excel® spreadsheet under the corresponding subject and date. Figure 2 represents a sample of the data collection form. A copy of the complete data collection tool is provided in Appendix F.

Figure 2



Appendix F

Data Collection Form

Student pseudonym: _____

Video: _1_ Date & Time of observation: _____ Phase: _____

Responses	Response (+ or -)
Item #1: baby = /beɪbɪ/	
Item #2: banana = /bənænə/	
Item #3: bunny = /bʌnɪ/	
Item #4: funny = /fʌnɪ/	
Item #5: kitty = /kɪɾɪ/	
Item #6: nighttime = /naɪɾaɪm/	
Item #7: papa = /pɑpə/	
Item #8: open = /oʊpɪn/	
Item #9: potato/ = /pəteɪroʊ/	
Item #10: pay day = /peɪdeɪ/	
Item #11: window = /wɪndoʊ/	
Item #12: taco = /tɑkoʊ/	
Item #13: puppy = /pʌpɪ/	
Item #14 boo boo = /bubu/	
Item #15 cookie = /kʊkɪ/	
Item #16 bye bye = /baɪbaɪ/	
Item #17 hankie = /hæŋkɪ/	
Item #18 yumm-o = /jʌmoʊ/	
Item #19 pokey = /poʊkɪ/	
Item #20 yucky = /jʌkɪ/	
	Sum of trial: _____

Independent Variable Data Collection Form

The author of this research study conducted the observations for each session of the study across all experimental conditions. While other methods, such as videotaping, are also used in research, in single-case research, humans are most often used to observe behavior and collect data rather than relying on mechanical devices (Kazdin, 2011). In addition, by limiting who conducts the observations, interrater differences are reduced, and the validity of the ratings increases; thus, the reliability of the data increases (Johnston & Pennypacker, 2009).

General and Intervention Procedures

Inter-Observer Reliability

Reliability is a measurement of consistency (Cooper et al., 2020). The closer the values obtained by repeated measurement of the same event are to one another by two independent observers, the greater the reliability. The more responses that the primary and independent observers agree on a given response, across all possible student's correct or incorrect responses, during an observation session, the greater the reliability (Cooper et al., 2020).

The primary observer is the researcher of this study. The primary observer provided training and feedback to the independent observer. The independent observer in this study is a speech and language pathologist. The independent observer is trained on the data collection procedures before implementation. The primary observer trained the independent observer on how to observe and record correct and incorrect responses. Training consisted of explanation, practice of the data collection procedures, using the same data

collection procedures as the primary observer, and understanding the dependent variables. The primary researcher will begin this training by explaining the definition of the dependent variable and discussing how correct responses look different than incorrect responses. The primary researcher provided questions and feedback throughout the training sessions.

Research sessions are digitally recorded. Students are only recorded throughout their participation in this study. This digital recording is fully explained, and parental consent is obtained before data collection begins. Research sessions begin when the student is sitting in the designated location as specified by the researcher. The researcher begins to digitally record the research session immediately prior to presenting the subject with the iPad®, with the video set ready to go and the initial verbal prompt to push play.

Current research recommends that researchers calculate and obtain inter-observer agreement during a minimum of 20% of study sessions across all experimental conditions (Cooper et al., 2020). Twenty-nine percent of this study's sessions were randomly selected for the independent observer to review. Sessions were randomly selected for evaluation of inter-observer agreement by the independent observer, choosing one session per every five sessions per subject. Random selection of sessions for comparison was determined by selecting dates of sessions from a blind selection (i.e., dates of sessions written on the back of cards and chosen without knowledge of what date was written on which card), resulting in a comparison of scores recorded by the primary researcher and independent observer on the chosen date. The

independent observer views and scores the digitized recordings following each selected research session.

These randomly selected sessions evaluated by the independent observer are then compared to the scores recorded by the primary researcher. The primary researcher and the independent observer utilize the same data collection form (Appendix F). The data from the Interval Recording Data Form (Appendix F) is transferred to an Inter-Observer Reliability comparison form (Appendix H) for an evaluation of interval-by-interval comparison of the observational agreement of the primary researcher. Data collection of correct responses between the primary observer and the independent observer are compared. The primary researcher's and the independent observer's score (i.e., + or -) for each response is recorded and compared (Appendix H).

The data from the primary observer's data is recorded in Column A of the Inter-Observer Reliability form. The data from the independent observer are then recorded in Column B of the Inter-Observer Reliability form. After the data is recorded in Column B, the primary researcher compares the response-by-response agreement in Column C of the form. The primary researcher records a "yes" for an individual score if the primary researcher, i.e., Column A, agrees with the observation of the interdependent observer, i.e., Column B, in Column C. The primary researcher records a "no" in the corresponding individual score line in Column C if the score from the primary researcher, i.e., Column A, does not agree with the score of the independent observer in Column B. For example, if the primary observer marks a correct response for an

individual response trial (i.e., marked in Column A), while the independent observer markers an incorrect response for the same corresponding response trial (i.e., Column B), then this difference in response agreement is represented in Column C with a “no” representing a disagreement between the two independent observers. The inter-observer agreement will be calculated by dividing the number of trials in which both observers independently agreed on (number of “yes” in Column C) the scores related to the number of trials completed, multiplied by 100 to represent the interval-by-interval Interobserver Agreement percentage.

Inter-observer agreement (i.e., inter-observer reliability) is calculated as the percentage of agreement in the scoring of each of the responses. Suppose discrepancies greater than 80% are detected when calculating inter-observer agreement following a session. In that case, the researcher will retrain the independent observer on what is defined as a correct versus incorrect response. The primary researcher will sum the percentages of agreement from the observed sessions and divide by the total number of sessions observed by the independent observer to determine the overall rate of agreement.

Experimental Design

The experimental design used in this study uses a single-case alternating treatment design (Johnston & Pennypacker, 2009). The initial baseline phase (A) is standard instruction that does not include any video modeling. This study’s baseline phase is the number of responses the subject produces during standard instruction.

Baseline data collection takes place until steady-state responding is achieved. Data is collected based on repeatability measures using the number of responses to researcher prompts (Cooper et al., 2020). The initial intervention phase (B) introduces the independent variable, the *GemIIni*© video modeling program. Subjects watch the video "Vocal Imitation Stage 3 Part 2, Vocal Imitation Stage 3 Part 3, and Vocal Imitation Stage 3 Part 4" created by *GemIIni*©, which provides commercially available video modeling therapy sessions. These videos were selected as the series focused on early communication skills – imitation – vocal imitation – words, and combinations. The videos are watched on a tablet or computer in the participants' classroom. Data collection procedures continue throughout the intervention procedures.

Single-case research is an appropriate method for this study because of the use of repeated measures to establish a steady-state response with a small sample size across all experimental conditions (Johnston & Pennypacker, 2009). Single-case research is also helpful for studying changes when a treatment is applied to behavior. This type of research traces its roots in clinical settings but is useful in educational settings when studying student behavior (Gay et al., 2012). An alternative treatment design is used to examine whether the intervention (©*GemIIni*) is effective on the number of responses produced. When comparing the effects of more than one treatment, an alternating treatment design provides an experimentally sound and efficient method (Cooper et al., 2020).

Procedures

General Procedures

Subjects for this study participate in their educational services within a self-contained special education classroom. The staff for the classroom consists of a certified special education teacher and two paraprofessionals. The self-contained special education classroom is set up with a prescriptive structure as one of the key instructional features. A large visual word/symbol picture schedule is displayed on the board to let the students know what activities to expect throughout the day. In conjunction with the large classroom schedule, each of the subjects of this study possesses access to their student schedule customized to their individual routines and learning needs. The structure of the classrooms allows for limited disruptions and distractions for the students.

The classroom structure provides opportunities for students to learn functional academic tasks and domestic and vocational skills. Throughout the school day, the students are instructed on these skills through independent work, group lessons, direct instruction, discrete trial training, prompting, repetition, guided-to-unguided instruction, and other instructional strategies based on principles of applied behavior analysis.

Baseline Procedures

During baseline condition, the data collection sessions were recorded via electronic digitized video recordings and occur when the researcher sits across the table from the subject. The researcher provides only a verbal prompt related to a specific stimulus (i.e., the subject's name). The researcher's prompt is intended to

evoke an imitative verbal response from the subject. The subject is prompted to imitate one response at a time, in the order listed on the data collection form (i.e., Appendix F).

Intervention Procedures

The video modeling program used in this study is a product titled *GemIIni*©. The video modeling program combines several evidence-based tactics to present expressive vocabulary words (e.g., saying the word “crab”). The video modeling curriculum presents each label from its library in a predetermined, controlled sequence, including repetition of the item labels by a peer model. Different examples of the label are presented to the subject through a series of pictures and videos on an iPad® and an intentional reduction of extraneous sensory distractions. No music or sound effects are part of the video modeling program.

More specifically, there are five parts to the video modeling filming sequence. All the shots are filmed on a white background to remove all possible distractions and present and provide only the salient information. The first portion of the sequence presents the label in a single slide, like a flash card, next to a quick clip of a peer model articulating the specific label taught. The peer model is shown from the waist up to put the focus model’s mouth. The visual images are presented on a background that is a white background with the label of the response focused on during the stimulus prompt. Second, there is a close-up of the speaker’s mouth, which is a slow close-up that articulates or exaggerates the articulation of the specific label, such as ‘‘c” . . . “r” . . . “a” . . . “b.’’ Third, there is a generalization of the response, which presents photos and videos of many types, sizes, and colors of the object. Fourth, the close-up of the mouth of the speaker slowly hyper-articulating the response is repeated. Last, the first

presentation of the response is repeated with a shot of the peer from the waist up, saying the response next to a picture of the response (Gilmour, 2015).

The data collection sessions were recorded via electronic digitized video recordings and occur when the researcher sits across the table from the subject. The researcher provides only a verbal prompt related to a specific stimulus (i.e., the subject's name). The researcher's prompt is intended to evoke an imitative verbal response from the subject. The subject is prompted to imitate one response at a time, in the order listed on the data collection form (i.e., Appendix F).

Procedural Integrity

Cooper et al. (2007) state that an independent observer measures procedural integrity (treatment integrity). The independent observer watches the primary observer implementing the interventions via digital recording to ensure that the baseline and intervention procedures are implemented as described in the research. Thirty-three percent of the sessions are selected randomly for the independent observer to review. The independent observer selected sessions at random for evaluation of procedural integrity by selecting one session per three sessions per subject across all experimental conditions. Random selection of sessions for evaluation is determined by choosing a date from a blind selection (i.e., dates written on the back of cards and selected without knowledge of what date is written on which card), resulting in the evaluation of procedural integrity measures by the independent observer of the session chosen.

While viewing electronic digital recordings of the selected sessions, the independent observer will utilize the Procedural Integrity Checklist (Appendix I) to ensure all baseline and intervention procedure components are implemented correctly. Procedural integrity checklist steps include the researcher sitting across the table from the subject. The only items present are the researcher's data collection form and writing utensils. The subject is prompted to imitate one response at a time, in the order listed on the data collection form. The format for this prompt is "(Student's name) [pause] say (the response)." The researcher allowed the subject a 5-second response time following the provided verbal directive. If the subject said the word correctly and independently within 5 seconds, the researcher records a plus sign (i.e., +) next to the corresponding response on the data collection sheet. If the subject did not respond within 5 seconds or responded incorrectly, the researcher records a minus sign (i.e., -) next to the corresponding response on the data collection sheet. Each of the 20 responses from the list is presented to the subject in this manner.

If all procedure components are implemented as written, the independent observer will write "yes" in the blank space next to the step (Appendix I). If any components of the step are not implemented as written, the independent observer will write "no" in the blank space next to the step (Appendix I). Procedural integrity will be analyzed by dividing the total number of steps completed as written by the total number of steps (i.e., seven total steps). Procedural integrity was documented as a percentage (i.e., the number of steps implemented correctly divided by the seven total steps).

Social Validity

Social validity is the extent to which target behaviors are appropriate, the intervention procedures are easy to implement, and significant behavioral changes are produced (Cooper et al., 2020). The subjects' parents, teachers, paraprofessional staff, and school administration completed a written survey to determine if the intended behavioral changes occurred during the study related to perceived benefits for the student (see Appendix J). The survey results described customer satisfaction with using the video modeling program *GemIIni*© for expanding expressive communication on the part of participating students.

Data analysis is essential in determining treatment options supported through applied research processes (Kazdin, 2011). However, the viewpoint of key stakeholders, including the classroom staff and the subjects' parents and guardians, provide important information in looking at the overall effectiveness of the study. Social validity for this study involved consumer satisfaction as determined through a survey completed by the stakeholders to determine if the intended behavioral changes occurred during the study were perceived as beneficial for the student. Upon completion of the study, the stakeholders were surveyed using a survey (found in Appendix J) developed by the researcher.

The survey consists of five questions with responses recorded on a Likert scale, which is a form of a behavior checklist used to rate responses (Cooper et al., 2014). The scale ranges from 1 to 5, representing a negative - to neutral - to positive scale. Three range-related guiding words are listed under each question's scale representing

the negative to positive range of responses. The survey asks the stakeholder to reflect on the effectiveness of *GemIIni©,* video modeling as an intervention, student satisfaction, and the importance of expressive communication phrases. The survey is administered after the conclusion of the final intervention data collection period. A paper copy of the survey is provided to classroom staff and sent home with subjects for the parents and guardians to complete.

The data from the surveys are divided into two stakeholder categories – classroom staff and students' parents and guardians. The individual scores for each question are summed and divided by the number of respondents for each category for an average descriptive score related to each survey question. A table (table x) is created in Chapter 4 with the consumer satisfaction survey results. More information on consumer satisfaction is reported in Chapter 4 as part of describing the results of the study.

Data Analysis

The number of expressive responses said is summarized in linear graphs representing each subject's number of responses said. The graphs show changes over time for each subject. Procedural integrity and inter-observer reliability are discussed in tabular and narrative explanations. The social validity results from the written surveys are shown in a table and described in the narrative.

Summary

This chapter discussed the research questions, human subjects, consent, and setting of the study. Measures of inter-observer reliability, procedural integrity, and social validity are described. Finally, the experimental design and general and specific intervention procedures are outlined.

Chapter 4

Results

This chapter presented the study's results examining the verbal response performance of three middle school students with Autism using the *GemIIni*© video modeling system. Data collection sessions were recorded via electronic digitized video recordings. Data on each participant's verbal response acquisition of the targeted skills, delivered through the video modeling instruction, are summarized through graphs, tables, and in a narrative format. Procedural integrity and interobserver reliability results are described. A summary of the responses to the social validity survey was provided in the chapter.

Research Question 1: What effect will the GemIIni© video modeling system exhibit on the number of responses exhibited by students who are nonspeaking or minimally speaking produce?

Results of Video Modeling Instruction

A range of results related to responses exhibited were obtained when examining the data in Table 1, summarizing the overall and participant medians and ranges for each participant during the implementation of the baseline and intervention conditions. For all participants, the baseline video 1 ranged 0-20 correct expressive responses, baseline video 2 ranged 0-20 correct expressive responses related to the prompt given during instruction, and baseline video 3 ranged 0-20 correct expressive responses during this instructional period. All baseline videos ranged 0-20 correct expressive responses. For all participants the median score for baseline video 1 was 12 correct expressive responses, for baseline video 2 the median score was 17 correct

expressive responses, and for baseline video 3 the median score was 12 correct expressive responses. The median score for all three baseline videos was 13 correct expressive responses to the prompt given by the primary researcher.

For all participants during the intervention (*GemIIni*© - self-management), video 1 ranged 0-20 correct expressive responses, video 2 ranged 0-20 correct expressive responses to the prompt given by the primary researcher, and video 3 ranged 0-20 correct expressive responses. All intervention (*GemIIni*© Self-Management) videos ranged 0-20 correct expressive responses. For all participants during the intervention (*GemIIni*© Self-Management), the median score for video 1 was 9.5 correct expressive responses, for video 2 the median score was 19 correct expressive responses, and for video 3 the median score was 20 correct expressive responses. The median score for all three intervention (*GemIIni*© - self-management) videos was 19 correct expressive responses to the prompt given.

The percentage of words mastered was shown in Table 2. Combined, all participants during the intervention (*GemIIni*© - self-management) mastered 65% of the video 1 words, mastered 67% of the video 2 words, and mastered 67% of the video 3 words. On average, the participants averaged 66% of the thirty words presented correctly. Overall, the participants grew 12% in their mastery of video 1 words identified correctly, 7% on video 2 words identified correctly, and 14% on video 3 words identified correctly; for an average of 11% growth in words identified correctly to the prompt given by the primary researcher.

Table 1

Median and Range of Skill Performance Data during Baseline and Intervention Procedures

Student	Mdn/Range	*BV1	*BV2	*BV3	*BVs	**IV1	**IV2	**IV3	**IVs
Jane	Median	19.5	19	19.5	19	19	20	20	20
	Range	15-20	17-20	19-20	15-20	19	19-20	20	19-20
Conn	Median	12	17	9.5	12	20	20	20	20
	Range	9-18	11-19	1-16	1-19	20	20	20	20
Tom	Median	0	0	0	0	0	0	0	0
	Range	0	0	0	0	0	0	0	0
Overall	Median	12	17	12	13	9.5	19	20	19
	Range	0-20	0-20	0-20	0-20	0-20	0-20	0-20	0-20

Baseline video 1-3 i.e., BV1, BV2, and BV3

**All Baseline videos, i.e., BVs*

***Intervention (GemIIni© Self-Management) videos 1-3 i.e., IV1, IV2, and IV3*

All Intervention videos i.e., IVs

Table 2

Percent of Words Mastered during Baseline and Intervention Procedures

Intervention (GemIIni© Self-Management) videos 1-3 i.e., IV1, IV2, and IV3

All Intervention videos i.e., IVs

Student	Percent Mastered	*BV1	*BV2	*BV3	*BVs	**IV1	**IV2	**IV3	**IVs
Jane	% Mastered	98	95	98	97	95	100	100	98
	% Grown					-3	5	2	1
Conn	% Mastered	60	85	60	68	100	100	100	100
	% Grown					40	15	40	32
Tom	% Mastered	0	0	0	0	0	0	0	0
	% Grown					0	0	0	0
Overall	% Mastered	53	60	53	55	65	67	67	66
	% Grown					12	7	14	11

Baseline video 1-3 i.e., BV1, BV2, and BV3

**All Baseline videos, i.e., BVs*

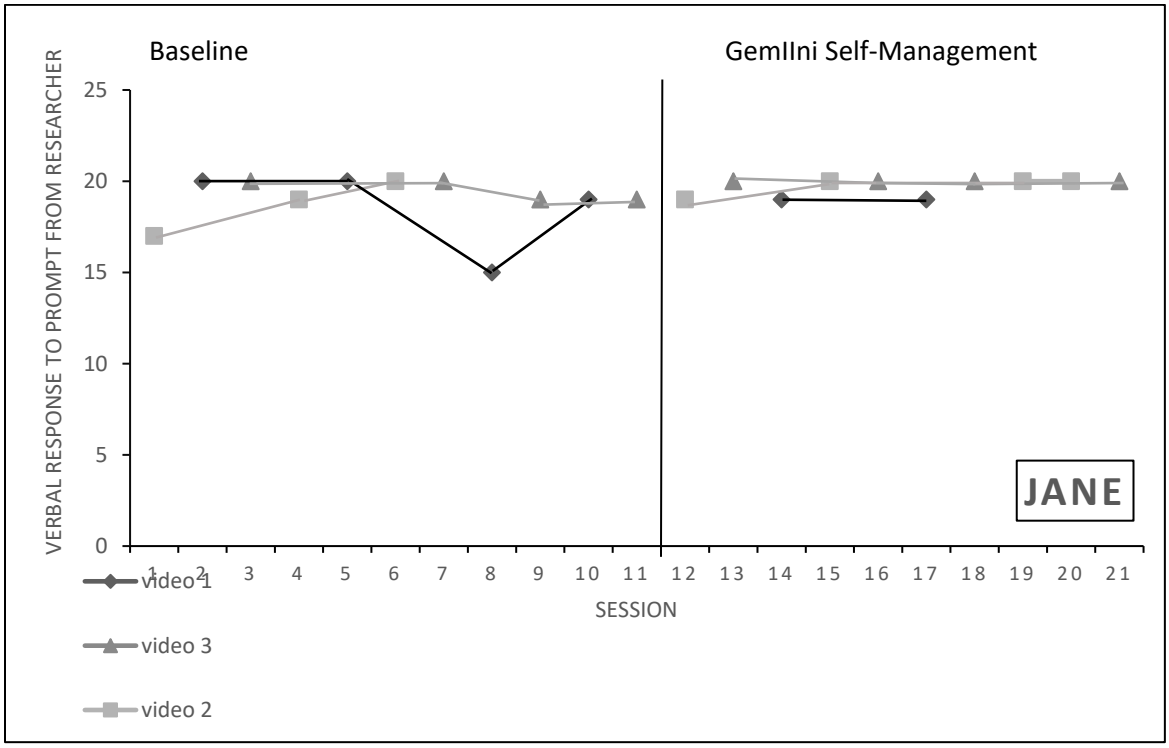
***Intervention (GemIIni© Self-Management) videos 1-3 i.e., IV1, IV2, and IV3*

All Intervention videos i.e., IVs

Jane's median and range of correct responding across Baseline and Intervention Procedures. Figure 3 displayed Jane's number of correct responses regarding each of the three videos during the baseline and *GemIIni*© self-management intervention procedures of the study. During the baseline procedure, Jane exhibited a median response score of 19.5 correct expressive responses, and a range of 15-20 responses during video 1. During video 2, Jane displayed a median score of 19 correct expressive responses, and a range of 17-20 correct expressive responses to the prompt given by the researcher. Jane scored a median of 19.5 correct expressive responses, and a range of 19-20 responses on video 3. Overall, Jane displayed a median score of 19 correct expressive responses, and a range of 15-20 correct expressive responses to the prompt given by the researcher during the baseline.

During the intervention procedure, Jane had a median response score of 19 correct expressive responses during video 1. During video 2, Jane had a median score of 20 and a range of 19-20 responses. Jane displayed a median score of 20 correct expressive responses to the prompt given on video 3. Overall, Jane's median score of 20 and a range of 19-20 correct expressive responses during the intervention. Jane mastered 98% of the 60 words presented. Table 1 displays a complete summary of Jane's median and range of scores across the study. Table 2 displays a complete summary of Jane's percentage of words mastered.

Figure 3

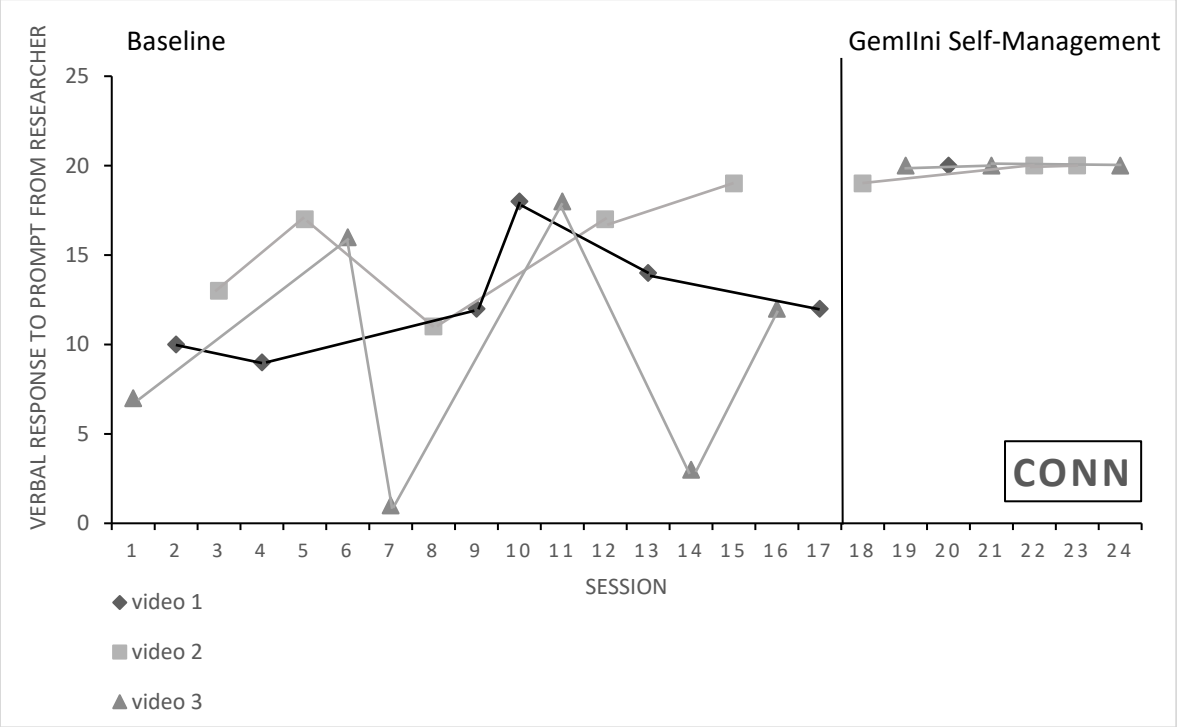


The effectiveness of three different video models (i.e., ♦ - Video 1, ■ - Video 2, & ▲ - Video 3) during baseline and a GemIIni© self-management procedure.

Conn's median and range of correct responding across Baseline and Interventions. Figure 4 displayed Conn's number of correct expressive responses regarding each of the three videos during the baseline and *GemIIni*© self-management intervention procedures of the study. During the baseline procedure, Conn exhibited a median response score of 12 correct expressive responses, and a range of 9-18 correct expressive responses during video 1. During video 2, Conn displayed a median score of 17 correct expressive responses to the prompt given, and a range of 11-19 correct expressive responses. Conn scored a median of 9.5 and a range of 1-16 responses on video 3. Overall, Conn displayed a median score of 12 correct expressive responses, and a range of 1-19 correct expressive responses to the prompt given during the baseline.

During the intervention procedure, Conn exhibited a median response score of 20 correct expressive responses during all three videos individually and during the whole intervention procedure. Conn mastered 100% of the 60 words presented. Table 1 displayed a complete summary of Conn's median and range of scores across the study. Table 2 displayed a complete summary of Conn's percentage of words mastered.

Figure 4



The effectiveness of three different video models (i.e., ♦ - Video 1, ■ - Video 2, & ▲ - Video 3) during baseline and a GemIIni© self-management procedure.

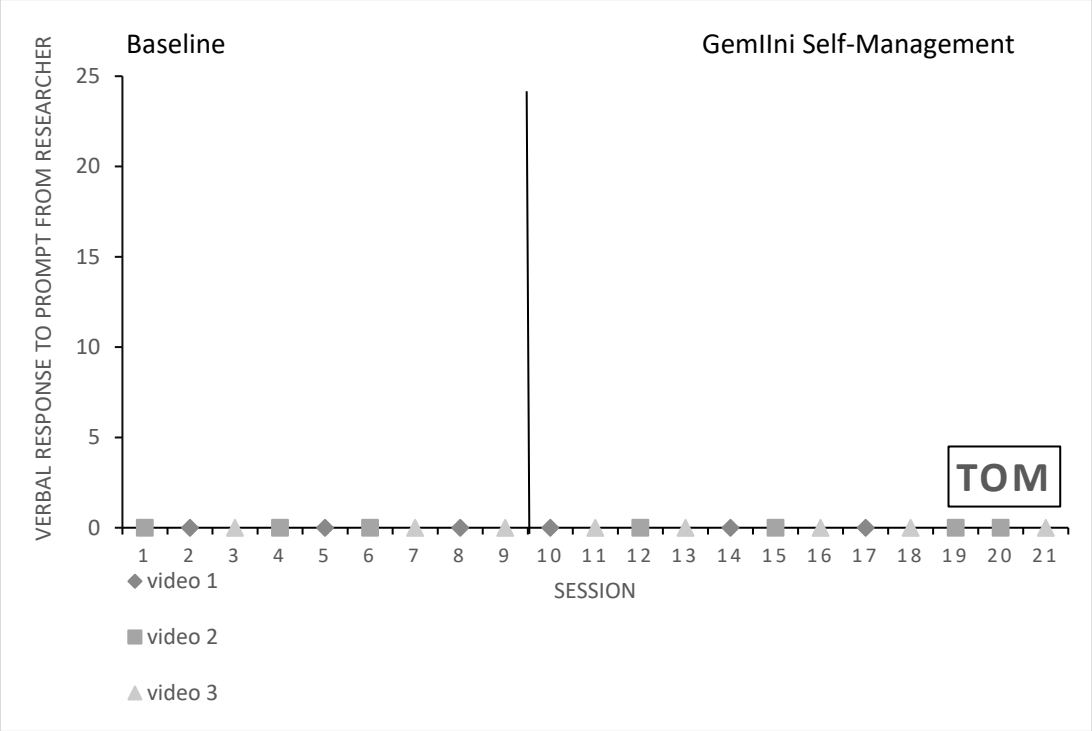
Tom's median and range of correct responses across Baseline and Interventions. Figure 5 displayed Tom's number of correct responses regarding each of the three videos during the baseline and *GemIIni*© self-management intervention procedures during the study. During the baseline procedure, Tom exhibited a median response score of 0 correct expressive responses to the prompt given during all three videos individually and during the entire baseline procedure.

During the intervention procedure, Tom exhibited a median response score of 0 correct expressive responses to the prompt given by the primary researcher during all three videos individually and during the whole intervention procedure. Tom identified 0% of the 60 words presented. Table 1 displayed a complete summary of Tom's median and range of scores across the study. Table 2 displayed a complete summary of Tom's percentage of words mastered.

Overall, the subjects sustained or increased in their word production. Conn did not show applicable differences due to increasing correct expressive responses on all three interventions, though variability did start to decrease during the end of the intervention procedure. Though results did appear to suggest level changes with Jane and Conn, when comparing Jane's data in baseline to intervention, there appears to be a surplus of overlapping data to suggest the existence of functional relationship. Also, Conn's data in baseline is highly variable. His data did stabilize once the self-management intervention was implemented. A level change with these two students did appear and the implementation of the intervention did appear to stabilize the pattern of data for Jane and especially Conn. The overlapping data between baseline and the GemIIni© video self-management system also seem to suggest that there are other

uncontrolled for variables that may affect the participants response patterns. Therefore, it can only be cautiously said that the video self-management system was marginally effective at improving the verbal response production of Jane and Conn.

Figure 5



The effectiveness of three different video models (i.e., ♦ - Video 1, ■ - Video 2, & ▲ - Video 3) during baseline and a GemIIni© self-management procedure.

Research Question 2: To what extent are the behavior and measurement system definitions for verbal response production a reliable measurement procedure?

Interobserver Reliability

Interobserver reliability of behavior related to definitions for verbal response production was completed using an independent observer to verify the individual responses and to compare their scores to that of the primary researcher. An electronic digitized video recording of the data collection sessions were viewed by the independent observer (speech and language pathologist) in 29% of the data collection sessions.

The independent observer drew 19 sessions from 66 cards representing each of the total sessions. The independent observer then watched the specific sessions represented by the cards drawn and scored each response given by the subject during the respective session. The independent observer's scores were compared line by line to the scores recorded by the primary researcher. If the independent observer and primary researcher agreed, a yes was noted on Appendix H. If the independent observer and the primary researcher were not in agreement, a no was recorded. The number of lines of agreement (the positive response agreement) were divided by 20 total responses per session, with the resulting percent appearing as the agreement of interobserver reliability between the primary researcher and the independent observer.

Table 3 represents the median and range percentage agreement of interobserver reliability between the primary researcher and the independent observer.

Overall, the median interobserver reliability was 100% agreement for session, with an 85-100% agreement range.

Table 3

Reliability of Behavior and Measurement System

Session	Interobserver Reliability
1	85
2	100
3	100
4	100
5	100
6	100
7	95
8	100
9	100
10	100
11	100
12	95
13	100
14	100
15	95
16	100
17	95
18	95
19	100
Overall	
Median	100%
Range	85-100%

Reliability of behavior and measurement system

Research Question 3: To what extent will the procedural integrity measures of GemIIni© ensure fidelity of the intervention implementation?

Procedural Integrity

The extent to which the procedural integrity measures of *GemIIni©* were implemented with fidelity during baseline and intervention sessions, as defined in the procedures section of Chapter 3, were verified using Procedural Integrity Checklist (Appendix I). An electronic digitized video recording of the data collection sessions was viewed by the independent observer (doctoral-level speech-language pathologist) during 17% of the digitized sessions. Each of the 7 procedural and scheduling-related items were reviewed and scored using a yes for correctly implemented items and a no for incorrectly implemented items. The total number of correctly implemented items was divided by 7 items on the Procedural Integrity Checklist for an individual session. The items on the Procedural Checklist were then calculated as a whole session percentage score to produce the session's procedural integrity score. These individual session scores were then added together and averaged to determine the overall percentage of procedural integrity. Eleven of the 66 sessions were viewed by the independent observer.

The extent to which the procedural integrity measures of *GemIIni©* were implemented with fidelity during data collection sessions, as defined in the procedures section of Chapter 3, were verified through a review of electronic digitized video recordings of the data collection sessions. Fidelity of intervention implementation was completed by comparing the independent observer’s scores on the Procedural Integrity

Checklist (Appendix I) to verify the correct delivery of the baseline and intervention procedures during the individual data collection sessions.

The range of scores for the sessions reviewed was 58-100%, with the researcher not allowing the full 5-second response time and observer not seeing the table on the electronic recording of the select session as the main areas of concern. Missed steps in the implementation list were marked with an “x” representing incorrect or no implementation of the stated procedures in a given session and experimental condition on the Procedural Integrity Form (Appendix I). The total number of correctly delivered steps was divided by the total number of steps (i.e., 7 steps), to calculate a percentage of correct implementation of the stated procedures per session when compared to the Procedural Integrity Checklist. The mean of the procedural fidelity scores was 86 and the range of scores was 58-100. Table 4 presented the overall sessions as a summative measure of the percentage of procedural integrity across all sessions and all experimental conditions observed by the independent observer.

When the procedural integrity percentage fell below 80%, reflection and retraining of the primary researcher should have been conducted. It would have benefited the primary researcher to have a designated photographer responsible for operating the digital recording device to ensure the table and data collection sheet could be seen within the frame of the video. The criteria of 80% procedural integrity is necessary to assure correct implementation of the experimental procedures as stated for baseline and intervention conditions of the study (Cooper et al., 2020).

Table 4

Procedural Integrity of Implementation

Procedural Integrity of Implementation	
Session	Procedural Integrity
Jane 10/17	86*
Tom 10/18	86
Tom 10/20	100
Jane 10/20	86*
Tom 10/31	72*
Jane 11/10	72*
Tom 11/13	58*
Tom 11/14	86
Tom 11/20	86
Conn 11/27	72*
Conn 11/28	72*
Overall	
Median	86
Range	58*-100

*Scores may appear lower due to the observer not being able to see the table on the electronic recording of the select sessions.

Research Question 4: To what effect will the GemIIni© video modeling system exhibit on the perceptions of consumer satisfaction of the classroom teaching staff?

Social Validity Measures

At the conclusion of the data collection the staff of the classroom where the research was conducted, completed a survey. Participation in the survey was voluntary and anonymous. The survey (Appendix J) consisted of five questions related to the perception of the classroom staff on the use and effectiveness of the *GemIIni*© video modeling system as an intervention. Respondents completed the paper survey to establish perceptions related to social validity. Respondents selected from a 5-point Likert Scale with scoring options as follows: *(1) strongly disagree, (2) disagree, (3) neutral, (4) agree, or (5) strongly agree.*

Question #1. GemIIni© video modeling system is effective in teaching your student(s) to produce responses.

Results of the survey (see Figure 6) indicated an agreement in their perceptions that the *GemIIni*© video modeling system was an effective use of time, with an overall satisfaction rating of 4.7 among the three respondents. Scores ranged from three to five, with a median score of five and overall satisfaction score of 4.7. Respondents indicated agreement that *GemIIni*© video modeling system appeared effective in teaching student(s) to produce responses.

Question #2. Implementing the video modeling intervention and data collection procedures were feasible. The classroom teaching staff strongly agreed that implementing the video modeling intervention and data collection procedures appeared feasible by providing a unanimous 5.0 satisfaction rating.

Question #3. My students enjoyed learning by watching the video clips and giving the responses. The respondents agreed that student(s) appeared to enjoy learning by watching the video clips and giving the responses. Scores ranged from three to five, with a median satisfaction score of 4.0.

Students were not surveyed due to their limitations in accurate responding and limited understanding of the Likert scoring scale due to their intellectual disabilities. The primary researcher observed one of the students enthusiastically repeating the positive praise comments from the video clips and spontaneously announcing “good job” when the clip ended. The primary researcher cautiously inferred satisfaction with the intervention system from student’s comments such as this example.

Question #4. Expressive communication phrases are a functional skill for students to learn. Expressive communication phrases were viewed as a functional skill for student(s) to learn. Respondent scores were a unanimous 5.0 related to their satisfaction rating. Respondents unanimously exhibited an overall positive opinion of the use of video modeling intervention.

Question# 5) Your overall opinions of using a video modeling intervention. The perceptions of classroom teaching staff indicated agreement that using video modeling to teach the engagement of responses using the *GemIIni*© self-

management intervention appeared effective, enjoyable for students, and feasible for the classroom staff.

Table 5: Mean Values of Social Validity Survey Results

Question	Respondent #1	#2	#3	Overall
GemIIni© video modeling system is effective in teaching your student(s) to produce responses?	4	5	5	4.7
Implementing the video modeling intervention and data collection procedures were feasible.	5	5	5	5
My students enjoyed learning by watching the video clips and giving the responses.	4	5	3	4
Expressive communication phrases are a functional skill for students to learn.	5	5	5	5
Your overall opinions of using a video modeling intervention.	5	5	5	5
Overall Satisfaction	4.6	5	4.6	4.74

Note: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, or (5) strongly agree.

Summary

This chapter reviewed the study's results examining the effectiveness of a commercial video modeling program, *GemIIni©*, on the number of correct expressive responses produced by students with autism spectrum disorder who are nonspeaking or minimally speaking. The results of each participant were summarized using tables, graphs, and narrative descriptions. Procedural integrity, interobserver reliability, and social validity measures were also contained in this chapter. Chapter 5 provides an overall summary of results, discusses the relationship to previous research, explains the results in relationship to the research questions, reviews limitations/de-limitations, and provides suggestions and implications for future research.

Chapter 5

Discussion

Organization and Discussion

The current study evaluated the effectiveness of a video modeling system on the verbal response performance of three middle school students with ASD. This chapter reviews the results of the study in relation to the research questions. Additionally, this chapter examines the relationship to previous research, discusses the results in relationship to the to the research questions, reviews limitations/de-limitations, implications for future practice for future research, and provides a concluding summary.

Overall Summary of Results

The current study examined four research questions: (1) what effect will the *GemIIni*© video modeling system exhibit on the number of responses exhibited by students who were nonspeaking or minimally speaking produce, (2) to what extent were the behavior and measurement system definitions for verbal response production a reliable measurement procedure, (3) to what extent did the procedural integrity measures of *GemIIni*© ensure fidelity of the intervention implementation, and (4) to what effect did the *GemIIni*© video modeling system exhibit on the perceptions of consumer satisfaction of the classroom teaching staff. Results of this study supported the following conclusions: (1) the video modeling product *GemIIni*© exhibited mixed results related to the number of responses exhibited by students who are nonspeaking or minimally speaking, (2) the measurement procedures definitions were a reliable measurement procedure, (3) evaluation of the implementation of the intervention procedures ensured high fidelity of procedural integrity related to the implementation of the intervention

procedures, and (4) the use of video modeling instruction demonstrated high consumer satisfaction amongst special education classroom staff.

Relationship to Previous Research

The current study exhibits both similarities and differences from previous research and expands upon the literature base regarding the use of video modeling as an intervention to teach verbal responses to students with ASD who were nonspeaking or minimally speaking. Video modeling was used to improve a range of skills in individuals with ASD, including social, communication, adaptive, and play skills (Shukla-Mehta et al., 2010). Studies of video modeling's effectiveness with individuals with ASD spanned a broad range of ages (i.e., 3-20 years) and settings (i.e., school, clinic, community, and home), with some studies combining video modeling with other strategies such as instructional prompts or tangible reinforcers (Bellini & Akullian, 2007; Shukla-Mehta et al., 2010). The research by MacDonald et al. (2015) supported the claims of gains on specifically targeted skill acquisition using video modeling. Bellini and Akullian (2007) conducted a meta-analysis of video modeling interventions for individuals with ASD and found that video modeling interventions met criteria for being an evidence-based practice. Through more than 3 decades of study, video modeling has demonstrated to be an empirically supported intervention for individuals with ASD (Bellini & Akullian, 2007; Hitchcock et al., 2003).

Additionally, previous research supported the behavior definitions and measurement systems for verbal response production a reliable measurement procedure (Gilmour, 2015; Morlock et al., 2015). Gilmour (2015) found the use of

preselected expressive word targets, with a specific evaluation criterion, as an effective way to improve expressive language.

The study appears as one of the only studies done on this commercially available self-management system outside of the researchers who published and marketed the system. Researchers who publish and market a commercially available system possess an internal bias related to their research because they want individuals or school districts to buy into their system. This internal bias could very well skew the results, intentionally or unintentionally, as a means of marketing their system to the public. Therefore, internal research may appear as a good start to the evaluation process; however, it needs to be fully understood that the objectivity of the research may not appear as sound as due to potential internal biases of the researcher to market and sell their intervention system. This point is especially important if as a profession there is an expectation of practitioners to adopt and use evidence-based intervention approaches with students with disabilities.

Researchers demonstrated that the procedural integrity measures of *GemIIni*© ensured fidelity of the intervention implementation (Gilmour, 2015; Morlock et al., 2015; Wisconsin Department of Health Services, 2015). Gilmour (2015) noted significantly more expressive novel words emitted by the subjects after exposure to the discrete video modeling program *GemIIni*© when compared to the number of expressive novel words students emitted after exposure to a standard video modeling program. The Wisconsin Department of Health Services (2015) found *GemIIni*© as an instructional strategy that exhibited a lengthy and successful history in the research literature.

Researchers demonstrated that the GemIIni© video modeling system exhibits positive consumer satisfaction perceptions from the classroom teaching staff (Gilmour, 2015; Morlock et al., 2015). Morlock et al. (2015) found that all instructors deemed video modeling acceptable, while Gilmour (2015) saw a majority of teachers commenting on the improvements observed in their students.

The importance of this research study is related to this specific population of students with disabilities. This overarching population of students, i.e., those with severe or multiple disabilities, is often seen as “invisible” to the general public. Part of the reason for the limited amount of research on this population relates to the low percentage of individuals with severe disabilities in public schools, as well as the lack of inclusive yet functional educational programs for these students in general education settings. Daily practice concerns only exacerbate the problem, leading to the apparent “invisibility” of these students within the general population, as well as in the research base and professional literature.

Minimal attention appeared in the literature related to students with ASD who were above five years of age (Pickett et al., 2009). Many individuals who acquired spoken language did so between 5 and 7 years of age. These individuals often received behavioral interventions targeting the production of sounds and words and learned to produce single words to request needs and wants. Only one-third of those who began to use spoken language progressed to expressive spoken speech at the phrase length level (Kasari et al., 2014). Many high-quality and adequate-quality studies predominantly focused on the population who were five years of age or younger.

Since research focused on toddlers with ASD or higher functioning individuals with ASD; however, relatively little is known about language abilities and communication in children with ASD and intellectual disabilities (Boucher et al., 2007; Tager-Flusberg et al., 2005). The body of research focused on students who exhibited ASD and nonspeaking or minimally speaking did not appear well represented in the research literature. Minimally speaking individuals who displayed characteristics of ASD were often assumed as profoundly intellectually impaired and excluded from analyses due to challenges completing standardized testing protocols (Bal et al., 2016). Studies provided evidence that children with ASD who appeared minimally verbal can make gains in spoken language through targeted interventions (Shire et al., 2015).

Relatively few studies were conducted evaluating the effectiveness of discrete video modeling delivered to teach expressive word production (Gilmour, 2015). The current study expands the limited field of research for students who display the characteristics of ASD and appeared as nonspeaking or minimally speaking, with the use of applied behavioral analysis instruction delivered through video modeling to teach verbal response production skills.

Prior research focused on subjects five years of age and younger, and subjects who were verbal (Boucher et al., 2007; Goods et al., 2013; Rogers et al., 2012; Tager-Flusberg et al., 2005; Tager-Flusberg & Kasari 2013; Vismara et al., 2009). The limitations in previous studies were indicative of factors such as concurrent learning, measurement tool and schedules of reinforcement, lack of a control group, the setting, small samples sizes, and the short duration of intervention.

Previous research conducted by Gilmour suggested that the *GemIIni*© video modeling system was an effective training method to teach verbal response production skills to students who were nonspeaking or minimally speaking (2015). The current study focused on the effectiveness of the commercial product *GemIIni*© delivered through video modeling to teach verbal response production skills.

Research Questions

Results of Question 1: What effect did the GemIIni© video modeling system exhibit on the number of responses exhibited by students who were nonspeaking or minimally speaking produce?

The results of this study indicated that the GemIIni© video modeling system was effective at increasing the number of verbal responses produced by two of the three students who were nonspeaking or minimally speaking (See Table 1). Jane's overall median score improved by one expressive verbal response. Furthermore, Jane's range variability improved from a baseline range of 15-20 expressive verbal responses to an intervention range of 19-20 verbal responses. Conn's overall median score improved by eight expressive verbal responses. Conn's range of variability was transformed from 1-19 to 20 verbal responses. Conn mastered 100% of the responses taught and improved by 32%. While Tom did not display an increase in expressive verbal responses, GemIIni© did not appear to exhibit a negative effect on his learning. The lack of growth Tom displayed could be attributed to his communication abilities, the characteristics and manifestation of his disabling condition, his possible lack of necessary prerequisite behaviors to successfully engage in the video self-management intervention, as well as other potential variables that might relate to the appropriateness

of his inclusion in this study at this time. On average, the subjects of this study mastered 66% of expressive words presented, while Gilmour (2015) saw individuals with autism master 41.5% of expressive novel words presented.

Long-term maintenance of skills and generalization outside the measurement format was not addressed. This research appeared consistent with the results from previous research in the area of discrete video modeling. This study builds upon the limited field of research supporting the use of discrete video modeling instruction with students with Autism who appear nonspeaking or minimally speaking.

Results of Question 2: To what extent were the behavior and measurement system definitions for verbal response production a reliable measurement procedure?

The results of this study indicated the behavioral definitions and measurement system for verbal response production procedures were a reliable data collection procedure (See Table 3). Of the 380 verbal production responses monitored with the interobserver reliability procedures, only 8 phrases were found to appear in disagreement between the two observers, accounting for 2% of the phrases monitored. Overall, the study indicated an interobserver reliability score of 100% and a range agreement scores of 85-100%. Gilmour (2015) reported an interobserver agreement of 96.5%.

Results of Question 3: To what extent did the procedural integrity measures of GemIIni© ensure fidelity of the intervention implementation?

This study examined the procedural integrity related to the correct implementation of the discrete video modeling program *GemIIni©.* Results ranged from 58-100% across sessions, with a median procedural integrity score of 86%. Overall, the discrete video modeling delivery of the *GemIIni©* program exhibited a lower procedural integrity than Gilmour (2015), which saw 100% procedural fidelity. The current study's procedural integrity scores were impacted by technical problems with the digitized electronic recording hardware (i.e., recording device). Specifically the data recording sheet not being within the frame of the recording.

Results of Question 4: What effect did the GemIIni© video modeling system exhibit on the perceptions of consumer satisfaction of the classroom teaching staff?

The study followed up with a survey completed by three classroom staff who worked with the students selected for participation in the study. Participation in the survey was voluntary and anonymous. Results of the survey indicated all participants agreed or strongly agreed related to the effectiveness of *GemIIni©* as a teaching strategy to teach students to produce expressive verbal responses. These findings align with a previous study focusing on video modeling and word identification in adolescents with ASD (Morlock et al., 2015). Positive feedback was also gathered in a study comparing two video modeling programs, one of which was *GemIIni©* (Gilmour, 2015).

Limitations/Delimitations

The potential limitations/delimitations of the current study were as follows: (a) education placement of participants, (b) nature of the disability, (c) one-on-one ratio, (d) other intervention services, (e) length of intervention, (f) curriculum development, and (g) other issues.

Educational placement of participants. Participants in this study received special education services within a self-contained classroom for students with disabilities. Students were provided significant modifications in comparison to the traditional grade-level curriculum based on their individual learning needs. The highly specialized and individualized nature of the classroom may present an impact on the acquisition of skills and the future generalizations of the skills to less specialized environments.

Nature of the disability. Students with ASD demonstrated a variety of skill profiles. There were no two individuals whose disability manifests itself in the exact same manner. Each individual exhibited characteristics representative of a variety of factors. The students selected for this study demonstrated intellectual disabilities in the severe and profound range that were comorbid with other disabilities and disorders. The students each presented with different skills and abilities.

One-on-one instruction. Participants in the study were provided one-on-one instruction throughout the procedures of the study. The teacher-to-student ratio may impact the generalization of skills to other settings that exhibit a higher teacher-to-student ratio. These implementation procedures may exhibit an impact on the

generalization and maintenance of skills. The practicality of one-on-one instruction may not appear present in other education settings.

Other intervention services. The participants in the study received additional intervention services such as speech therapy which may potentially impact the student's performance from day to day in school. The specific goals addressed during these services may inadvertently target instruction related to skills addressed in the verbal response instruction through the video modeling intervention.

Students received ongoing informal instruction in a variety of skills throughout their school experiences. The potential exposure to previous or ongoing instruction may influence the outcome of the verbal response instruction. The three sets of 20 phrases used during the intervention were common phrases used in everyday instruction and interactions.

The potential occurrence or effects of any additional instruction from outside the intervention and the impact on the results of the study was unknown. However, the results seen from the implementation of the video modeling delivered verbal response instruction was likely due to the repeated measures of performance collected across all participants and skills and not the result of other factors.

Length of intervention. The population selected for participation in the current study displays a history of slower-than-average progress, requiring an extended period to learn a new skill. The three participants participated in the video modeling instruction intervention for 10 minutes a day, five days a week, over a six-week period, depending on the availability of the student. Due to the time frames of the study, it is unclear if the length of time impacted the outcome. Continuing the intervention for additional time may

contribute to more significant progress in the desired verbal production skills. Expanding the length of the study would have allowed for an investigation into the generalization and maintenance of the effects of the self-management system.

Curriculum development. One limitation is the lack of information on the backgrounds of the developers of the *GemIIni©* video modeling system. The lack of information related to the development of the commercially available *GemIIni©* video modeling system did not provide information on whether the intervention system possessed adequate training and background in curriculum development, intervention implementation and evaluation, and disability knowledge related to the initial development, research, and dissemination of this intervention system. Limited empirical evidence on a product that boasts it has been available commercially for a decade is concerning (*GemIIni©,* n.d.).

Additional issues. Limited available subjects for subject selection led the researcher to include a subject (Tom) who, due to the current communication abilities he possessed, the characteristics and manifestation of his disabling condition, his possible lack of necessary prerequisite behaviors to engage in the video self-management intervention successfully, and other potential variables, that might relate to the appropriateness of his inclusion in this study at this time.

The classroom selected for this study served students with multiple disabilities including ASD, Rett's Syndrome, intellectual disability, and other health impairments. Coexisting with these areas of disability was the incidence of maladaptive behavior in the form of physical aggression towards staff and peers, self-injurious behavior, property destruction, distractibility, and inappropriate vocalization in the form of

screaming or verbal aggression. The concerns associated with student demonstration of maladaptive behavior and distractibility impacted the primary researcher's ability to ensure students were 100% focused and calm when implementing the intervention and data collection. All three subjects were under doctor's care resulting in daily medication that was administered by parents. Consistency in the administration of said medications was outside of the researcher's control and knowledge.

Researchers must consider the potential impact that oversaturation imposed on the results of the study. Oversaturation posed a threat to external validity because it made it difficult to definitively determine if the study's results, or the lack thereof, were due to the intervention or if the intervention was overused. Oversaturation may result in an inadvertent impact on the study as a whole, as well as related production of specific words on the word list. Another limitation of the study initially was the impact of the COVID-19 pandemic and the unknowns of in-person attendance of subjects.

Recommendations

Recommendations for practice. Use of the video modeling system *GemIIni*© was minimally effective in teaching verbal response production to students with ASD who were nonspeaking or minimally speaking. The behavioral definitions and measurement system for verbal response production appeared as a reliable measurement procedure. The procedural integrity measures of *GemIIni*© ensured fidelity of the intervention implementation. The classroom teaching staff exhibited high satisfaction with the *GemIIni*© program. Incorporating the use of the video modeling program *GemIIni*© provided students with ASD, who appeared nonspeaking or minimally speaking, a way to gain verbal response production skills.

The *GemIIni©* program was found to be easy to use, with limited training needed for classroom staff. The application-based program lends itself to general technology skills and was quickly mastered by paraprofessional staff in the classroom environment. The limited to no technology disruptions was ideal for the population of subjects being utilizing the intervention. The researcher observed multiple instances of the subjects attempting to interact with the simple video interface.

Subject selection considerations should include current communication abilities the subject possesses, necessary prerequisite behaviors to successfully engage in the video self-management intervention, and other potential variables that might relate to the appropriateness of utilizing the intervention with the subject.

Potential positive implications for future practice using video modeling for verbal response production occurred across several different levels of academic areas within special education. These levels included benefits to the individual student, educators, classroom, school, and home. At the student level, additional practice and opportunity through video modeling instruction exist for verbal response production skills within a motivating delivery format. Educators were provided an additional evidence-based strategy to implement with their students in schools and within various distance learning formats.

The ability to extend additional work opportunities within the classroom allows for decreased downtime and potential increased verbal response production skill development. At the school level, increased verbal response production skill development with students with ASD, who appeared nonspeaking or minimally speaking, may assist in potentially decreasing behavioral concerns as it increases

opportunities to communicate in the student's special education program and in all aspects of the student's life. The current study expanded upon the previous research examining the use of video modeling to teach skills to individuals with ASD. Given the limited external research on this commercial product, the need for future research addressing issues of generalization and maintenance would be helpful.

Recommendations for Further Study.

Future study may allow for the opportunity for future research with students using discrimination training both individually and in group settings. Reviews of research led to effective practices with clear evidence of positive effects on individuals with autism spectrum disorder (University of North Carolina at Chapel Hill et al., 2020). Strategies embedded within applied behavior analysis such as focused intervention practices were designed to address a single skill or goal of a learner with autism spectrum disorder (Odom et al., 2010). These instructional practices provide a basis for intervention in special education settings to address students with disabilities through comprehensive learning programs (Wong et al., 2015, p. 1957). These types of interventions require specialized training and were often implemented during in-person instruction. Limited research was found to support the use of video modeling instruction specifically for individuals with ASD who were nonspeaking or minimally speaking. Future research appears needed to determine the efficacy of teaching strategies delivered in formats different than the traditional classroom mode of instruction, especially within the population of students on the autism spectrum disorder who appeared as nonspeaking or minimally speaking.

This study focused solely on the effectiveness of the commercial video modeling system *GemIIni*© to increase the number of verbal responses exhibited by students who were nonspeaking or minimally speaking. Given the limited external research on this commercial product, future research would address issues of generalization and maintenance in future research. Future research warrants examination of the following factors: (1) generalization of verbal response skills developed through video modeling instruction; (2) efficiency of video modeling instruction to increase verbal response skill production in comparison to traditional in-person delivery of skill instruction; and (3) investigation into how *GemIIni*© video modeling system was considered as acceptable across disciplines. The user-friendly nature of the *GemIIni*© program lends itself to use across a variety of educational disciplines. There also appeared a need for future collaboration with professionals from other disciplines to bridge the gap between research and practice.

Generalizing skills to naturally occurring environments was considered fundamental in developing skills for all students, especially those with ASD. While not explicitly addressed as a formal component of the study, anecdotal reports from staff and family members suggested the appearance of generalization of acquired skills attained from the video modeling instruction. During the study, Jane and Conn appeared to marginally improve in overall verbal speech. Tom cautiously displayed growth in verbalization of sounds and vocal play.

The current study focused on the effectiveness of the video modeling program *GemIIni*© to increase the number of verbal responses exhibited by students who were nonspeaking or minimally speaking. Future research needs to examine the long-term

effects of using video modeling instruction. Specifically, how long the gains were maintained and if gains transferred to new environments, classrooms, or teachers after acquiring skills through video modeling instruction. Examining these effects allows practitioners to make evidence-based decisions on implementing video modeling instruction.

It can be hypothesized the use, practicality, and adoption of this self-management system or other similar systems, especially when working with populations of students with severe intellectual deficits, autism spectrum disorders, or individuals that do not use vocal-verbal speech, or only use limited vocal-verbal speech to communicate.

Video modeling instruction was used widely within the field of special education (Bellini & Akullian, 2007; Hitchcock et al., 2003; MacDonald et al., 2015; Wilson, 2013) Limited research exists on this type of instruction with students who exhibit characteristics of ASD and appeared nonspeaking or minimally speaking. This void in the research limits educators' ability to implement highly motivating formats of evidence-based instruction. Future research should expand the current study across other academic learning skills with students with ASD who were nonspeaking or minimally speaking. Further investigation within this specific population provides educators with information to make evidence-based decisions on the implementation of video modeling instruction.

Conclusions

The current study examined the effectiveness of the video modeling product *GemIIni*© on verbal response production of individuals with ASD who appeared nonspeaking or minimally speaking. A multiple baseline across three subjects who received their educational services within a self-contained classroom setting was used to analyze the data.

The results suggested some improved performance by 2 out of the 3 participants. The data was analyzed using a single-subject alternating treatments research design, and the results suggested this type of intervention was marginally successful for the selected participants of this study.

The perception of classroom staff indicated agreement that the use of video modeling as an intervention in the delivery of verbal response production was an effective instructional tool, feasible to implement, enjoyable for the students, important to functional skill instruction, and an overall positive classroom instructional approach.

The current study provided both empirical and anecdotal support for the effectiveness of the commercial video modeling product *GemIIni*© in teaching verbal response production skills to students with autism spectrum disorder who were nonspeaking or minimally speaking and in the correct language development stage. The study addressed the limitation in empirical research related to the interpretation of results from this research study. Educators in the field of special education should consider methods, such as video modeling, as an evidence-based procedure to support the comprehensive learning package of instruction for students with autism spectrum disorder who appeared nonspeaking or minimally speaking. Further research needs to

continue to expand the understanding of the effectiveness of the commercial product *GemIIni©.* The expansion of this research will allow educators to make evidence-based instructional decisions on implementing the commercial product.

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Appendices

Appendix A

CITI Human Subject's Training Certificate

Appendix A

CITI Human Subject's Training Certificate

CITI PROGRAM

Completion Date 21-Dec-2021
Expiration Date 20-Dec-2024
Record ID 46413112

This is to certify that:

Miranda Galvin

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

Human Research
(Curriculum Group)
Group 2 Social Behavioral Research Investigators and Key Personnel
(Course Learner Group)
2 - Refresher Course
(Stage)

Under requirements set by:

University of South Dakota

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w378cf63c-a2e3-4bc4-8ac2-2fec622e85ec-46413112

Appendix B

The University of South Dakota Institution Review Board Approval and School Approval

Appendix B

The University of South Dakota Institution Review Board Approval and School Approval

UNIVERSITY OF
SOUTH DAKOTA

Date: January 12, 2023
University of South Dakota
414 E. Clark Street
Vermillion, SD 57069

PI: William Sweeney
Department: Curriculum & Instruction
Re: Admin Closure - IRB-22-288
THE EFFECTS OF THE VIDEO MODELING PRODUCT GEMIINI© ON VERBAL RESPONSE PRODUCTION OF INDIVIDUALS WITH AUTISM SPECTRUM DISORDER WHO ARE NONVERBAL OR MINIMALLY VERBAL
Administrative Closure Date: Jan 12, 2023 9:27:03 AM CST

Dear William Sweeney,
The University of South Dakota Institutional Review Board (IRB) has administratively closed this research project. Since the protocol was deemed Not Human Subjects Research.

Federal regulations require that all records on this project be retained by the Office of Human Subjects Protection and the PI for three years beyond the date of the protocol expiration. If this is a VA project, the records need to be kept indefinitely.

The study is now closed in the project file.

If you have any questions, please contact the Office of Human Subjects Protection at irb@usd.edu or 605-658-3743.

Sincerely,

University of South Dakota Institutional Review Board

Linda Rupp
Research Compliance Coordinator
University of South Dakota
(605) 658-3743

Sioux City Community Schools
believe... achieve... succeed

Erica Somsky | *Principal*
East Middle School
5401 Lorraine Ave. | Sioux City, IA 51106
Ph: 712-274-4030
somskye@live.siouxcityschools.com
www.siouxcityschools.org

EAST MIDDLE
SPARTANS

October 27, 2023

Protection of Human Subjects Committee
University of South Dakota
Office of Research
414 E. Clark Street
Vermillion, South Dakota 57069

To whom it may concern:

As principal of East Middle School in the Sioux City Community Schools, it is my pleasure to write this letter of support related to Miranda Galvin's dissertation research on the video modeling program GemIIni to teach verbal communication skills to students with autism spectrum disorder. This research aims to use empirically based instructional procedures to teach students with significant intellectual disabilities expressive verbal communication skills.

The current study employs the principles and tactics from applied behavior analysis and special education disciplines. These disciplines emphasize research-based approaches to teaching that focus on improving the potential participants' educational success and overall quality of life. Ms. Galvin and Dr. Sweeney's background in behavioral interventions display the highest level of preparation, professionalism, and utilization of instruction related to using "best practices" for improving the potential academic and personal outcomes and skills for individuals with significant intellectual disabilities.

Dr. Sweeney, Ms. Galvin, and I have discussed this project, and I believe it holds a great deal of promise for improving the target student's expressive verbal skills. I am also aware of the rich empirical research base for the use of Observation of Spontaneous Expressive Language measurement procedures in the classroom to improve the expressive communication skills of students with significant intellectual disabilities. I do not foresee any potentially harmful effects from the collection, analysis, or presentation of this data from Ms. Galvin related to her research and ongoing instruction with these students. In fact, I believe that this study may be a strategy that could be effectively used with other students with significant intellectual disabilities throughout the Sioux City Community Schools.

Dr. Sweeney and Ms. Galvin fully understand the importance of confidentiality regarding this project, and I have the utmost confidence that they will follow through with these requirements ethically and responsibly. Therefore, I fully endorse and support the study of the video modeling program GemIIni to teach verbal communication skills to students with autism spectrum disorder by Ms. Galvin and Dr. Sweeney at East Middle School in Sioux City, Iowa. If you have any questions or concerns about this letter of support, please feel free to contact me at East Middle School at (712) 274-4030. Thank you for your time and consideration of these important demonstration research presentations by the faculty and students at The University of South Dakota.

Sincerely,

Erica Somsky

Erica Somsky, Principal
East Middle School
Sioux City Community Schools

Sioux City Community Schools
believe... achieve... succeed

Angela Bemus, Associate Superintendent
627 - 4th Street • Sioux City, Iowa 51101
Phone: (712) 279-6083
E: bemusa@live.siouxcityschools.com
www.siouxcityschools.org

October 26, 2023

Protection of Human Subjects Committee
University of South Dakota
Office of Research
414 E. Clark Street
Vermillion, South Dakota 57069

To whom it may concern:

As Director of Learning Supports and Associate Superintendent of Sioux City Community Schools, it is our pleasure to write this letter of support related to Miranda Galvin's dissertation research on the video modeling program GemIIni to teach verbal communication skills to students with autism spectrum disorder. This research aims at using empirically based instructional procedures to teach students with significant intellectual disabilities expressive verbal communication skills.

The current study employs the principles and tactics from applied behavior analysis and special education disciplines. These disciplines emphasize research-based approaches to teaching that focus on improving the potential participants' educational success and overall quality of life. Ms. Galvin and Dr. Sweeney's background in behavioral interventions display the highest level of preparation, professionalism, and utilization of instruction related to using "best practices" for improving the potential academic and personal outcomes and skills for individuals with significant intellectual disabilities.

Dr. Sweeney, Ms. Galvin, and we have discussed this project, and we believe it holds a great deal of promise for improving the target student's expressive verbal skills. We are also aware of the rich empirical research base for the use of Observation of Spontaneous Expressive Language measurement procedures in the classroom to improve the expressive communication skills of students with significant intellectual disabilities. We do not foresee any potentially harmful effects from the collection, analysis, or presentation of this data from Ms. Galvin related to her research and ongoing instruction with these students. In fact, we believe that this study may be a strategy that could be effectively used with other students with significant intellectual disabilities throughout the Sioux City Community Schools.

Dr. Sweeney and Ms. Galvin fully understand the importance of confidentiality regarding this project, and we have the utmost confidence that they will follow through with these requirements ethically and responsibly. Therefore, we fully endorse and support the study of the video modeling program GemIIni to teach verbal communication skills to students with autism spectrum disorder by Ms. Galvin and Dr. Sweeney at East Middle School in Sioux City, Iowa. If you have any questions or concerns about this letter of support, please feel free to contact us at Sioux City Schools at 712-224-3648 and 712-279-6083 respectfully. Thank you for your time and consideration of these important demonstration research presentations by the faculty and students at The University of South Dakota.

Sincerely,

Angela Bemus, Associate Superintendent
Sioux City Community Schools

Kim Neal, Director of Learning Supports
Sioux City Community Schools

Appendix C

Informed Consent

For Child's Participation in Research

Appendix C

Informed Consent

For Child's Participation in Research

The University of South Dakota

Vermillion, SD 57069

Title: The Effects of the Video Modeling Product *GemIIni*© on Verbal Response Production of Individuals with Autism Spectrum Disorder who are Nonspeaking or minimally speaking

Project Director: *William Sweeney, Ph.D.*

Phone #: *605-677-5824*

Department: *Curriculum and Instruction*

This is a request for parental permission to allow your child to participate in a research study. It is a basic ethical principle to obtain informed consent from both the parent and the child unless the child is unable to give consent. In this case, informed consent is obtained from the parent of the child. The consent must be based on an understanding of the nature and risks of the research. This document provides important information for this understanding. If you have any questions, please ask. Research projects include only parents and children who choose to take part. Please take your time to make your decision. If at any time you have questions, please ask.

WHAT IS THE PURPOSE OF THIS STUDY?

Your child is invited to be in a research study about the use of a teaching strategy using the commercial video modeling product, *GemIIni*©, to teach expressive response production. Your child was selected as a possible participant because your child receives special education services at East High School. The purpose of this study is to determine whether the video modeling product is effective in increasing the number of responses students who are nonspeaking or minimally speaking produce. An additional and related purpose of this study is to determine the extent of which the behavior and measurement system for verbal response production a reliable measurement procedure.

HOW MANY PEOPLE WILL PARTICIPATE?

Three children will take part in the study conducted through the University of South Dakota.

Your child will not have to travel; the study will take place at East Middle School in Sioux City, IA.

HOW LONG WILL I BE IN THIS STUDY?
Your child's participation in the study will last for approximately twelve weeks. Your child will participate during the regular class time, with three sessions each day. Each session will last approximately 10 minutes.

WHAT WILL HAPPEN DURING THIS STUDY?
During the study, the students will participate in their typical school routine. During each research session, Miranda Galvin will work with each student individually during the school day. Students will not miss special education services (i.e., instruction, related services, etc.) during their school day while participating in this study. Miranda Galvin will video record each session to ensure she and her independent observer observe the same behaviors. Using the videotape, the number of responses said with the video clips will be recorded. Reinforcement will be provided to each student participating in the study based on their individualized reinforcement system as identified in their Behavior Intervention Plan and/or Individualized Education Plan.

WHAT ARE THE RISKS OF THE STUDY?
Through participation in this study, your child will be learning expressive communication skills that are also part of their Individualized Education Plan. There are no perceived risks for participation in the study.

WHAT ARE THE BENEFITS OF THIS STUDY?
Your child may or may not benefit personally from being in this study. However, we hope that in the future, other children may benefit from this study because we may learn the implementation of this intervention strategy may help more students be successful in gaining expressive communication skills.

ALTERNATIVES TO PARTICIPATING IN THIS STUDY
If you and your child decide not to participate, they will continue to receive special education services within the Sioux City Community School District as supported by their EP.

WILL IT COST ME ANYTHING TO BE IN THIS STUDY?
Your child will not have any costs for being in this research study.

WILL I BE PAID FOR PARTICIPATING?
Your child will not be paid for being in this research study.

WHO IS FUNDING THIS STUDY?
The University of South Dakota and the research team are receiving no payments from other agencies, organizations, or companies to conduct this research study.

CONFIDENTIALITY

The records of this study will be kept private to the extent permitted by law. In any report about this study that may be published, your child will not be identified. Your child's study recorded may be reviewed by Government agencies, the USD Research Compliance Office, and The University of South Dakota Institutional Review Boards. All recordings will be deleted and destroyed at the conclusion of this study.

IS THIS STUDY VOLUNTARY?

Your child's participation is voluntary. You may choose for your child to not participate, or you may discontinue your child's participation in this study at any time without penalty or loss of benefits to which your child is otherwise entitled. The decision whether or not to participate will not affect you or your child's current or future relations with the University of South Dakota.

If you decide for your child to leave the study early, we ask that you notify Miranda Galvin. Your child will not receive any consequences for withdrawing.

CONTACTS AND QUESTIONS

The researchers conducting this study are Dr. William Sweeney and doctoral candidate Miranda Galvin. You may ask any questions you have now. If you later have questions, concerns, or complaints about this research, please contact Dr. Sweeney at 605-677-5824 (William.sweeny@usd.edu) or Miranda Galvin at 712-229-6307 (galvinm@live.siouxcityschoools.com).

If you have any questions regarding your child's rights as a research subject, you may contact The University of South Dakota Institutional Review Board at (605) 677-6184. You may also call this number to tell us about any problems, complaints, or concerns about the research. Please contact this number if you cannot reach the research staff or wish to talk to someone independent of the research.

Please read below, check the appropriate blank according to your wishes, and sign accordingly. You will receive a copy of this form.

_____ I give my permission for my child to participate fully in the study, which includes video recording and collection of the data.

_____ I give permission for my child to be video recorded but DO NOT want data collected on him/her.

_____ I DO NOT give permission for my child to be video recorded but do give permission for him/her to be videotaped.

_____ He/she cannot be video recorded, and data cannot be collected on him/her.

Child's name: _____
(please print)

Parent/Guardian: _____
(please print)

Parent Signature: _____Date: _____

Appendix D

Subject Assent Form

Appendix D

Subject Assent Form

Appendix E

Fidelity Record Sheet

Appendix E

Fidelity Record Sheet

Student	Date	Time

Appendix F

Data Collection Form

Appendix F

Data Collection Form

Student pseudonym: _____

Video: _1_ Date & Time of observation: _____ Phase: _____

Responses	Response (+ or -)
Item #1: baby = /beɪbɪ/	
Item #2: banana = /bənænə/	
Item #3: bunny = /bʌnɪ/	
Item #4: funny = /fʌnɪ/	
Item #5: kitty = /kɪɾɪ/	
Item #6: nighttime = /naɪɾaɪm/	
Item #7: papa = /pɑpə/	
Item #8: open = /oʊpɪn/	
Item #9: potato/ = /pəɾeɪɾoʊ/	
Item #10: pay day = /peɪdeɪ/	
Item #11: window = /wɪndoʊ/	
Item #12: taco = /tɑkoʊ/	
Item #13: puppy = /pʌpɪ/	
Item #14 boo boo = /bubu/	
Item #15 cookie = /kʊkɪ/	
Item #16 bye bye = /baɪbaɪ/	
Item #17 hankie = /hænkɪ/	
Item #18 yumm-o = /jʌmoʊ/	
Item #19 pokey = /pokɪ/	
Item #20 yucky = /jʌkɪ/	
	Sum of trial: _____

Data Collection Form

Student pseudonym: _____

Video: _2_ Date & Time of observation: _____ Phase: _____

Responses	Response (+ or -)
Item #1: ball = /bɑl/	
Item #2: book = /bʊk/	
Item #3: box = /bɑks/	
Item #4: cap = /kæp/	
Item #5: cat = /kæt/	
Item #6: cup = /kʌp/	
Item #7: dad = /dæd/	
Item #8: doll = /dɑl/	
Item #9: hop = /hɑp/	
Item #10: juice = /dʒus/	
Item #11: lap = /læp/	
Item #12: mom = /mɑm/	
Item #13: mop = /mɑp/	
Item #14: nap = /næp/	
Item #15: phone = /foʊn/	
Item #16: pig = /pɪg/	
Item #17: pop = /pɑp/	
Item #18: sip = /sɪp/	
Item #19: tap = /tæp/	
Item #20: top = /tɑp/	
	Sum of trial: _____

Data Collection Form

Student pseudonym: _____

Video: _3_ Date & Time of observation: _____ Phase: _____

Responses	Response (+ or -)
Item #1: blender = /blɛndɚ/	
Item #2: black = /blæk/	
Item #3: bubbles = /bʌbl̩z/	
Item #4: candy = /kændɪ/	
Item #5: chip = /tʃɪp/	
Item #6: clock = /klɑk/	
Item #7: crayon = /kɹæən/	
Item #8: flower = /flaʊɚ/	
Item #9: icky = /ɪkɪ/	
Item #10: monkey = /mʌnkɪ/	
Item #11: plate = /pleɪt/	
Item #12: reach = /ɹitʃ/	
Item #13: ring = /ɹɪŋ/	
Item #14: stapler = /steɪplɚ/	
Item #15: stop = /stɑp/	
Item #16: street = /stɹit/	
Item #17: swap = /swɑp/	
Item #18: twelve = /twɛlv/	
Item #19: watch = /wɑtʃ/	
Item #20: wow = /waʊw/	
	Sum of trial: _____

Appendix G

Session Procedural Integrity Recording Data Form

Appendix G

Session Procedural Integrity Recording Data Form

Procedures:

- visual schedule of images and words present
- subjects working individually or in small groups with staff
- staff includes certified teacher(s) and paraprofessional(s)
- Subjects view the video modeling video clips on an iPad® or computer.
- Subjects view one of the three videos one time a day.
- Subjects view the video modeling video clips for less than 10 minutes each viewing.
- If a subject is absent, the primary observer notes this on the fidelity record sheet (Appendix E).
- School staff encourages the subjects to watch the videos by directing them to the iPad® screen.
- Staff does not prompt the subjects to talk during the videos.
- Staff does not reinforce any of the content while viewing the videos.
- Staff does not reinforce any content after viewing the videos.

Appendix H

Inter-observer Reliability Data Collection Form

Appendix H

Inter-observer Reliability Data Collection Form

Video number: 1	Primary Observer (column A)	Indepen. Obser. (column B)	Inter-observer Agreement (yes/no) (column C)
Item #1: baby = /beɪbɪ/			
Item #2: banana = /bənænə/			
Item #3: bunny = /bʌnɪ/			
Item #4: funny = /fʌnɪ/			
Item #5: kitty = /kɪrɪ/			
Item #6: nighttime = /naɪraɪm/			
Item #7: papa = /pɑpə/			
Item #8: open = /oʊpɪn/			
Item #9: potato/ = /pəreɪroʊ/			
Item #10: pay day = /peɪdeɪ/			
Item #11: window = /wɪndoʊ/			
Item #12: taco = /tɑkoʊ/			
Item #13: puppy /pʌpɪ/			
Item #14 boo boo = /bubu/			
Item #15 cookie = /kʊkɪ/			
Item #16 bye bye = /baɪbaɪ/			
Item #17 hankie = /hænkɪ/			
Item #18 yumm-o = /jʌmoʊ/			
Item #19 pokey = /pokɪ/			

Item #20 yucky = /jʌkɪ/			
			___ / 20 ___% agreement for session

Video number: 2	Primary Observer (column A)	Indepen. Obser. (column B)	Inter-observer Agreement (yes/no) (column C)
Item #1: ball = /bɑl/			
Item #2: book = /bʊk/			
Item #3: box = /bɑks/			
Item #4: cap = /kæp/			
Item #5: cat = /kæt/			
Item #6: cup = /kʌp/			
Item #7: dad = /dæd/			
Item #8: doll = /dɑl/			
Item #9: hop = /hɑp/			
Item #10: juice = /dʒus/			
Item #11: lap = /læp/			
Item #12: mom = /mɑm/			
Item #13: mop = /mɑp/			
Item #14: nap = /næp/			
Item #15: phone = /foʊn/			
Item #16: pig = /pɪg/			
Item #17: pop = /pɑp/			
Item #18: sip = /sɪp/			
Item #19: tap = /tæp/			
Item #20: top = /tɑp/			
			___/20__% agreement for session

Video number: 3	Primary Observer (column A)	Indepen. Obser. (column B)	Inter-observer Agreement (yes/no) (column C)
Item #1: blender = /blɛndɚ/			
Item #2: black = /blæk/			
Item #3: bubbles = /bʌbl̩z/			
Item #4: candy = /kændɪ/			
Item #5: chip = /tʃɪp/			
Item #6: clock = /klɑk/			
Item #7: crayon = /kɹæən/			
Item #8: flower = /flaʊɚ/			
Item #9: icky = /ɪkɪ/			
Item #10: monkey = /mʌnkɪ/			
Item #11: plate = /pleɪt/			
Item #12: reach = /ɹitʃ/			
Item #13: ring = /ɹɪŋ/			
Item #14: stapler = /steɪplɚ/			
Item #15: stop = /stɑp/			
Item #16: street = /stɹit/			
Item #17: swap = /swɑp/			
Item #18: twelve = /twɛlv/			
Item #19: watch = /wɑtʃ/			
Item #20: wow = /waʊw/			
			__ / 20__% agreement for session

Appendix I

Procedural Integrity Checklist

Appendix I

Procedural Integrity Checklist

Subject: _____

Date: _____ Time: _____

Step	Step Implemented as Written Yes or No
1. The researcher sits across the table from the subject	
2. The only items present are the researcher's data collection form and writing utensil	
3. The subject is prompted to imitate one response at a time, in the order listed on the data collection form.	
4. The format for this prompt is "(Student's name) [pause] say (the response)."	
5. The researcher allowed the subject a 5-second response time following the provided verbal directive	
6. If the subject said the word correctly and independently within 5-seconds, the researcher records a plus sign (i.e., +) next to the corresponding response on the data collection sheet. If the subject did not respond within 5-seconds or responded incorrectly, the researcher records a minus sign (i.e., -) next to the corresponding response on the data collection sheet.	
7. Each of the 20 responses from the list is presented to the subject in this manner.	

Calculate Procedural Integrity:
Total number of yes responses/total number of steps (7) X by 100 = _____% of the steps were implemented as written.

Appendix J

Social Validity Survey

Appendix J

Social Validity Survey

Completed by: _____

Answer the following questions on a scale of 1-5.

Circle your responses.

1) *GemIIni*© video modeling system is effective in teaching your student(s) to produce responses?

1	2	3	4	5
	Disagree	Neutral	Agree	

2) Implementing the video modeling intervention and data collection procedures were feasible.

1	2	3	4	5
	Difficult	Neutral	Feasible	

3) My students enjoyed learning by watching the video clips and giving the responses.

1	2	3	4	5
	Disagree	Neutral	Agree	

4) Expressive communication phrases are a functional skill for students to learn.

1	2	3	4	5
	Disagree	Neutral	Agree	

5) Your overall opinions of using a video modeling intervention.

1	2	3	4	5
	Dislike	Neutral	Like	

Please make any additional comments on the back of this sheet.