LETTER FORMATION USING VIDEO MODELING COMPARED TO IN VIVO MODELING FOR CHILDREN WITH AUTISM

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I am submitting herewith a thesis written by Jeanie Marizza entitled "Letter Formation Using Video Modeling Compared to In Vivo Modeling for Children with Autism." I have examined this thesis for form and content and recommend that it will be accepted in partial fulfillment of the requirements for the degree of Master of Arts with a major in Occupational Therapy.

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ABSTRACT

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LETTER FORMATION USING VIDEO MODELING COMPARED TO IN VIVO MODELING FOR CHILDREN WITH AUTISM

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A multiple-baseline A-B single subject design across four participants was used to evaluate the effectiveness of in vivo versus video modeling on copying skills in children with autism. Participants were presented with an uppercase letter that was not in their particular current letter-copying repertoire. The participants were presented with the letter, first in the in vivo condition and then in the video modeling condition. After observing the letter modeled in either condition, the participant was asked to copy the letter. Each copying attempt was scored, on a scale of 1 to 4. Results suggest that video modeling made a difference in acquisition of uppercase letter copying skills for one out of the four participants.

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CHAPTER I

INTRODUCTION

Occupational therapists who work in public school settings are often sought out by other teachers and parents to assist in solving students' handwriting difficulties. Children with autism spectrum disorders (ASDs) are one group of children who struggle with handwriting. School occupational therapists often look for innovative ways of helping children with handwriting difficulties. These innovative ideas might include using different handwriting curriculums, providing different writing implements or even using an alternative to handwriting, such as portable keyboard or computer with word prediction software. As our current society progresses technologically, children are becoming more adept at using computers. The demands for handwriting seem to be decreasing. However, the basic skill of needing to be able to write a quick note, sign a name on a check or take a high-stakes exam in school, persist.

Designing different teaching strategies to help children with ASD learn handwriting strokes is challenging. One promising area of teaching children with ASD a new skill is to use video modeling or video instruction. Research is needed to determine if the use of video instruction might be beneficial in teaching children with ASD to learn how to form letters.

Statement of the Problem and Purpose of the Study

Children with autism spectrum disorders have difficultly learning handwriting. Video modeling has been demonstrated by researchers to be a successful technique in teaching children with autism spectrum disorders various functional skills. This study researched if there was a difference in learning handwriting strokes using in vivo modeling as compared to video modeling to teach handwriting strokes. This study adds to the current body of research in identifying best practice techniques for children with autism spectrum disorders. .

CHAPTER II

REVIEW OF LITERATURE

Autism Spectrum Disorders

Autism spectrum disorders (ASDs) are a group of developmental disabilities that affect between two and six of every 1,000 children born in the United States (CDC, 2006). Autism spectrum disorders include autistic disorder, pervasive developmental disorder- not otherwise specified and Asperger's disorder (American Psychiatric Association, Diagnostic and statistical manual of mental disorders, 2000). Autism spectrum disorders are defined by unusual patterns of communication, problems with social interactions and behaviors. There is a wide range of impairment within ASDs. Children with autistic disorder are more severely impacted than children with Asperger's disorder. Males are four to five times more likely to have an ASD than females (DSM-IV-TR, 2000). Each year, from 1994-2006 the number of children with autism 3-21 years old served in public education has increased, from 2,200 in 1994, to the most current number available of 223,000 children in the 2005-2006 school year (US Department of Education's Institute of Education Sciences, 2008). As the prevalence of children with ASDs in public education increases, school professionals continue to seek effective interventions to help children with ASDs become successful learners.

In order to foster successful learning in children with ASDs, school professionals have examined the unique set of learning strengths and weaknesses children with autism have. Mayes and Calhoun (2003) analyzed psychological testing data of 164 3-15 year old children with autism. Specifically, they analyzed IQ data, visual reasoning, graphomotor, reading, math, spelling and written expression. Mayes and Calhoun found that visual reasoning test scores significantly exceeded graphomotor scores in all the children involved in the study. The researchers concluded that children with autism have strength in learning though the visual system and struggle with graphomotor or paper and pencil tasks. Difficulty with graphomotor skills is directly related to handwriting ability and these results are consistent with other studies. Beversdorf, Anderson and Manning (2001) compared 10 high-functioning adults with autism spectrum disorder and compared their handwriting size to those of 13 non-autistic adults. They found that the group with autism had statistically significant large letter size or macrographia. Mayes and Calhoun (2007) found that children with high functioning autism or Asperger syndrome have a high frequency of learning disabilities, especially in written expression. People with ASDs struggle with motor clumsiness and awkwardness; handwriting is one particular motor skill that can be challenging to master (DSM-IV-TR, 2000).

When a child enters kindergarten, one of the first academic expectations is for a child to learn to write their first name. In the classroom, children spend 30%-60% of their school time performing fine motor tasks, primarily handwriting (McHale & Cermak, 1992). For children with ASDs, learning to form letters correctly can be challenging. By using the visual strengths of children with ASDs; a possibility is to teach handwriting using modeling that is highly visual. Video modeling or video instruction has been shown to be a promising area to teach children with ASDs.

Video Modeling

Video modeling or video instruction is a method of teaching a child a new skill by using video or computer instruction. There are many potential reasons why video modeling can be successful for teaching children with ASDs. Children with autism often have intense, focused interests, which revolve around television and computers, possibly due to a strong visual system (Nally, Houlton & Ralph, 2000). Parents have observed that children with ASD often will watch videos repeatedly. Parents reported that although they need to control the time their child with ASD watches videos; some have seen positive outcomes in behaviors such as imitation of verbal and motor skills in their child (Nally, Houlton & Ralph, 2000). In a recent survey of 89 children with ASDs, 41% of children occasionally and 10% frequently imitated movements observed on a computer screen (Shane & Albert, in press). Winter-Messiers (2007) found a strong positive relationship between special interests and improvement in students' fine motor, social, communication, emotional and sensory skills. By capitalizing on children with ASDs strengths and interests, the potential for new skill learning using video modeling or video instruction, seems apparent.

Charlop and Milestein (1989) conducted a study with 3 boys with autism and demonstrated that they could learn conversational skills by viewing videotaped conversations of two people discussing specific toys that were preferred by the subjects.

They found that those skills were generalized and maintained over a 15 month period. Alcantara (1994) successfully used video instruction plus in vivo, on-site instruction and reinforcement to teach 3 children with autism to purchase items at a grocery store. Alcantara had the children observe the video of the 32-step purchasing task, and then took the children to the same store they saw on the videotape and prompted the children, as needed, to complete the purchasing task. All three children in the study demonstrated rapid acquisition of the skills taught and those skills were generalized to other settings. Shipley-Benamou, Lutzker and Taubman (2002) taught mailing a letter, pet care and setting a table to three 5-year old children with autism through the use of video modeling. In this study, the narrator gave specific instructions to the subjects and then had the children performed the tasks immediately afterwards. All the students made large gains in independence in learning the skills and those skills were maintained one month after the intervention ended.

Types of Video Models

Researchers have looked at using video modeling using a variety of methodologies. These include the use of an adult model, a peer model or self as model and using different perspectives to determine if there is a difference in success rates. Ayers and Langone (2007) compared the effectiveness of using video models taught from a first person perspective versus a third person perspective to teach putting away groceries to four elementary students. The results showed that there was no difference which perspective was used, however they did determine that students performed better when the videos were shown at a slower speed. Ihrig and Wolchick (1988) concluded that four children with autism showed no difference in acquisition, generalization or maintenance of skills learned from peer versus adult models. Delano (2007) used self as model to improve written language skills in three 13–17-year-old boys with Asperger's Syndrome. This study was unique in that the participants made a video instructing themselves on how to use self-monitoring strategies for writing essays. For the intervention phase, each student observed himself in a video performing self-monitoring writing strategies to increase number of words written and number of functional essay elements. All students made gains in both areas measured during the intervention phases. Follow-up probes at 1 week and 3 months, indicated two out of three maintained numbers of words written. None of the three participant's maintained number of functional essay elements at the 3 month probe. Delano suggested that the participants may have needed a longer intervention period in order to maintain the skills learned. Buggey (2005) performed three studies with children with autism spectrum disorders in a private school setting. In study one, two participants observed a video of peers and selves modeling social initiation. Both participants made substantial gains in the frequency of social initiations, from baseline of .17 mean daily initiations to an intervention rate of 3.8 initiations. Buggy reported that this rate of daily initiations was maintained for the 6 week, maintenance phase. In the second study, Buggey used video self-modeling to decrease tantrum behavior in two participants. Each of these students decreased the mean length of tantrum behavior by nearly 15 minutes during the intervention phase. During the maintenance phase, both participants also had a significant decrease in the length of tantrum behavior. Buggey also noted that the overall frequency of tantrums reduced for both participants, but this was measured through anecdotal evidence. In Buggey's third study, the participant had pervasive developmental delay. The aim of the study was to use self and others as video models to reduce pushing classmate behaviors and to increase unsolicited verbalizations. Both goals of the study were met, in that the participant reduced and maintained the reduction of pushing behavior and increased and maintained unsolicited vocalizations. Scherer et al., 2001 compared using peer versus self as model to teach conversation skills to five boys with autism. The conclusion of this study showed no difference in rates of acquisition of skills taught, demonstrating that children who were successful at learning from video modeling learned using both treatment approaches, self or peer as model. Apple, Billingsley and Schwartz (2005) also used peers as models in their study of two 5-year old boys with autism. They demonstrated that using peer video models can be successful in teaching compliment giving behaviors but suggested that using adults as models may be a more efficient approach, because adults are able to read and memorize scripts at a faster rate, thereby reducing the amount of video editing time. In sum, several studies have attempted to determine if there is a difference in success rates of video modeling based on who is doing the modeling. There appears to be no real trend; researchers have demonstrated success using video modeling with peers, self and adults as models.

In Vivo Compared to Video Modeling

Only one study, by Charlop-Christy, Le, and Freeman (2000), compared in vivo modeling to video modeling, with five children 7-11 years old with autism. Models for both conditions were familiar adults to the participants. Each of the five children had from 2-5 target behaviors and each of those behaviors were assigned at random to be either taught thorough a video model or in vivo, using identical procedures. Specifically, in both conditions, the models performed the instruction at a slow pace and cued children to pay attention and respond whenever needed. The tasks were chosen according to individual participant's school curriculum and were then randomly assigned to either in-vivo or video modeling condition. The tasks taught were similar to each other, for example, tooth brushing was taught using video model, and face washing was taught in vivo. Participants were presented with either the video or in vivo modeling two times, and then the experimenter began testing for acquisition of the target behavior. If criterion for the acquisition of skill was not met, then the video or in vivo modeling was repeated, and testing for acquisition of skill was done again until criterion was met. Outcomes from Charlop-Christy et al. (2000) show that five children with autism learned specific skills in the video modeling condition with fewer numbers of presentations than the in vivo condition. The skill was generalized by all participants in the video modeling condition, but not in the in vivo modeling condition. They also determined video modeling was more cost-effective, based on the time it took to train and implement the sessions.

Despite the fact there are numerous peer-reviewed articles documenting the success of video modeling to teach children with autism, none looked at using video modeling to teach letter formations for handwriting. This study compared acquisition of letter formation in children with autism spectrum disorders using video instruction with in vivo instruction. It has added to the current research of video modeling instruction for children with autism spectrum disorders.

CHAPTER III

METHODOLOGY

This study used a multiple-baseline A-B single subject design across participants to evaluate the effectiveness of in vivo versus video modeling on copying skills (Kennedy, 2005). The multiple-baselines across participants address the impact of the treatments (independent variables) on the copying skills of different participants (dependent variable). Baseline was in vivo treatment. A letter was chosen out of the participant's repertoire of 0, 1 or 2 scored letters from the pre-testing.

Participants

Participants met the following criteria: (a) designation of diagnosis of autism spectrum disorder according to IDEIA (2004); (b) able to copy a vertical and horizontal line and a circle using a writing tool (Olsen, 2004); (c) between 5 and 10 years old; and (d) demonstrate a minimum of 15 minutes of attention to computer or television screen with minimal cueing, as reported by special education teacher or parent(s).

Institutional Review Board, school district and parental consent was be obtained. Four participants were selected for this study from public elementary schools in the Denver, Colorado metropolitan area. Excluded from this study were participants who had uncorrected vision or any condition which would biomechanically affect the act of handwriting. Participant A is an 8-year-old male diagnosed with autism when he was 3.5 years old. He was born at full term but did have a birth significant for the umbilical cord wrapped around his neck, which required some resuscitation after delivery. He generally is considered to be in good health, is on a casein free diet, and does not take any prescription medications. His vision is corrected with glasses and he wears them consistently throughout the school day. Participant B is a 10-year-old female diagnosed with autism spectrum when she 2.5 years old. Her birth was full term with no complications. Participant C is a 7-year-old male born at full term. He currently takes medication for loose bowels. He was diagnosed at age 4.5 with Asperger's syndrome. Participant D is a 9-year old male diagnosed with autism when he was 3 years old. Participant D is a twin, was born at 28 weeks, and was in the NICU for 1-month post birth. He was on oxygen for a short time after being discharged from the hospital. He also a history of apnea and bradycardia, but these issues are resolved. Currently, Participant D is not on any medications.

Video Model

Alphamation™ is a compact disk that demonstrates stroke by stroke each letter as it as being formed; concurrently the stroke is described, for example, "Uppercase B-Start, pull down straight, stop, lift, start, slide right, curve down, slide left, pause slide right, curve down, slide left, pause, slide right, curve down, slide left, stop." This script, as shown in Appendix D, was utilized for the in vivo modeling condition as the primary investigator was modeling the strokes, to replicate the video modeling condition.

Procedure

Pre-testing was conducted to determine each participant's pool of letters. The primary investigator presented one letter model to the participant. The investigator asked each participant to copy the letter on a piece of paper. After going through the whole upper case alphabet with each participant in this same sequence, all letters were scored using the scale-based handwriting tool as shown in Appendix D. Letters scoring 2 or less on the instrument formed a pool of letters for each participant from which the target letter(s) for the study is drawn at random.

Data Collection

Each participant was seated in a small, quiet and familiar room with minimal visual distracters for both conditions. The investigator assured that the desk and table height were appropriate for the participant. This included assuring that the participant's feet were flat on floor and the table height at the center of the torso. The child was asked if they were comfortable and adjustments were made, as needed. Each participant was given a choice of writing tools, and the one chosen was used throughout the study. In the in-vivo condition, the experimenter was seated to the side of the participant, performing the instruction. In the video condition, a computer was placed in front of the participant on the table top and instruction was delivered using the compact disk program *Alphamation*™. A piece of paper, with two solid lines and one dashed line in the middle, with left written on the bottom left side and right on the bottom right, was placed in front of the participant, with the child's writing implement. This type of paper was utilized in both conditions and is most similar to the demonstration used in the *Alphamation*™ video. The participant viewed the modeling and then was asked to copy the letter. Participants had three opportunities to copy the letter in each session. Each session was approximately 10 minutes for both conditions.

The baseline or A phase was in vivo. The length of the A phase was randomly assigned among the participants, and varied from 3, 5, or 7 sessions. A letter was introduced and the data was monitored for a flat, variable or descending trend using the scale as shown in Appendix B. If a positive trend was discerned, based on the data gathered using the letter-scale from Appendix D, within the baseline phase, a different letter was chosen from the participants pool and the process was repeated until an A phase of no improvement was established.

The treatment or B condition was video modeling. Video modeling was presented, using Alphamation™, until criterion was established (5 scores of 4, within two consecutive sessions) or to a maximum of 5 sessions. A positive trend initiated within 2 sessions and discerned by 5 sessions across multiple baselines is interpreted as an advantage to video modeling for letter reproduction.

In Vivo Modeling Procedure

1. The primary investigator modeled the letter using the script as shown in Appendix A and used similar 3-lined paper to the paper in the Alphamation™ CD.
2. The investigator reminded the participant to pay attention to the paper where the letter was being modeled. The investigator then said "Now it is your turn to write the letter ___."

3. The participant was given the opportunity to respond on the 3-lined paper, each time after observing the modeling, for 3 times per session.

Video Modeling Procedure

1. The participant sat in front of a laptop computer.
2. The investigator reminded the participant to pay attention to the video.
3. When video model of the letter was shown, the primary investigator said, "Now is your turn to write the letter___. The participant was given the opportunity to respond each time using the 3-lined paper, again for 3 times per session.

Each data collection session lasted approximately 10-15 minutes long in both conditions. The baseline condition (A) was in vivo. Participants were presented with in vivo modeling for a minimum of three and a maximum of seven sessions until a flat, variable, or descending trend was established. If a positive (improvement) trend was discerned a different letter is chosen from the pool and the process repeated until a flat, variable, or descending trend is established.

The treatment condition (B) was video modeling. Participants were presented with video modeling and each trial recorded until criterion is established (5 scores of 4 within two consecutive sessions).

This procedure was repeated across the four participants.

Data Analysis

Within Participants

A positive trend in the data within two sessions of the introduction of video modeling is interpreted as evidence of an advantage to video modeling.

A negative trend in the data within two sessions of the introduction of video modeling is interpreted as evidence of a disadvantage to video modeling.

A positive trend in the data post 2 sessions of the introduction of video modeling, or continuation of flat, variable, or negative trend is interpreted as no effect for video modeling.

Between Participants

A repetition of trend results across participants is interpreted as additional evidence for the finding.

CHAPTER IV

RESULTS

All the data are presented in Figure 1. All participants in this study were receiving handwriting instruction from their regular or special education teachers during the data collection portion of this study. Participants who engaged in handwriting for longer periods during their school day had fewer letters in their pool from the pre-testing.

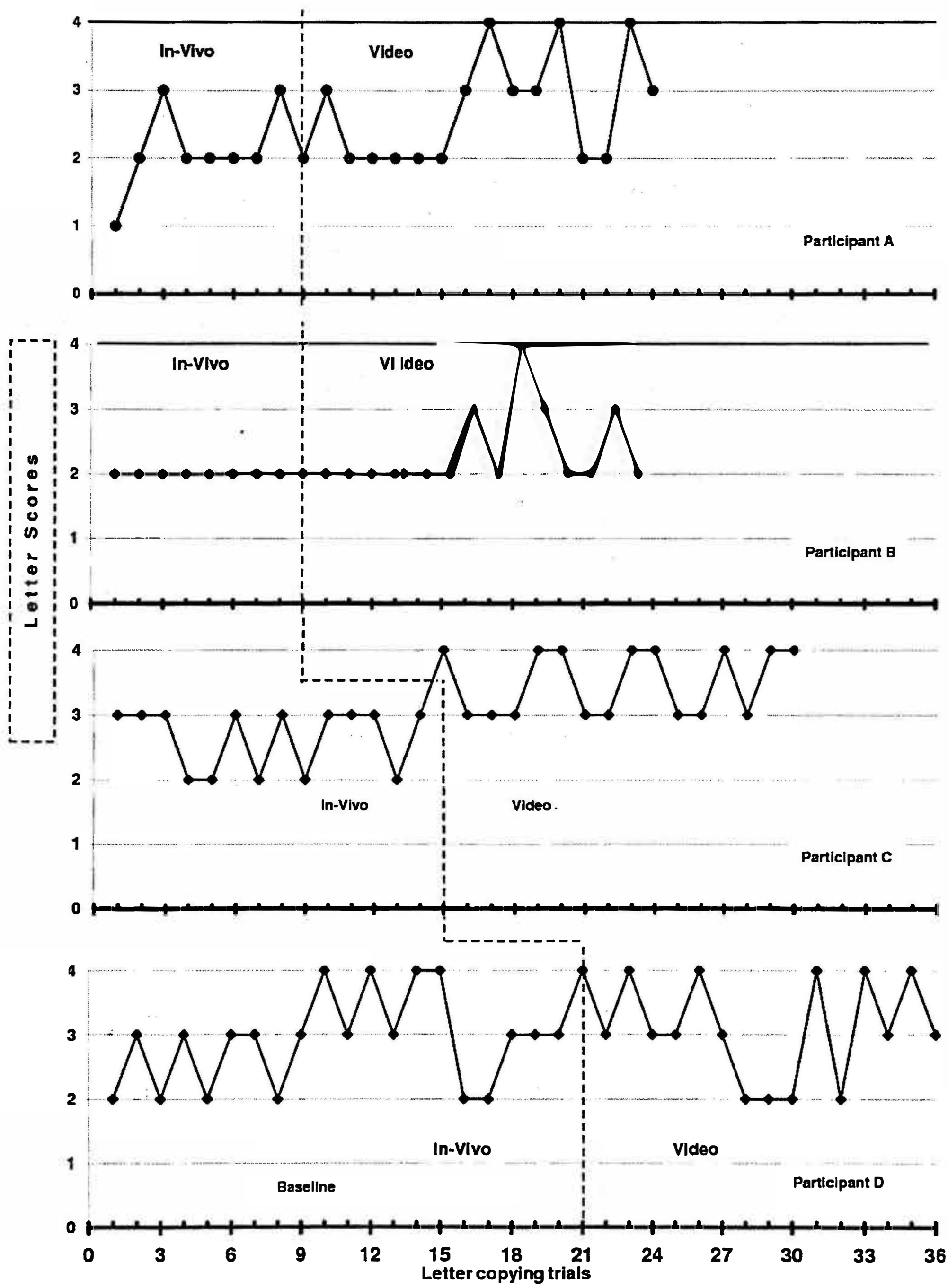

Figure 1. Multiple-baseline letter score data, three observations per session.

In addition to meeting all the criteria for the study, Participant A can color, write his first name, and intermittently write numbers 1–10 when verbally cued. If given a writing tool without a verbal or visual cue, this participant will habitually write his first name. Participant A usually does not engage in more than 5 minutes of paper and pencil tasks per school day. Participant A's letter writing pool consisted of the letters F, E, D, C, B, L, H, I, M, O, R, Q, V, U, T, S, N, Z, Y, X, W, K, J and G. Participant A was randomly assigned 3 sessions for the baseline phase. Participant A's letter for the study was uppercase H. This was the first letter randomly selected from his letter pool. Participant A required a food reinforcer, a raisin, to visually attend to the modeling and to copy letters throughout the study. He also required frequent sensory breaks that consisted of jumping on a mini trampoline or bouncing on a therapy ball. Participant A's data trend line indicates a variable trend, showing no effect for video modeling. A positive trend was observed after three sessions of video modeling and this positive trend continued through the fifth video modeling session letter copying data points.

Typically, Participant B's letter writing size is approximately 3 inch height. Intermittently, she is able to write many letters of the alphabet. She consistently writes her first name when cued. Participant B engages in 10-15 minutes maximum of paper and pencil tasks per school day. Participant B's letter writing pool consisted of the letters F, E, B, A, L, I, M, O, R, Q, P, V, U, S, N, Z, Y, X, W, K, J, and G. Participant B was randomly assigned 3 sessions for the baseline phase, her randomly selected letter was uppercase v. The motor sequence for uppercase v is an atypical pattern (see Appendix A).

Participant B required intermittent sensory breaks that consisted of jumping on a mini trampoline, crawling and lying in a play tunnel and bouncing on a therapy ball. She did not appear to have a hand dominance established as she copied letters using both hands even though the marker was presented at her midline throughout the study. Her letter scores did not appear to be impacted by this apparent lack of hand dominance. Participant B's data trend line indicates a flat trend through the first two video modeling sessions, showing no advantage to video modeling. As with Participant A, Participant B began to show a positive trend line during the third video modeling session but did not maintain that positive trend line through the fifth video modeling session.

Participant C engages in paper and pencil tasks for up to 60 minutes per school day. Participant C's letter writing pool consisted of the letters M, T, S, Z and Y. Participant C was randomly assigned 5 sessions for the baseline phase. His letter for the study was uppercase y, the second randomly selected letter from his pool. Alphamation uses an unusual motor sequence for uppercase y (see Appendix A). Participant C's data trend line shows an advantage to video modeling. His graph shows letter scores of 4, starting in video modeling session two. Participant C's letter score data varied between 3's and 4's through the 5 video modeling sessions.

Participant D's engages in paper and pencil tasks for up to 45 minutes per school day. Participant D's letter writing pool consisted of the letters D, O, Q, U and S. Participant D was randomly assigned 7 sessions for the baseline phase. Participant D went through four letters in his pool before starting the baseline phase. His letter was uppercase o. Participant D's letter score data was variable during baseline and treatment sessions. He was the only participant to score 4's in the baseline sessions. Participant D's data trend line shows no advantage to video modeling. From observation, it appeared that this participant's became frustrated with his difficulty in forming the letter, as he increased the marker pressure he used and wanted to make multiple attempts to form the letter, as he seemed to visually recognize when he motorically did not form the letter as he wanted.

CHAPTER V

DISCUSSION

This study presents results of a multiple-baseline A-B single subject study across 4 participants with autism spectrum disorders. Analyses of the results indicate that video modeling was effective in teaching letter copying for one of the four participants in this study. Three of the four participant's data indicated no effect of video modeling in teaching letter-copying skills.

Limitations of the Study

Each participant had previous exposure to varying degrees of handwriting instruction throughout their school careers thus the target behavior was not a new skill. This study utilized a small number of participants from one school district in Colorado. Participants were engaged in handwriting instruction concurrently during the study from their regular and special education teachers. The letter scoring scale utilized for the study is a non-standardized measure; this could have had an impact on the results of the study. Additionally, the video modeling provided by the Alphamation™ utilized some atypical motor patterns for letter formations. Participant's B and C's letter scores may have been impacted by the unusual motor sequences required to form their letters. This study was performed in an unnatural educational setting; a small room with 1:1 instruction. Because of time constraints, post treatment data were not collected to determine retention of letter copying skill.

Implications for Future Research

This thesis presents a pilot study looking at using video modeling to teach children with autism spectrum disorders handwriting strokes. Three out of four participants seemed to enjoy the video modeling instruction as seen by their initiation of reaching for the computer mouse to repeat the instruction, visual attention to the video model and verbal repetition of the verbiage used in the video model. Two of the four participants inquired about the video modeling several times outside of the data collection sessions.

Continued research on video modeling to teach functional skills to children with autism spectrum disorders is needed. Children with ASD's struggle with many skills, including writing, for many reasons not clearly understood. Research that initially exposes children to letter formations using video modeling as compared to in vivo modeling; beginning in kindergarten or first grade; to determine if all children could possibly benefit from this alternative form of instruction, would be useful to education research best practice. It would be important for the video modeling handwriting instruction to utilize the most typical motor sequences used in the current education setting.

Conclusion

Finding educational practices that support the success of children on the autism spectrum is an ongoing need to be addressed by all school professionals. Although this study did not demonstrate a clear advantage to video modeling instruction for copying handwriting strokes in children with ASD's; this study does support the current body of research that indicates that children on the autism spectrum can benefit from learning a skill using video modeling. This study also supports current research that children with ASD's appear to be motivated by video modeling as two of the four participants appeared highly engaged in the video viewing throughout the study.

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APPENDIX A

Alphamation™ Letter Scripts

Uppercase A-Start, slant left, stop, lift, start slant right, stop, lift, start, slide right, stop.
Uppercase B- Start, pull down straight, stop, lift, start, slide right, curve down, slide left, pause, slide right, curve down, slide left, stop.
Uppercase C- Start, circle left, stop.
Uppercase D- Start, pull down straight, stop, lift, start, slide right, curve down, slide left, stop.
Uppercase E- Start, pull down straight, pause, slide right, stop, lift, start, slide right, stop, lift, start, slide right, stop.
Uppercase F-Start, pull down straight, stop, lift, start, slide right, stop, lift, start, slide right, stop.
Uppercase G- Start, circle left, pause, slide left, stop.
Uppercase H- Start, pull down straight, stop, lift, start, pull down straight, stop, lift, start, slide right, stop.
Uppercase I- Start, slide right, stop, lift, start, pull down straight, stop, lift, start, slide right, stop.
Uppercase J- Start, pull down straight, curve left, curve up, stop.
Uppercase K- Start, pull down straight, stop, lift, start, slant left, pause, slant right, stop.
Uppercase L- Start, pull down straight, pause, slide right, stop.
Uppercase M- Start, pull down straight, stop, lift, start, pull down straight, stop, lift, start, slant right, stop, lift, start, slant left, stop.
Uppercase N- Start, pull down straight, stop, lift, start, pull down straight, stop, lift, start slant right, stop.
Uppercase O-Start, circle left, stop.
Uppercase P- Start, pull down straight, stop, lift, start, curve right, stop.
Uppercase Q- Start, circle left, stop, lift, start, slant right, stop.
Uppercase R- Start, pull down straight, stop, lift, start, circle right, pause, slant right, stop.
Uppercase S- Start, curve left, curve right, curve left, stop.
Uppercase T- Start, pull down straight, stop, lift, start, slide right, stop.
Uppercase U- Start, pull down straight, curve right, push up straight, stop.
Uppercase V- Start, slant right, stop, lift, start, slant left, stop.
Uppercase W-Start, slant right, stop, lift, start, slant left, stop, lift, slant right, stop, lift, slant left, stop.
Uppercase X- Start, slant right, stop, lift, start, slant left, stop.
Uppercase Y- Start, slant right, stop, lift, start, slant left, pause, pull down straight, stop.
Uppercase Z- Start, slide right, pause, slant left, pause, slide right, stop.

APPENDIX B

Brief Letter to Participant's Parent(s)

Dear Parent,

My name is Jeanie Marizza and I work at your child's school. I am an occupational therapist and am interested in how children with autism learn. Some research studies show that children with autism pay more attention and imitate better when they watch a video rather than someone in person. I am conducting a study to see if children with autism respond better when they see lessons on a video about copying letters. Would you be interested in having your child be part of my study? If so, please return this letter to school with your signature and phone number. I will give you a call and tell you about the study. Or, you can call me at 303-347-4500. I am at Franklin on Mondays, Wednesday's and Thursday's.

If you do not want to hear any more about the study then do nothing and thank you for your time.

Sincerely,

Jeanie Marizza, OTR/L

Yes, I would like to learn about the study! This is my phone number and signature.

APPENDIX C

Consent to Participate in Research

TEXAS WOMAN'S UNIVERSITY
CONSENT TO PARTICIPATE IN RESEARCH

Title: Letter formation using video modeling compared to in vivo modeling for children with autism

Investigator: Jeanie Marizza, OTR.......................................303-347-4500
Ivette Acevedo, OTR/L....................................915-584-4397
Advisor: Catherine Candler, PhD.......................................214-706-2350

Explanation and Purpose of the Research

You are being asked to give consent for your child to participate in a research study for Texas Woman's University. The purpose of this research is to determine if children with autism respond better and copy more when learning how to write letters when they view a model on video.

Research Procedures

For this study, your child will be asked to copy each of the capital letters. The investigator will make a list of the letters your child is unable to copy accurately. The investigator will pick one of these letters to teach your child. The teaching will happen in 10-15 minute lessons. In the first lessons, the investigator will show your child how to make the letter and ask him or her to copy it. After 3-7 of these lessons, the investigator will bring a video of a person showing how the letters are made. Your child will be asked to copy the letter after using the video for 5 more lessons. The investigators will grade and count the number of letter copies your child has made with the video to determine if the video has improved performance. All added up, the total time your child may be in these lessons is 3 and half hours.

Potential Risks

Potential risks related to your child's participation in the study include fatigue and or physical discomfort. To avoid fatigue, your child may take a break, as needed during the sessions. If your child indicates that he/she no longer wants to participate in the session; he/she may stop at any time.

Another possible risk to your child as a result of participation in this study is release of confidential information. Confidentiality will be protected to the extent that is allowed by law. It is anticipated that the results of this study will be published in the investigators thesis as well as in other research publications. However, no names or other identifying information will be included in any publication.

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Parent/Guardian
Initials

The last risk to your child as a result of participation in this study is that your child may miss up to15 minutes of his or her usual school instructional time per lesson. To minimize this risk the investigators will conduct lessons during a recess time, right after lunch, or at a time the classroom teacher identifies as the best time.

The researchers will try to prevent any problem that could happen because of this research. You should let the researchers know at once if there is a problem and they will help you. However, TWU does not provide medical service or financial assistance for injuries that might happen because your child is taking part in this research.

Participation and Benefits

Your child's involvement in this research study is completely voluntary, and you may discontinue you child's participation in this study at any time The only direct benefit of this study to you is that at the completion of the study a summary of the results will be mailed to you upon request. *

Questions Regarding the Study

If you have any questions about the research study you may ask the researchers; their phone numbers are at the top of this form. If you have questions about your child's rights as a participant in this research or the way this study has been conducted, you may contact the Texas Woman's University Office of Research and Sponsored Programs at 940-898-3378 or via e-mail at IRB@twu.ed. You will be given a copy of this signed and dated consent form to keep.

_______________________________________ ______________

Signature of Parent/Guardian Date

***If you would like to receive a summary of the results of this study, please provide an address to which this summary should be sent:**

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APPENDIX D

Scale-Based Letter Scoring Instrument

A scale-based handwriting rubric designed using the Test of Handwriting Skills-revised (Gardner & Morrison, 1998) and the Print Tool (Olsen & Knapton, 2006) was used to give a numerical grade of the participant's letter formation skill.
Score of 1 – participant makes no attempt to copy.
Score of 2 – participant makes attempt to copy but creates an undecipherable form.
Score of 3 – participant creates a form that resembles the target letter and contains any of the following: Missing parts, added parts, broken lines, unattached curves/lines, reversal or wavy lines. This indicates emerging letter copying skill.
Score of 4 – participant copies the letter without any of the errors listed under the score of 3.
Five consecutive scores of 4 or above indicate mastery.