

## THE EFFECTS OF, LINED PAPER, PROMPTING, TRACING, REWARDS, AND FADING TO INCREASE HANDWRITING PERFORMANCE AND LEGIBILITY WITH TWO PRESCHOOL SPECIAL EDUCATION STUDENTS DIAGNOSED WITH DEVELOPMENTAL DELAYS, AND FINE MOTOR DEFICITS

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### ABSTRACT

*This study was designed to examine the effects of tracing and fading prompts to improve the handwriting of two preschoolers both diagnosed as Developmentally Delayed (DD) and one of whom had fine motor goals. The study took place in a self-contained special education public preschool classroom located in the Pacific Northwest. The results showed an increase in legibility of writing for both participants as well as an increase in independence when writing their letters. This report suggests that providing traceable prompts and methodically fading those prompts based on student performance was effective and applicable when teaching preschool children diagnosed with Developmental Delays to write their names.*

*Keywords: Tracing, Fading, Prompts, Developmentally Delayed, Fine Motor, Preschool Children, Self-Contained Preschool, Handwriting.*

### INTRODUCTION

Handwriting is a skill humans have used throughout history to communicate, document, and learn. At one point in history, handwriting was even viewed as art, and individuals practiced for hours each day to perfect their handwriting into art (Leo, 2006; Richard, 2011). Modern technology has allowed for handwriting to receive less instruction in today's classrooms and curriculums. However, technology should not be allowed the opportunity to replace handwriting for several reasons. To begin with, punching buttons to make a shape that represents a sound hinders children's reading development because children are not "using a multisensory pathway to remember the shapes and names of the letters they will need as they learn to read" (Graham, 1999; Richard, 2011). Instead, children should still be taught to neatly and correctly form letters so they

are familiar with the letters and all they represent (Graham, 1999). Furthermore, technology should not be seen as a replacement or substitute for handwriting because many standardized tests contain a written portion in which the handwriting of the individual taking the test is considered in the scoring and value of the ideas presented (Leo, 2006; Nilsson, 2004). Research also revealed that students who are able to write legibly produce better compositions because they do not have to focus on the letter they are struggling to produce; instead, they can focus on generating a thought or an idea and presenting it in an elegant way (Nilsson, 2004). School work completed and written legibly receives higher grades than does work written with illegible letters or words (Graham, 1999). Finally, individuals are asked often for their name, phone numbers, addresses, and emails and when these names and modes of electronic communication are not hand written properly, the

electronic contact is lost. Including handwriting in a student's routine from an early age is a way of preventing such loss, preparing students adequately and completely for formal tests, and helping them prepare more fully for reading. As helpful and beneficial as technology is, it cannot fully take the place of handwriting. Consequently, it seems only logical to introduce and begin refining such a necessary, lifelong skill as early as preschool and then regularly throughout grade school (Park, Weber, & McLaughlin, 2007).

For beginning writers, there are three components to handwriting that are necessary to learn and simple to evaluate: size, slant, and formation of the letter (Nilsson, 2004). Research has shown that tracing is an activity that strengthens handwriting by helping children recognize the shape a letter takes while also practicing appropriate size of the letter and correct formation of the letter (Wistrom, 2011). Tracing letters is an ideal gateway to mastering size, slant, and formation of letters. Tracing also provides children with the opportunity to further refine their fine motor skills and concentrate on forming artistic letters (Leo, 2006). It has also been shown that tracing improves handwriting for children as young as preschool (Caletti, McLaughlin, Derby, & Rinaldi, 2012). The place for young children to begin preparing for reading, formal test, and interactions without technology is by learning to write their name.

The purpose of this study was to evaluate the effects of tracing and fading the prompts provided by tracing on the legibility of two preschool students' writing of their names in a self-contained preschool classroom. An additional purpose was to replicate our current handwriting research in the same preschool setting with different participants (Catelli et al., 2012).

## Method

### *Participants*

Participant 1 was a 5 ½-year-old male preschooler diagnosed with a developmental delay and who also exhibited severe behavioral and social disabilities. He attended a public preschool and was enrolled in a self-contained classroom. The Individualized Education Plan

(IEP) goals established for Participant 1 were in the pre academic domain and the behavioral domain. Participant 1 was referred to special education after being asked to leave several day cares and other preschools due to disruptive and destructive behavior. There was a history of learning disabilities on the maternal side of Participant 1's family. The mother and her siblings had IEPs with preacademic and academic goals throughout their schooling.

Participant 1 has also been tested using the Woodcock-Johnson-III (WJ-III) (Woodcock, McGrew, & Mather, 2008) and the BATTelle Developmental Inventory-II (BDI-2) (Newborg, 2004). His scores on the WJ-III were low and documented his need for special education in the preacademic domain. Participant 1 was able to demonstrate more strength on the BDI-2. He showed strong Adaptive skills and Personal-Social skills as demonstrated by his scores of 0.47 and 1.0 standard deviations below the mean respectively. His Motor Development was struggling minimally and only due to one area, perceptual motor. His fine and gross motor skills were developing at an appropriate rate, and his current skills are age appropriate. Participant 1 earned a score of 1.47 standard deviations below the mean in Communication. Although there was room for improvement, this was not an area of concern for his lead teacher. The fifth and final skill set, Cognitive skills, was Participant 1's weakest skill set. He scored 2.27 standard deviations below the mean. Participant 1 was receiving specialized instruction in this area to increase his skills and abilities so integration and success could be a part of his future.

Participant 2 was a 4 ½-year-old girl who was diagnosed with a Developmental Delay (DD) and ASD. She was referred to a self-contained public preschool to receive therapy in the communication and fine motor domains. One of her IEP goals was to write the first three letters of her name by June 2012 and then her whole name by February 2013 with the guidance and extra instruction provided by an occupational therapist (OT).

### Setting

This study took place in a self-contained special education preschool classroom at a public elementary school in the Pacific Northwest. It has been the setting for several recent research projects involving handwriting (Caletti et al., 2012; Chandler, McLaughlin, Neyman, & Rinaldi, 2012; Coussens, McLaughlin, Derby, & McKenzie, 2012; Ehlers, McLaughlin, Derby, & Rinaldi, 2012). Both participants were enrolled in the afternoon session of a half-day public preschool program. When the study began there were eight students in the afternoon. By the conclusion of the study there were a total of ten students in the session, including the participants. The classroom served a wide range of disabilities including Down's Syndrome, Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD), Developmentally Delayed (DD), sensory impairments and delays, social delays, speech delays, and the blind. The data were collected after the students arrived in the classroom and checked-in and was to be completed before engaging in free play. These data were collected at a table located near the door of the classroom that was oriented in such a way that made the children look at the door with their backs to the classroom where free play was taking place for those who had completed their tasks. This was done to eliminate some distraction caused by classmates engaging in free play and also to engage all children in an entry task that would help prepare them for the increased structure and demands of kindergarten.

### **Dependent Variables and Measurement Procedures**

The dependent variable recorded was the rating of handwriting. Three parts to each student's handwriting were scored: size of the letter, slant of the lines or curves within appropriate letters, and formation of the letter. If size of letter was appropriate one point was awarded. The letter had to stay within the lines on the paper yet touch, or bump, the top and/or bottom lines. For slant, one point was awarded when the lines were steady and at appropriate angles to form the intended letter. Formation of the letter earned a point if the letter written by the student was judged. Formation was defined as resembling the intended letter without clarification by the student or the need for a reference such as the faint

outline of the letter being traced. At the beginning of each session, the participants were reminded to trace the lines or write the letters they had nearly mastered and to finish the sheet so they could earn as many points as possible. The participants and their classmates had the opportunity to earn up to 69 points per session by tracing or writing 23 letters. The students were allowed to proceed to the next level or a new letter, when they earned 55 points or more for three consecutive days. Data were collected twice a week for approximately three weeks and four times a week for approximately seven weeks.

### **Experimental Designs and Conditions**

A combination multiple baseline and reversal design was used for the duration of this study (Barlow, Nock, & Hersen, 2008; Kazdin, 2011). Below are descriptions of each condition.

#### ***Baseline***

Baseline data were collected by having Participant 1 and Participant 2 write their first name on a piece of white coloring paper. They were not provided with a visual aid, verbal prompting, or hand-over-hand assistance. The researcher scored the final product considering the size, slant, and formation of each letter. Baseline was in effect for differing numbers of sessions for Participants 1 and 2.

#### ***Lined Paper***

After baseline data were collected, the participants were asked to write their names on lined paper. The letters produced were scored the same way as in baseline; size, slant, and formation were considered for letters written. However, points were not awarded for letters not written. These scores were used to determine which letter and the stage at which each participant began to trace their name.

#### ***Lined Paper and Tracing 1.***

The researcher drew each letter of each participant's name 24 times through 7-9 stages in which the prompts for the participants were faded. The first stage was the letter written with wide, solid lines. The next stage was the whole letter written with thin solid lines. The third stage was the use of wide dots, and the fourth stage was thin dots all to be connected by the participants. After the fourth stage

the number of dots to be connected were faded until the eighth or ninth stage, depending on the complexity of the letter. Next, the participant was presented a full sheet of blank lined paper on which to write the letter. The first letter of every page, including the pages designated for the student to write the letter without prompts, had a model of how the final letter should look. To progress to the next stage or graduate to the next letter, the participants had to earn 55 of the 69 possible points for two consecutive data days.

## Lined Paper and Tracing 2

Participant 2 was presented with smaller segments of the writing sheet. She was then required to trace or write eight

letters per session instead of 23 letters. During this phase, Participant 1 continued to receive the whole sheet with 23 letters and one model.

## Results

Both participants demonstrated an increase in awareness and ability to write the first letters of their names (See Figures 1 and 2) from the beginning to the end of the study. This increased awareness and increased ability to write the letters allowed both participants to acquire more points when writing their names at the end of the study (See Figures 3 and 4). Participant 1 earned 1 out of 18 points during baseline 1 for writing his entire name on white paper. Participant 2 earned 0 out of 18 points for writing her name on white paper during baseline 1. During baseline 2, Participant 1 earned 2 out of 18 points while Participant 2 earned 6 out of 18 points for writing their

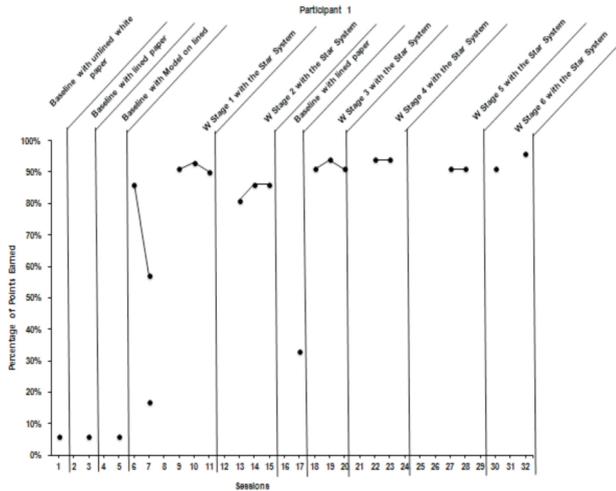


Figure 1. The Percentage of Points Earned by Participant 1 During Four Baselines and the First Six Stages of Tracing the First Letter of his Name

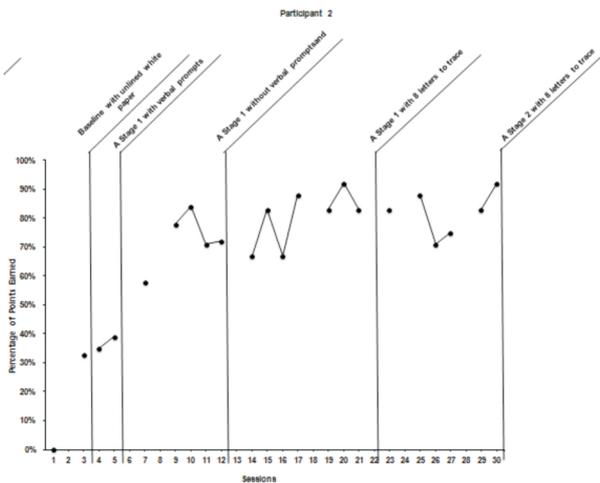


Figure 2. The Percentage of Handwriting Points Earned by Participant 2 During Baseline, Two Prompting and the Two Tracing Phases

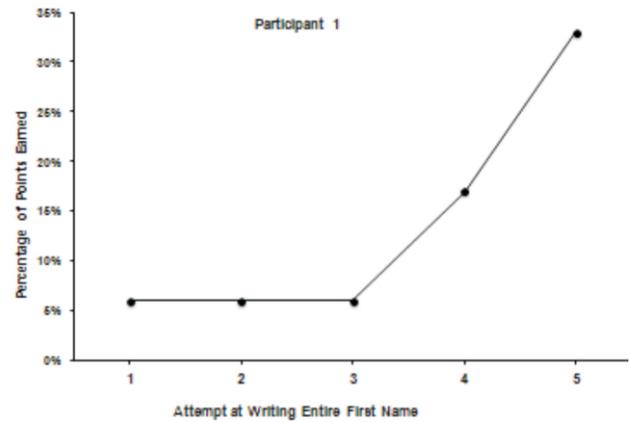


Figure 3. The Percentage of Points Earned by Participant 1 when asked to Write his Whole First Name after Intervention Began

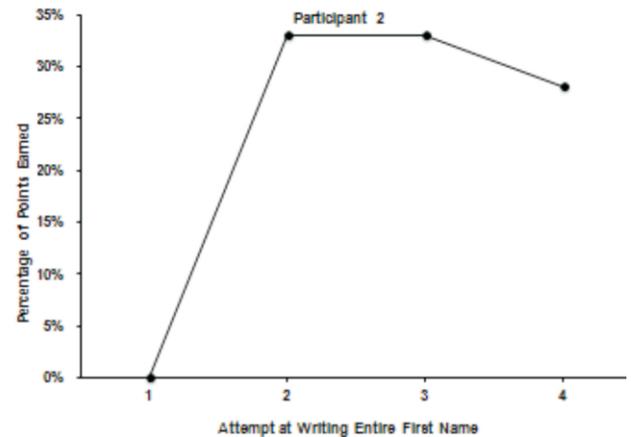


Figure 4. The Percentage of Points Earned by Participant 2 when asked to Write her whole First Name after Intervention began

names on lined paper. By the end of the study, baseline 5 for Participant 1 and baseline 4 for Participant 2, Participant 1 earned 6 out of 18 points for writing his entire name on lined paper, and Participant 2 earned 5 out of 18 points for writing her entire name on lined paper.

Participant 1 earned 59, 39, 63, and 64 out of 69 points for stage 1 intervention for the first letter of his name. For stage 2 of the same letter, he earned 62 and 56 out of 69 points. For stage 3 of the same letter, he earned 59, 52, and 63 out of 69 points. For stage 4 of the same letter, he earned 65, 63, and 65 out of 69 points. For stage 5, he earned 65, 63, and 63 out of 69 points. For stage 6 of the same letter, he earned 63 and 66 points.

Participant 2 earned 24, 27, 40, 54, 58, 49, and 50 out of 69 points for stage 1 of the first letter of her name. Modifications were made to her practice sheets and she earned 16, 20, 16, 21, 20, 22, and 20 points out of 24 points for stage 1 of the first letter of her name. While continuing the modifications, Participant 2 earned 20, 21, 17, 18, 20, and 22 out of 24 points for Stage 2 of the first letter of her name.

## Discussion

The results of the study indicate that tracing letters and then fading the prompts for those traceable letters was developmentally appropriate. Each individual participant improved in their ability to write his or her name. Providing students with and without disabilities with starting dots and the opportunity to trace letters to learn size, slant, and formation, and then to fade those prompts appropriately was supported by previous research (Park et al., 2007).

Despite the demonstrated success, greater success could be obtained, especially for Participant 2, if the study lasted several more weeks or if daily practice was implemented so more letters could be mastered. Neither participant was able to complete their entire first name within the time line for data collection.

One of the greatest strengths within this study was the reinforcement system used for Participant 1. Hand drawn stars were awarded for each letter, and Participant 1 worked diligently to earn the maximum amount of stars for

every letter he wrote. The large quantity of stars he earned in the beginning stages made him very proud of his work and motivated him to maintain such high quantities of stars throughout the study. This steady, consistent eagerness to succeed allowed Participant 1 to progress through several letters of his name as well as learn the control and discipline required for writing quality letters. This mastering the ability to write letters leads to a second strength within the study: the participant's learned the invaluable skill of writing their names. The ability to write one's name legibly and reliably is a necessary skill each individual with the potential to write should be able to do. It is a skill used daily in childhood to claim one's work and a skill used in adulthood when distributing contact information, writing a check, or taking notes while at work. A third strength within this study was the ease with which it can be replicated and implemented in other preschools for both disabled and nondisabled children. The materials needed were affordable and easy to find. Furthermore, entire classes can benefit from such a set up, the teacher is not restricted to a small group of participants.

Several weaknesses within the study took place. One of the largest weaknesses within the study was the time restraint. There was not enough time from the initiation of the study, mid-school year to the conclusion-the end of the researcher's school year-for the participants to benefit from having the opportunity to practice letters seen later in their names or to begin work on their last names. Also, while the study was taking place, the researcher's time with the participant's was limited, therefore limiting the researcher's ability to provide all of the necessary verbal prompting and direct instruction that would have allowed for possible faster progress and therefore practice with more letters of their names and the alphabet. Another weakness within the study was that all of the letters traced by the students were drawn by the first author. There were some slight and some more significant inconsistencies between letters on each page, potentially confusing the participants as to how to properly trace or write the letter. Furthermore, the participant's were both held to a certain standard that required them to form letters with consistent precision. It was not best for them to have inconsistent

letters to trace or write when their prompt was inconsistent. Another weakness lies within the time it takes to create the work sheets and the quantity of worksheets per letter. Drawing a letter to look the same 24 times per sheet is tiring for the instructor. Having to then create seven to nine stages per letter requires a time commitment not available to many instructors in today's school system. There were also days when the researcher found it especially difficult to gather and maintain the participants' attention, especially Participant 2. She often wanted to play with her peers, one boy in particular, and when she could not because she had not finished her work, she rushed and did a poor job thus slowing her progress. With better timing of the activity in the day or a more controlled atmosphere, some students were not feeling as though they were missing out on the fun activities, and could have potentially delivered better results for the students who found reinforcement from free play.

The main goal of this study was to increase the participants' skills at writing their names so they would be better prepared to fulfill the tasks required of them next year in kindergarten. The data gathered during and presented in this study suggests that both participants will be better prepared for kindergarten due to their demonstrated increased handwriting skills. This analysis replicates previous research on handwriting with preschool children with disabilities (Carlson, McLaughlin, Derby, & Blecher, 2009; Cosby, McLaughlin, Derby, Huewe, 2009; Coussens et al., 2012; Lebrun, McLaughlin, Derby, & McKenzie, 2012; Park et al., 2007). Furthermore, these outcomes suggest that students with disabilities can be taught and obtain skills that are often thought to be too difficult or too strenuous for them to learn and maintain and are therefore reserved only for children in general education (Hoard, Williams, & Lepper, 2010). In an effort to continue to strengthen the skills of these students, continued research should be conducted to determine if the acquired skills are maintained over time and across a variety of classroom settings.

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