

HANDWRITING AND FINE MOTOR SKILL DEVELOPMENT
IN THE KINDERGARTEN CLASSROOM

by

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Handwriting and Fine Motor Skill Development in the Kindergarten Classroom

In the last two years of being a kindergarten teacher, I have noticed a trend with students in my classroom. I have noticed that many students struggle with handwriting and correct letter formation even after being explicitly taught. This is a concern to me because I have seen that it interferes with student writing. I have seen that some students spend a majority of their energy focusing on how to form letters, rather than what words they are writing. These students also struggle with fine motor tasks such as coloring and cutting. These students often lack confidence as well as engagement when participating in any writing task.

In my current kindergarten class, I have identified several students who struggle significantly with handwriting. There are several possible explanations as to why these students continue to struggle while the rest of the class is progressing normally. Some of the students did not attend pre-K or any schooling prior to kindergarten. The hand muscles which help with fine motor skills may be weak due to lack of experience at home and school. Another possible explanation would be a learning disorder. It is possible that there may be a cognitive processing issue that could be linked with dysgraphia. While the participants in this study have not been diagnosed as having dysgraphia, I believe it is a valid consideration as many of the characteristics of dysgraphia are similar to those that I observe in the students' writing samples.

Currently, I teach in a district in which there is a lack of emphasis on handwriting and fine motor skill development. There is not a handwriting curriculum or resources for teachers to use in order to teach handwriting. This implies that teachers must teach kindergarten children to write words and sentences before ever teaching them the foundational steps of how to form a letter. All lessons that are taught must follow a framework that boosts higher order thinking and rigor. Fine motor activities are not encouraged by the district because while they might be

developmentally appropriate, they are not considered higher-order thinking. I believe that these factors may contribute to why some students struggle with handwriting.

These are the factors that led to my desire to implement change in my kindergarten classroom. I used classroom action research as a way to improve my instruction as a kindergarten teacher through handwriting interventions and fine motor skill practice. Classroom action research is a form of research that values the interpretations that teachers make based on data collection with their students and is designed for teachers to implement in their classrooms with the purpose of improving practice (Hendricks, 2009). Action research best fit the needs of this study as I implemented interventions and revised those interventions in order to meet the needs of each participant.

Prior to the start of the study, I collected writing samples from all potential study participants to determine the specific areas in which they were struggling. These writing samples included independent writing, journal writing, and copied writing. Based on these writing samples, I was able to determine the needs of each participant. I noticed that each participant had a weak pencil grip, lacked fluidity when writing, and formed letters that were often illegible. I used this information to form interventions to meet the needs of each specific student. This information was also used to determine if there was one area that proved to be more challenging for these students. These writing samples also served as a base to compare any progress that was made.

According to recent research, drill and fine motor activities can significantly improve student handwriting. Using drills that build the muscles used for fine motor activities can help improve hand functioning, which can lead to better handwriting (Crouch & Jakubecy, 2007). As their primary teacher, I was wondering how I could improve student handwriting skills,

specifically letter formation. I was interested to find out what impact fine motor drills and handwriting based interventions had on student handwriting in the classroom.

Literature Review

Fine Motor Skill Development

Kindergarten

According to recent research, effective fine motor skills are essential for kindergarten success (Ohl et al., 2013). Fine motor skills refer to the small muscles in the hands and fingers that are responsible for tasks such as picking objects up and grasping a pencil. Children use fine motor skills in school with tasks such as cutting and pasting, using manipulatives in mathematics, or clapping their hands to learn syllables (Cameron et al., 2012). Research suggests that kindergarten students spend a significant portion of the school day (46%) performing a variety of fine motor activities such as eating, coloring, cutting, and writing (Marr, Cermak, Cohn, & Henderson, 2003).

According to the *Developmentally Appropriate Practice in Early Childhood Programs* manual, published by the National Association for the Education of Young Children, most kindergarten students will initially struggle with tasks that require fine motor coordination such as writing, drawing, and cutting with precision (Copple & Bredekamp, 2009). By the end of the year, kindergarten students, who have had practice developing their hand muscles with activities such as writing, drawing, painting, working with clay, and constructing Legos, should have more developed fine motor skills (Copple & Bredekamp, 2009). Other activities commonly used in kindergarten to improve fine motor skills are sorting small objects, stringing beads, zipping, buttoning, tying clothing, using scissors, and pouring (Copple & Bredekamp, 2009). Refinement

in fine-motor skills develops as students continue to practice writing and drawing skills in the primary grades (Frost, Wortham, & Reifel, 2008).

Significance

Not only are fine motor skills important for children to develop so they can become proficient in tasks such as cutting and coloring, but according to recent research fine motor skill development is also associated with mathematics and reading achievement in the later years (Cameron et al., 2012; Grissmer, Grimm, Aiyer, Murrah, & Steele, 2010). Researchers Grissmer et al. (2010) analyzed three longitudinal data sets to determine if motor skills were related to later academic achievement. The data for this study was collected from children ages birth to kindergarten and followed the children through at least third grade. Using a method introduced by Duncan et al. (2007), the researchers found that fine motor skills were accurate predictors of later mathematics and reading achievement scores (Grissmer et al., 2010). The researchers suggested that the neural infrastructure that is built during motor development has an impact on cognitive development and specific types of learning (Grissmer et al., 2010). This is significant research as it suggests that fine motor skill development plays an important role in academic achievement. Typical fine motor tests include tasks such as drawing with a pencil to copy an image, drawing to create an original image, or spatial organization such as building with blocks (Cameron et al., 2012). Researchers Cameron et al. (2012) used such tests with preschool aged children and found that children's ability to use fine motor skills to copy designs was strongly associated with gains in decoding, comprehension, and overall reading once they entered kindergarten.

According to the Texas Education Agency (TEA), “using a computer mouse, cutting with scissors, and drawing are the foundational skills needed for the demands of handwriting and

other small-motor skills in later school years” (Texas Prekindergarten Guidelines, 2008). While many of the activities done in a typical kindergarten classroom use fine motor skills, the emphasis needs to be on developing these skills appropriately. Researchers from a recent study found that 24 out of 32 kindergarten aged students who were involved in a daily specific fine motor program attained fine motor scores above the population mean for their age group and significantly higher than the control group in the study (Brown, 2010). This is an indication that fine motor programs are beneficial to students in kindergarten. This also supports the need for kindergarten students and teachers to have the time, materials, and curriculum in order to develop these fundamental fine motor skills.

Barriers

There are many possible reasons as to why students enter the kindergarten classroom at varying levels of fine motor skill development. Three possible causes are developmental delay, lack of any schooling prior to kindergarten, and/or a writing disability such as dysgraphia.

First, developmental delay is associated with the varying rates at which children develop. Rates of development are so rapid in the preschool and early elementary grades that often children of the same chronological age will be at strikingly different developmental levels (Zill, Loomis, & West, 1997). Language, social, emotional, and physical development are all components that play a role in the development of a child. Not all children who enter kindergarten may be “ready for school” or be ready to handle the social and cognitive expectations of a kindergarten classroom, but according to typical kindergarten programs and curricula all general education children are held to the same standards despite developmental level (Zill et al., 1997).

Second, while it is ideal that all students attend a developmentally appropriate preschool or pre-kindergarten program, that is simply not the case. Current literature suggests that preschool children gain precision in fine-motor development, or the use of the hands and fingers, between the ages of three and five (Frost et al., 2008). In Texas, there are specific prekindergarten standards that emphasize fine motor development. According to TEA, by the end of prekindergarten children should show “control of tasks that require small-muscle strength and control” (Texas Prekindergarten Guidelines, 2008). TEA Prekindergarten Guidelines also state that students should be able to show “increasing control of tasks that require eye-hand coordination” (Texas Prekindergarten Guidelines, 2008). While these standards help to provide the foundation students need to develop fine motor skills, it must be noted that not all students entering kindergarten have these skills or even the access to a prekindergarten program. Not all children attend a preschool or prekindergarten program before entering kindergarten, as preschool is not a requirement in any state across the United States. Students who do not attend school prior to kindergarten may lack the experiences needed to demonstrate fine motor skills in kindergarten.

Environmental factors play a role in motor development of young children. Children who attend a preschool program or live in a home that provides fine motor development activities have a greater advantage to those who come from an environment with little to no opportunities (Venetsanou & Kambas, 2010). For example, highly educated and wealthy parents can provide their children with enriched educational opportunities or high-quality preschool programs, whereas children from families with fewer financial resources may not have the chance to experience such learning opportunities (Holloway, 2003).

Third, it is possible that some students who struggle with writing and lack typical fine motor development may have a learning disability. For example, dysgraphia is a processing disorder that affects a person's ability to write legibly. The National Center for Learning Disabilities (NCLD) notes the following as possible early signs of dysgraphia: tight and awkward pencil grip, trouble forming letter shapes, inconsistent spacing between letters and words, inability to write or draw on the lines, poor understanding between capital and lower case letters, illegible handwriting, and/or trouble of thinking of words to write ("What is Dysgraphia?," n.d.). Students with dysgraphia struggle to express their thoughts in written form and also often exhibit trouble with working memory because so much of their attention is spent on the mechanics of writing (Crouch & Jakubecy, 2007). Students with dysgraphia may lack the automaticity that comes with letter formation. Letter formation is automatic for most students after initial skill attainment, and when letter formation is automatic, students can concentrate on other aspects of writing such as spelling and sentence structure (Crouch & Jakubecy, 2007). Many of the suggested activities to help students with dysgraphia focus on strengthening fine motor skills and teaching specific letter formation (Berninger & Wolf, 2012).

Interventions

Children who lack fine motor skills, notably design copy skills, are likely to fall behind in other academic areas (Cameron et al., 2012). Implementing specific interventions may be critical to helping students strengthen fine motor skills in the early years of schooling which could lead to later on academic success. Specifically, interventions may help students develop the writing skills in order to become successful writers (Berninger et al., 2005). One research study found that although kindergarten classrooms were rich with fine motor activities, carefully constructed and coached activities were more effective in improving pincer grasp, one aspect

associated with fine motor development (Ohl et al., 2013). Often times these “coached activities” are done with small groups of students. During the first half of the school year, kindergarten students may benefit from improving the underlying performance skills of handwriting (Ohl et al., 2013) through small group interventions focused on fine motor skill development.

Small group interventions can provide students with opportunities to develop new fine motor skills and strengthen previously learned fine motor skills. An important part of motor development is a spiraling process in which newly developed motor skills provide expanding opportunity for children to experience more challenging environments that, in turn, require more complex cognitive ability (Grissmer et al., 2010). Introducing students to these complex motor activities and coaching them through in a small group setting may be one way educators can effectively promote student fine motor skill development. Fine motor skills are essential to kindergarten performance as well as predictive of later achievement and therefore require immediate intervention when a concern arises (Ohl et al., 2013).

Some examples of these interventions are writing with pencils and markers, completing puzzles, molding clay, stringing beads, cutting with scissors, connecting small plastic interlocking cubes, and tracing in the lines to complete mazes (Berninger & Wolf, 2012; Copple & Bredekamp, 2009). Rule and Stewart (2002) found that children who participated in fine motor activities strengthened their fine motor skills when compared to those children who did not participate. Rule and Stewart (2002) used the following fine motor activities to foster fine motor skill development of kindergarten children. “Ladybug Levels” is an activity in which children use tweezers to pick up ladybug shaped erasers and match them in the correct position to the coordinating picture of ladybugs. Similarly, “Diamonds” is an activity that contains a box with 12 fake diamonds, a bowl, and an egg carton with fabric glued to the bottom of each of the

compartments to represent pillows. The child is instructed to use a spoon to transfer and position each of the diamonds to the “pillows” in the egg carton. The child then must return the diamonds back to the glass bowl using the spoon (Rule & Stewart, 2002). Another example that Stewart, Rule, & Giordano (2007) used to improve fine motor skills in the classroom is what they called the “Tropical Fish” activity. For this activity children used tweezers to place miniature fish statues onto spoons of differing heights. Activities like these require focus and hand strength which can be developed through the strengthening of fine motor skills.

Another intervention that has also been used as a fine motor skills assessment is what Rule & Stewart (2002) call the “Penny Posting Test.” In the Penny Posting Test, children are to use their dominant hand, while seated, to pick up and drop pennies into a can with a small slit at the top. The children are measured based on the number of pennies they can put into the can in a 30 second time frame (Rule & Stewart, 2002). Increasing children’s opportunities for fine motor learning experiences with interventions such as these may be one direction for kindergarten programs and curricula.

Handwriting

Kindergarten

Writing is an especially important area of communication and fine motor development in kindergarten. At this age, children develop an increased desire to communicate effectively (Copple & Bredekamp, 2009). Writing is an integral component of language, and when a child writes, thoughts and knowledge are synthesized to create a unique message (Jones, Reutzel, & Fargo, 2010). It is at this time of development when children begin to understand that their personal thoughts and experiences can be expressed in written form.

According to Olsen and Knapton (2013), kindergarten is the crucial year to teach good handwriting habits. Writing requires fine motor skills with the hands as well as hand-eye coordination (Grissmer et al., 2010). Most students who enter kindergarten are at the beginning stages of reading and writing development. This is an important year for students to gain conceptual understanding of basic writing skills. The earlier that children master the skill of handwriting, the more likely they are to succeed in school (Olsen & Knapton, 2013). Writing is important because it is a basic skill that is incorporated into all subject areas as well as homework, tests, note taking, and classroom assignments (Spear-Swerling, 2006).

The kindergarten curriculum is changing and the academic expectations for kindergarten students are higher than they have ever been (Litty & Hatch, 2006; Morrison, 2007). Kindergarten now looks like what first and second grade did in the recent past (Hatch, 2005). Many professionals agree that this trend will continue, making higher expectations for kindergarten students (Morrison, 2007). As these trends continue it is important that instruction remains developmentally appropriate and meets the needs of students.

According to Morrison (2007), the primary goal of kindergarten education is for children to learn how to read and teachers must instruct, support, and guide them in what is necessary to become successful readers. Writing is a complex skill that is as important to literacy as is reading (Berninger et al., 2005). In order to promote reading, it is vital that writing is also given appropriate attention in school. As reading and fine motor skills progress, kindergarteners typically move forward in writing skills. Engaging students in writing helps students increasingly become better readers (Copple & Bredekamp, 2009).

Standards and Curriculum

The Texas Essential Knowledge and Skills for kindergarten state 97 different standards

for English Language Arts. Of the 97 English Language Arts standards, two emphasize handwriting and letter formation. Kindergarten students are expected to “form upper- and lower-case letters legibly using the basic conventions of print” as well as “write legibly and use appropriate capitalization and punctuation conventions in their compositions” (TEKS for Kindergarten, 2013). While this is a standard that is required by the state, many schools and school districts have moved away from teaching non-tested subjects in order to focus more minutes of the day on reading, mathematics, and science instruction to prepare for high-stakes state testing (Au, 2007). At the same time, most states now have standards for writing and require students to create written compositions to communicate knowledge and understanding of the subject matter (Berninger et al., 2005). Students in Texas are required to take a standardized writing test in fourth grade and seventh grade. Automatic letter writing, which is developed through handwriting instruction, may be the single best predictor of length and quality of written composition in the elementary grades (Graham, Berninger, Abbott, Abbott, & Whitaker, 1997). In order for students to be able to write fluently on standardized tests, handwriting skills should be taught once students begin school.

In one study focusing on handwriting problems in 144 first grade students, several of the first grade teachers noted that many children entering first grade did not have the level of handwriting skill that would be typical in the past (Berninger et al., 1997). The teachers in the study speculated that handwriting is no longer given as much priority in the kindergarten curriculum as it once was. The authors of the study noted that at the present time handwriting and spelling skills are underemphasized, with many children receiving little to no explicit instruction in handwriting (Berninger et al., 2005). If students are not given the proper time and

instruction to develop their handwriting skills in early grades, it is likely that they will continue to struggle with writing in later years.

Interventions

Students who struggle with handwriting in the early grades will often continue to have difficulty writing clear legible letters in the later grades (Graham et al., 1997). In order for teachers to meet the needs of developmentally diverse students, they must adapt the curriculum and modify instruction so that every child in the class is learning (Litty & Hatch, 2006). Short-term interventions can have a significant effect on the fine motor and visual-motor integration skills required for handwriting readiness (Ohl et al., 2013).

As soon as children are able to write legibly, it is important that they learn to write letters automatically (Berninger et al., 2006). Interventions such as explicit handwriting instruction and practice at an early age may help students to develop letter automaticity. Researchers have found that frequent explicit handwriting instruction may help young children learn to develop automatic letter production and retrieve letter forms quickly from memory and may increase the probability that they will become skilled writers (Berninger et al., 1997; Berninger et al, 2005).

Handwriting Without Tears®

Handwriting Without Tears® is a handwriting curriculum for teachers that emphasizes developmentally appropriate strategies, explicit demonstration, and multisensory tools to help students effectively master handwriting skills (Olsen & Knapton, 2013). Multisensory instruction allows for varied teaching styles to address diverse learning styles such as visual, tactile, auditory, and kinesthetic. Furthermore, multisensory instruction may also be beneficial for students with dysgraphia (“What is Dysgraphia?,” n.d.).

Olsen and Knapton (2013) believe that children need to be taught explicit letter formation in a specific developmental order in order to achieve legible, fluent handwriting as well as to boost children's confidence for writing. The lessons in the Handwriting Without Tears® program demonstrate step-by-step letter formation to help students learn basic letter formation habits (Olsen & Knapton, 2013). For students to be able to develop legible handwriting, one critical step is teaching an efficient pattern for forming individual letters (Graham, 2010).

The Handwriting Without Tears® program suggests a specific order to introduce and teach each letter. Capital letters are taught first as they all start at the top, are all the same height, and are easier for children to recognize than lowercase letters (Olsen & Knapton, 2013). Lowercase letters are typically more difficult for students to master so those are taught in small groups of similar formation after all capital letters are taught. Teaching letter formation in this sequential order may help students use prior knowledge and previously taught techniques to form new letters correctly.

The Handwriting Without Tears® program is research based and focuses on developmentally appropriate practices. Researchers Lust and Donica (2011) found that when implementing the Handwriting Without Tears® program in an early childhood Head Start program, the children who received the Handwriting Without Tears® curriculum made significant progress in handwriting readiness skills. The researchers noted that the children receiving the Handwriting Without Tears® supplemental instruction made greater gains in handwriting readiness skills than the students who did not receive the supplemental instruction (Lust & Donica, 2011).

In conclusion, it is important that handwriting and fine motor skill development are given adequate recognition in today's kindergarten classroom. As children enter the kindergarten

classroom and begin the process of learning to write, teachers must make certain that they have the foundational skills to become successful. As the research literature demonstrates, small group interventions may be beneficial for students who enter kindergarten with underdeveloped fine motor skills. The research question guiding this study was: how can I use classroom action research to determine the impact of implementing small group fine motor practice on student handwriting skills?

Method

Setting

East Elementary School¹ is a public school located in a large urban district in Texas. The school currently serves 720 students kindergarten through fifth grade. The school is located in an industrial part of town and most students live within two miles of the school. According to the most recent data from the Texas Education Association (TEA) website, the demographics of the students are 73.5% Hispanic, 16.5% White, 5.4% African American, 1.9% Asian, and 2.7% other. Data also shows 80.6% of students are economically disadvantaged and 49.9% of students are English Language Learners. The school follows a bilingual/ESL model. All monolingual teachers must be certified as an English as a Second Language (ESL) teacher.

There are 18 students in my kindergarten class. Seven of these are girls and 11 are boys. Of the 18 students in my class, only five attended a pre-K program. The demographics of my classroom are similar to the demographics of the school. There are three African American students, four Caucasian students, and 12 Hispanic students. All students speak English although six students speak English as a second language. The school day starts at 7:45 a.m. with breakfast in the class room and ends at 2:45 p.m. The school day is broken down into 140 minutes of reading/writing instruction, 90 minutes of mathematics instruction, 60 minutes of

¹ All names are pseudonyms.

science instruction, 50 minutes of specials (art, music, or physical education) and 40 minutes of social studies instruction. During each school day 45 instructional minutes are spent specifically on writing. Writing is also frequently incorporated into every other subject area throughout the day.

Participants

There are two male students and one female student who are the focus for this study. Each of these students' names has been changed to a pseudonym in order to maintain confidentiality. Each of the three participants' legal guardians signed a parent permission form prior to the start of the study. I also received verbal assent from each of the three participants.

John. John is a six year old boy who attended a half day prekindergarten program. John alternates living with his mother and his father. After school he spends most of his time with his grandfather. John enjoys playing video games and learning about cars. He receives little support at home when it comes to school work and rarely turns in completed homework. John struggles to complete tasks independently such as putting on his jacket, clipping on his school badge, tying his shoes, and opening his milk carton. When this topic came up during a parent-teacher conference, his mother and father did not express a desire to help John become more independent. It is apparent that his mother and father do not want to make John do anything that is out of his comfort zone. As his teacher, I see the frustration John displays when he is asked to do something that he does not want to do. John is above grade level in both mathematics and reading. John works well with his peers and has many friends in class. John was selected for this study based on his illegible handwriting, weak pencil grip, and frustration displayed during writing.

Katie. Katie is a five year old girl who did not attend a prekindergarten program. Katie turned five on September 1st, which is the cutoff date for students entering kindergarten. She is the youngest student in the class and it is often evident through her behaviors. Katie enjoys playing and often struggles to focus in class. She lives with her mother, father, brother, and sister. Katie is the youngest child, separated by a fifteen year age difference. Katie speaks English as a second language. Her first language is Spanish, which is predominantly spoken at home. Katie is on grade level in reading and is below grade level in mathematics. Katie receives support at home with school work. Katie was selected for this study because of her inability to form letters correctly. After being taught each of the letters, Katie's handwriting was not improving.

Luis. Luis is a five year old boy who, like John, attended a half day prekindergarten program. Luis lives with his mother, father, and several siblings. Luis is at grade level in both reading and mathematics. He works well with others and is eager to learn. Luis receives support at home in regard to his school work. Luis has a hard time seeing. His vision was checked with the school nurse, and his parents were notified about seeing an eye doctor for glasses. Luis has yet to receive glasses and struggles daily to see the board and/or anything that is not directly in front of him. It is possible that this may impact his handwriting skills, although that has not been determined. Luis was chosen for this study based on his weak pencil grip and illegible handwriting. His handwriting looks shaky as if the handwriting motions do not come natural.

Procedures

The framework for this research study follows the plan outlined in Figure 1. At the start of the school year, all students in the class received daily handwriting instruction following the Handwriting Without Tears® model. By the time that interventions started in December, the

participants had all been taught how to correctly form all of the letters in the alphabet. As soon as participants were identified in October, I began to collect preliminary data to determine the areas of focus for each student. I used this data to drive small group activities as well as to measure changes over time. For preliminary data, I collected writing samples from independent writing and journal writing. Using preliminary data, I created the first set of interventions in the action research cycle.

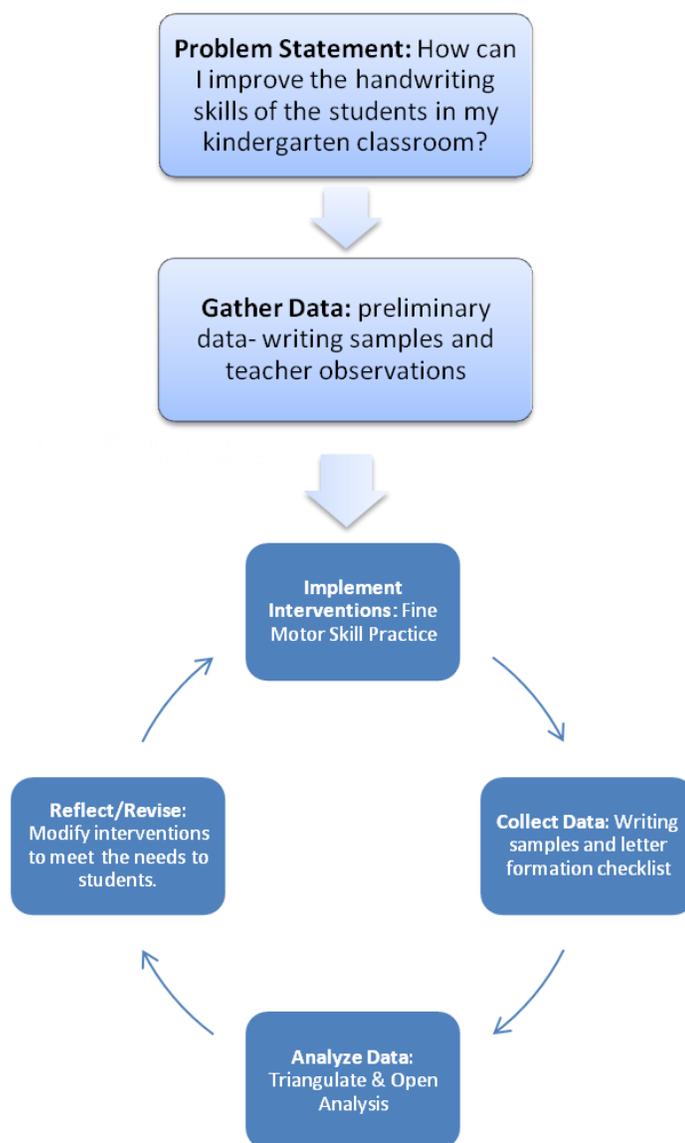


Figure 1. This figure represents the cycle that was used during the action research study.

Cycle 1 of the study began with all three students working on fine motor skill activities. I met with the participants in a small group two to three times a week. I had initially planned to meet with students for 10 to 15 minutes each day, but, after realizing the length needed for the interventions, I worked with students for 20 to 30 minutes each day. While I was working with this small group, the rest of the class was working independently on mathematics workstations. This allowed for uninterrupted time with the three participants. During and after each small group lesson, I made notes in a journal to document any changes or areas of concern that caught my attention. Every two weeks, I scored students' writing based on a rubric created for this study (Figure 2). I created the rubric based off of the rubric used by Crouch and Jakubecy (2007). For each student, I scored one sample from each writing category for a total of three samples every two weeks. The writing categories included: independent writing, journal writing, and copied writing. I used the rubric to determine areas of strength and weakness for each student. In addition to the rubric, I had students complete a writing checklist (Figure 3) to determine which capital and lower case letters the students could form correctly.

During Cycle 1 of the study, I was following a two week intervention model. I started the first two weeks focusing on interventions specific to pincer grasp. I chose to start with pincer grasp because all of the participants displayed a weak pencil grip. I was able to determine that each of the students had a weak pencil grip based on informal observations. The muscles used for pincer grasp are the same muscles used to hold a pencil and I wanted to see if strengthening those muscles would have an impact on pencil grip or handwriting.

Kindergarten Handwriting Rubric

	Weak (1Pt)	Poor (2Pts)	Fair (3pts)	Good (4Pts)	Outstanding (5Pts)
Directionality Is the student beginning and ending their letters at the correct spot?	Many errors. Does not begin letters at the correct spot.	Some errors. Rarely begins letters at appropriate spot.	Few errors. Begins letters at appropriate spot some of the time.	Uses correct directionality most of the time. Begins letters at the appropriate spot most of the time.	Always uses correct directionality. Begins letters at the appropriate spot all of the time.
Using the Lines Is the student using the writing lines?	Many errors. Letters are not formed using the lines.	Some errors. Letters touch a few of the correct lines.	Few errors. Letters touch some of the correct lines.	Uses lines correctly most of the time.	Uses lines correctly all of the time.
Circle closure Do circles close?	Circles do not close.	Some circles close.	Few circles close.	Most circles close.	All circles close.
Lines are Straight Are all lines straight that are supposed to be?	Lines are not straight.	Some lines are straight.	Few lines are straight.	Most lines are straight.	All lines are straight.

Figure 2. This figure represents the rubric that was used to score to student writing.

Name: _____

Date: _____

Name: _____

Date: _____

A	B	C	a	b	c
D	E	F	d	e	f
G	H	I	g	h	i
J	K	L	j	k	l
M	N	O	m	n	o
P	Q	R	p	q	r
S	T	U	s	t	u
V	W	X	v	w	x
Y	Z		y	z	

Figure 3. This figure represents the handwriting checklists that were used for data collection.

Some of these interventions were stringing beads onto string, peeling stickers, and using clothes pins to pick up cotton balls. After two weeks of pincer grasp activities, I analyzed writing samples and had participants complete a writing checklist. Based on this data analysis, I did not see much change in handwriting behaviors. This led to the decision to focus on whole-hand strengthening interventions. For the next two weeks of interventions, I focused on fine motor activities specific to whole-hand muscle development. Some of these activities included cutting through stickers in a circular motion, molding clay, and using a single-whole hand punch. After two weeks of interventions, I again analyzed the writing samples and had students complete a handwriting checklist. Alternating between two weeks of pincer grasp interventions and whole hand interventions proved to be difficult and inconsistent. The writing samples did not show evidence of either of one method working better than another.

At this point in the study, I began Cycle 2 in the research cycle and decided to combine the interventions and do both whole hand and pincer grasp interventions together. After eight weeks of fine motor interventions, I compared data from week one writing samples to week eight writing samples. Along with the participant data, I analyzed anecdotal notes to guide my decision to start a new cycle. Based on this data, I was able to determine that Luis was not struggling with the fine motor tasks but was still forming his letters incorrectly. During the fine motor tasks, Luis would often finish first and would not show any signs or frustration or struggle. These activities came easy to him whereas they did not with Katie and John. As a result, Luis's handwriting was not improving as significantly as Katie and John's handwriting. It was at this time that I decided to change the interventions for Luis. I began Cycle 3 and decided to focus specifically on letter formation with Luis and alternate between letter formation and fine motor skill practice with John and Katie. I continued to follow this cycle for the remainder of the study (Figure 4).

Date	Focus	Interventions
Week 1	Pincer Grasp	Peeling stickers, using clothes pins to pick up cotton balls, stringing beads onto string
Week 2	Pincer Grasp	Peeling stickers, using clothes pins to pick up cotton balls, yarn weaving puzzle
Week 3	Whole Hand	Cutting with scissors, using a single-hand whole punch, molding clay
Week 4	Whole Hand	Cutting with scissors through stickers, using a single-hand whole punch, molding clay
Week 5	Pincer Grasp & Whole Hand	Peeling stickers, cutting through stickers, tracing over dotted lines
Week 6	Pincer Grasp & Whole Hand	Molding clay, cutting in varying patterns, using clothes pins to pick up cotton balls
Week 7	Pincer Grasp & Whole Hand	Stringing beads onto string, tearing paper, using tweezers to pick up objects
Week 8	Pincer Grasp & Whole Hand	Tearing paper, peeling stickers, cutting with scissors, using a single-hole hand punch
Week 9	Letter formation & FMS practice	Luis: letter formation practice (Letters: r, h, n, m) Katie & John: Alternating between fine motor skill interventions (Cutting and using clothes pins) and letter formation practice following Handwriting Without Tears© curriculum (Letters: a, d, s)
Week 10	Letter formation & FMS practice	Luis: letter formation practice (Letters: r, n, m, t,) Katie & John: Alternating between fine motor skill interventions (Using tweezers, tearing paper) and letter formation practice following Handwriting Without Tears© curriculum (Letters: g, o, p)
Week 11	Letter formation & FMS practice	Luis: letter formation practice (Letters: a, c, d, g) Katie & John: Alternating between fine motor skill interventions (Cutting and peeling stickers) and letter formation practice following Handwriting Without Tears© curriculum (Letters: r, n, m)
Week 12	Letter formation & FMS practice	Luis: letter formation practice (Letters: s, r, n, m, h) Katie & John: Alternating between fine motor skill interventions (Rolling clay and using the single hand whole punch) and letter formation practice following Handwriting Without Tears© curriculum (Letters: e, u, z)

Figure 4. This figure shows the interventions used each week during the research study.

Results

Over the course of this research, all students' handwriting improved. The degree to which each student improved was uniquely different. There are many factors that seemed play into the role of writing development for each student. For this section I will report the findings specific to each participant.

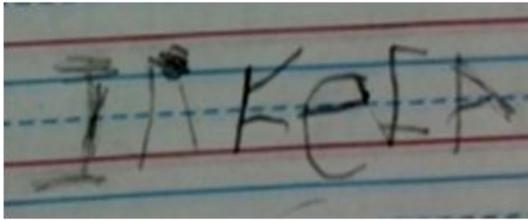
John

Throughout the study, John displayed a lot of frustration in regard to writing. He would often cry or spend so much time erasing his words that his writing was illegible. He displayed a desire to improve his writing, and, when his writing was not satisfactory, he would get upset. During almost every small group intervention, John made a comment similar to "this is going to be really hard." John also expressed that he liked to find the "easy way" to complete tasks. For example, when stringing beads onto string he would place the bead on the table, rather than holding it in his hand and call it the "easy way." The fine motor skill development was challenging yet very beneficial in developing handwriting skills for John.

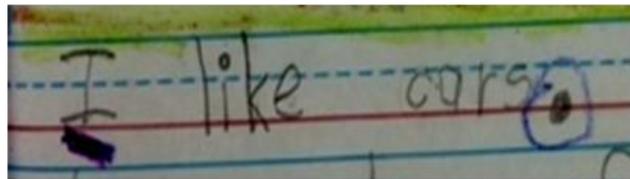
At the start of the study, John's writing score based on the rubric was on average a 4.5. At the end of the study John's writing was on average a score of 16 out of 20 possible points. Based on the rubric, John made significant improvements in using the lines correctly, circle closure, and directionality. Over the course of the research study, John's writing score more than tripled.

Based on writing samples scored using the rubric, John made improvements in using the lines correctly. Prior to the start of the study John did not use the lines as a guide when forming letters. Many of his letters did not stay in between the top and bottom line. In general, the

majority of lowercase letters are formed using the bottom and middle line. Figure 5 shows the improvement John made in regard to using the lines correctly, specifically when writing lowercase letters. Prior to interventions, he would form the letter “e” using all three lines and going below the bottom line. After interventions, John was able to make the letter “e” staying in between the bottom and middle line.



John's handwriting prior to interventions.



John's handwriting after interventions.

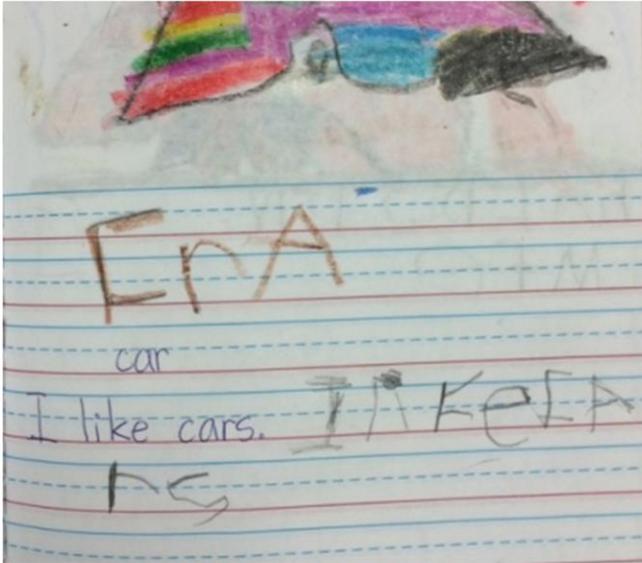
Figure 5. This figure shows John's improvement of writing using the lines.

John also made improvements in his handwriting with circle closure. The letters o, a, g, d, b, p, and q all require a closed circle if forming the letter correctly. Prior to interventions, John would often not close the circle completely or would go back and add an extra stroke to close the circle. By adding an extra stroke it often makes the letter appear jagged and not fluid. By the end of the study, John was forming most of his letters with a circle closure using one fluid stroke, except for the letter “a.” For the letter “a” John was still using multiple strokes to close the top part of the circle.

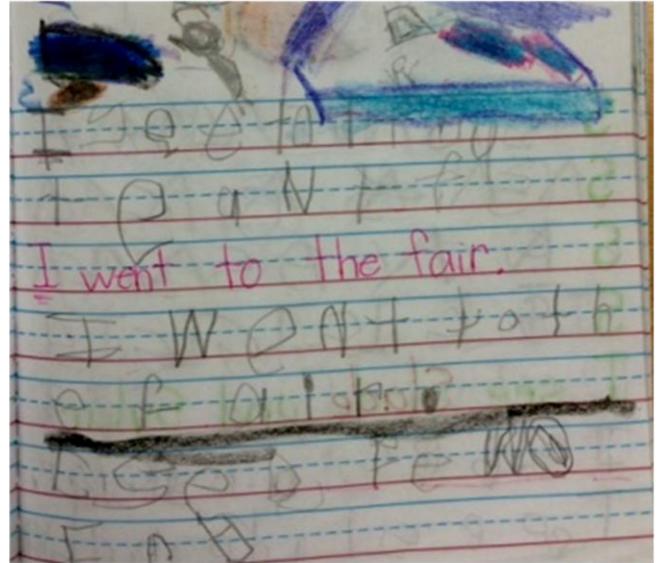
John made improvements in the directionality of his letter formation. Prior to interventions, John made several letters backwards, specifically the letter “n.” For the letter “c” John was using multiple straight line strokes rather than one fluid curved stroke. By the end of the study, John was able to correctly form both the letter “c” and “n.” John also began to correctly form the letter “p.” John was beginning the letter “p” at the bottom of the lines, and by

the end of the study he was correctly forming the letter by starting at the top. Figure 6 shows the progression of John's writing over the course of the research study.

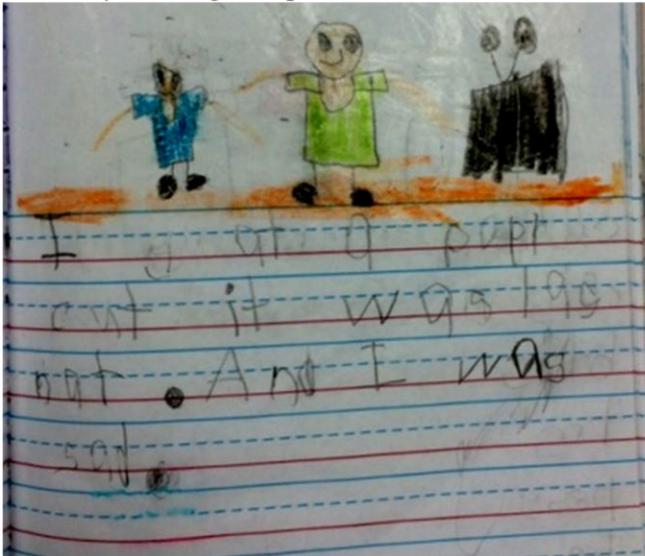
September Writing Sample.



October Writing Sample.



January Writing Sample.



February Writing Sample.

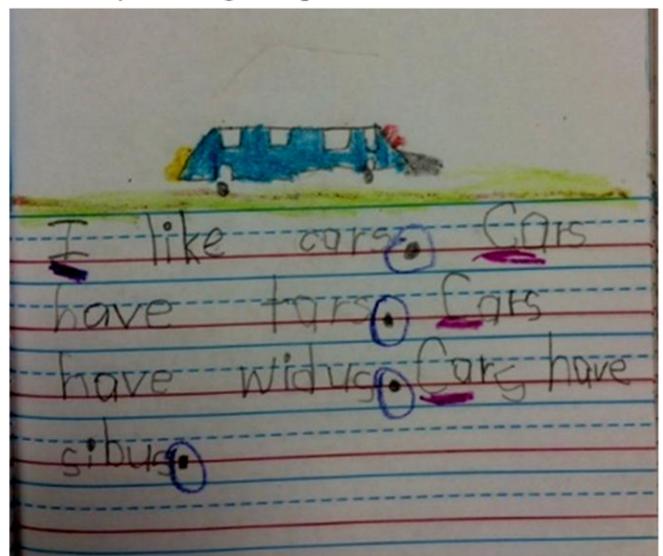


Figure 6. This figure shows the development of John's handwriting over the course of the study.

There were some tasks that John could not complete at the start of the study and was able to complete by the end. For example, at the start of the study, John was not able to open his fruit cup independently, and, by the end of the study, he was able to open it successfully. He also developed enough strength in his hand to use the single-hand hole punch. John also gained confidence in regard to his writing. During the last week of the study, John asked me to share his writing with the class, displaying a sense of pride and accomplishment. This was rare for John, as he had never willingly asked to share his writing with the class.

Katie

Katie started the school year with very minimal writing skills. In order to help her understand the writing process, I would have her draw a picture and dictate what she drew. I would then write what she told me and she would copy the sentence below. By doing this, I was able to focus primarily on her handwriting. Both the handwriting interventions and fine motor skill interventions seemed to play a role in developing her handwriting skills. Katie was motivated when completing the small group intervention activities and rarely showed verbal signs of frustration. She was not always successful in all the fine motor interventions, but she always kept a positive attitude. Based on the rubric, Katie made most progress in directionality, using the lines, and circle closure. At the start of the study, Katie's writing received an average score of 6 out of a possible 20 points. At the end of the study, Katie's writing score improved to a average of 14.

After several weeks of fine motor skill practice, Katie started forming specific letters correctly. Her letter formation directionally improved and her handwriting became more fluid. For example, prior to interventions she was making the letter “s” using multiple strokes. After weeks of fine motor skill practice, Katie was forming the letter “s” using one fluid stroke (Figure 7). This improvement also occurred with the letters “a” and “r.”

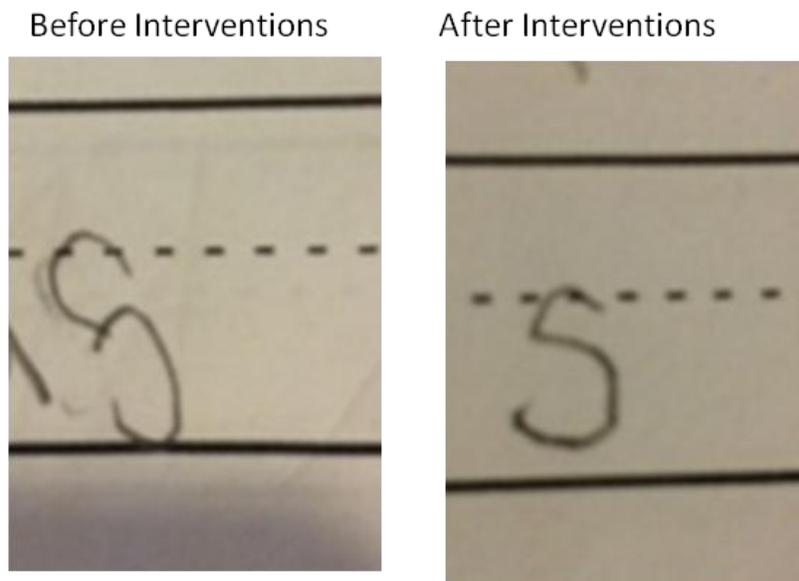
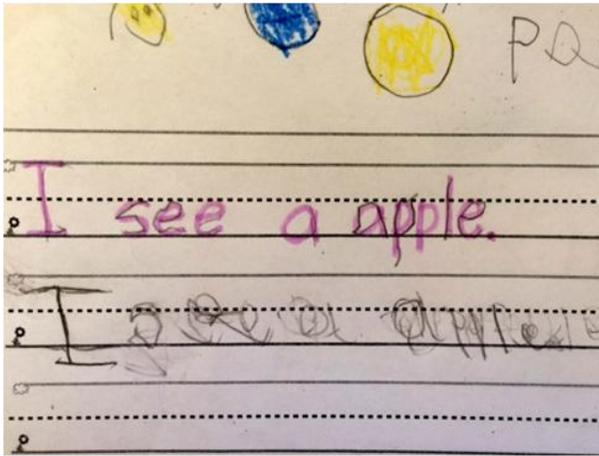


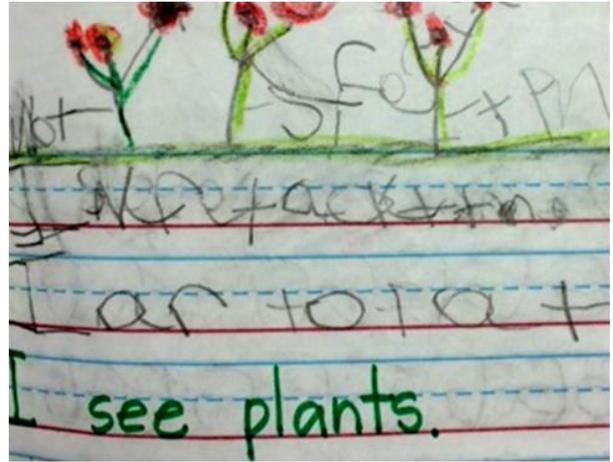
Figure 7. This figure shows the progression of Katie’s letter formation.

Katie also began to form her letters using the bottom, middle, and top lines correctly. Using the writing lines is important to help students differentiate between capital and lowercase letters and also for writing to be legible. Before interventions Katie was forming most of her letters between the bottom and middle line. By doing this, her handwriting look crowded. Specifically, Katie was forming the letters “p”, “t”, and “l” all between the bottom and middle line. After interventions, Katie began to form her letters correctly on the lines and her handwriting became more legible (Figure 8).

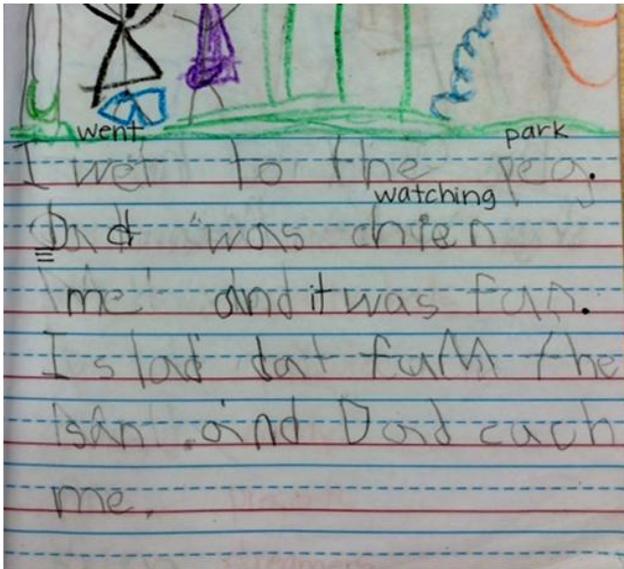
September Writing Sample.



October Writing Sample.



January Writing Sample.



February Writing Sample.

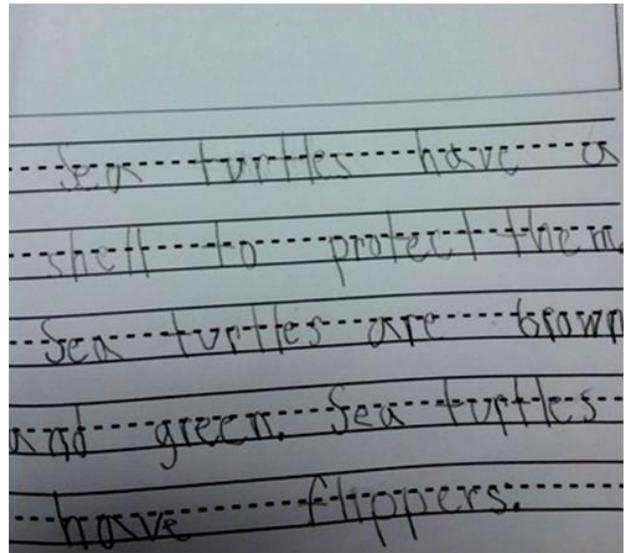


Figure 8. This figure shows the development of Katie's handwriting over the course of the study.

Luis

Luis started the school year with minimal writing skills. When participating in the fine motor skill activities, he was typically the first to complete each task. The fine motor skill activities seemed to come very easily to him, although writing proved to be difficult. After several weeks of fine motor skill practice, I transitioned to focusing on letter formation and handwriting practice with Luis. He rarely showed any frustration throughout the study. At the

start of the study Luis's average writing score was a 6 out of a possible 20 points. By the end of the study Luis's average writing score was a 14. Luis more than doubled his writing score. Luis made significant improvements in directionality, using the lines, and using straight lines (Figure 9).

September Writing Sample.



October Writing Sample.



January Writing Sample.



February Writing Sample.

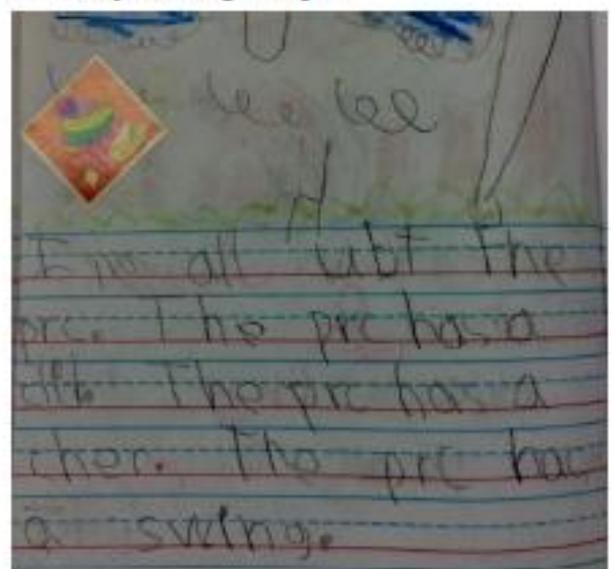
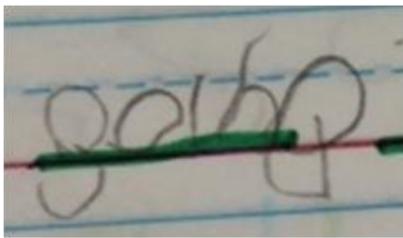
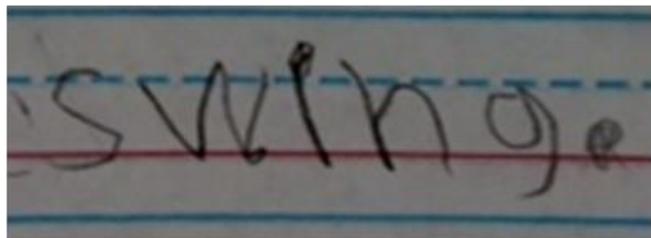


Figure 9. This figure shows the development of Luis's handwriting over the course of the study.

Directionality was one of the biggest struggles for Luis. He had a very hard time relearning how to form a letter correctly. At the start of the study, Luis was forming almost all of his letters incorrectly. When forming the letters “n”, “m”, or “r” he would create the curved lines and then go back and add the straight line. For the letter “n” it would often make it look like the letter “h” (Figure 10). For the letter “g,” he would draw a circle then go back and add a curved line down (Figure 10). Adding these extra strokes often made the letters illegible. After interventions, Luis was forming his letters using less strokes, although inconsistently. He would often form his letters correctly when I was sitting with him but when working independently he would still form the letters incorrectly.



Prior to interventions.



After interventions.

Figure 10. This figure shows the development of Luis’s handwriting directionality.

Luis made improvements in his ability to create straight lines with his handwriting. Luis had a weak pencil grip and this would often result in his letters looking shaky. When I would watch him hold his pencil, it looked as though he was barely holding it at all. During letter formation interventions, I would work with Luis on forming a tighter grip on his pencil. Over the course of the study, Luis began to form letters using straight fluid strokes. By using fluid strokes and straight lines, his handwriting became clearer (Figure 11).

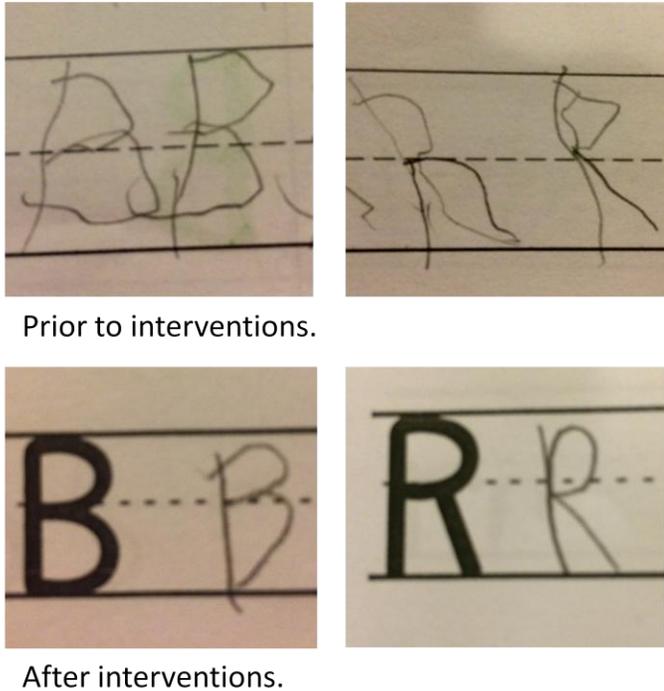


Figure 11. This figure shows the development of Luis's handwriting.

Discussion

The reason that handwriting instruction is crucial to kindergarten is because once handwriting is developed students are able to spend more time developing core writing skills, which are foundational literacy skills. As handwriting skills develop and become more automatic, students are able to spend less cognitive thought on handwriting and can focus more attention on other writing processes (Graham, 2010). It was this observation that led me to choose the three participants in this study. I was able to see that students were not able to develop their writing skills without the handwriting skills first. Each of the participant's handwriting and writing skills significantly improved throughout the study. At the start of the study, the students were at the beginning stages of forming sentences. They were able to verbally tell me a sentence but often struggled to form the letters and words. As the participants learned

more about the writing process and developed their handwriting skills at the same time, their writing began to develop. Handwriting is causally related to learning to write and results in long-term improvement in compositional fluency skills (Graham, Harris, & Fink, 2000). Without having to worry about letter formation students were able to focus on aspects such as spelling, spacing, and punctuation. These are the core components to help writers become fluent in their writing abilities. Students were also able to read what they had written, which I believe helped to increase their confidence in regard to writing.

What I Learned

This research study taught me a lot about teaching handwriting to kindergarten children and the importance of incorporating fine motor skill activities. The progress that each participant made supports that fine motor skill development is related to handwriting. All participants more than doubled their writing scores over the course of the study. This study helped to show the importance of providing students with the opportunities to develop their fine motor muscles and also the importance of varying interventions to meet the needs of each student. I was able to determine that without developed fine motor muscles, handwriting is much more difficult for students to master. For example, when students lacked the strength to hold their pencil using a tight grip, their handwriting looked shaky. Similarly, students also struggled to form letters in a fluid motion due to weak pencil grip. The data from this study supports that when students participate in fine motor specific interventions their handwriting improves. By spending time to develop the fine motor muscles and strengthen their skills, students were able to form letters in a more fluid motion. By forming letters more fluidly, their handwriting improved.

I believe one factor that contributed to the handwriting development of each participant was the personal desire to improve handwriting. On several occasions, John brought his writing

to me and asked for my approval. This desire for approval shows that John was consciously thinking about his handwriting and making an effort to improve. Katie displayed a similar desire to improve her handwriting. Luis often displayed better handwriting skills when working in a small group rather than working independently. This may mean that his handwriting struggles are not from his inability to write correctly, but rather his desire. Throughout the study, Luis rarely showed frustration with his writing. When asked to rewrite something because it was illegible, he would do so without any signs of frustration. Often when he rewrote something, it would have the same errors as his previous writing. It seemed as if he did not realize the mistakes he was making, even when specifically pointed out to him. If I were conducting this study again, I would create a student rubric and have Luis score his own writing alongside the writing of his peers. I believe this would help me determine if Luis was capable of seeing his own errors the way that outsiders can.

Incorporating fine motor activities into a kindergarten class should be purposeful and planned. By implementing fine motor activities at the beginning of the school year, I believe that would provide a solid foundation for students as they learn and develop their handwriting skills. The interventions and data collection of this study took place over a 12-week period. I found that developing fine motor skills and handwriting skills takes time. The handwriting of each participant slowly and steadily progressed over the 12-week study. Handwriting and fine motor skills are skills that must be continuously developed rather than taught for a few days then forgotten about. While each classroom looks different, and the needs of each child are different, what I found through this study is that if you are looking to improve handwriting, fine motor skill development cannot be ignored.

I found that scoring the writing samples based on the rubric was inconsistent. At the beginning of the study students were writing words or incomplete sentences. By the end of the study students were writing multiple sentences. Because of the difference in their writing ability, the writing samples were hard to compare. In future action research, I would recommend having students copy a sample sentence at the start of the study and then copy the same sentence throughout the study to determine growth. I did find that even if the student score was not helpful, the specific components of the rubric were what I was looking for in student writing. For beginning teachers or teachers looking to improve student handwriting, I would recommend using a similar rubric.

Unexpectedly, I found that better handwriting led to more confidence in writing abilities. It is important that kindergarten students are confident in their writing abilities at this young age. Early attention to handwriting is important as children often avoid writing and develop a mind-set that they cannot write when experiencing difficulty (Graham, 2010). The confidence that each participant displayed in regard to writing gradually grew over the course of the study, especially with Katie and John. Katie and John both made the shift from not wanting to participate in writing, to writing independently for the sake of enjoyment. It is unclear where this confidence came from, but I have to believe their improvement of handwriting skills played a role. I did not see as much of a significant shift in Luis's confidence in regard to writing. This may be because at the start of the study he did not lack confidence in writing the same way John and Katie expressed. Also, I believe that it may be because Luis has still not developed his handwriting skills fully. Luis still struggles to write legibly and while his handwriting has improved, it is not on par with the rest of the kindergarten class.

Classroom Action Research

Classroom action research was appropriate for this study because it allowed me to develop research to improve my practice as a classroom teacher. Through action research, I was able to modify and make changes in order to best meet the needs of each participant. By using action research, I was able to continually self reflect and make changes to better my instruction. Each of the students participating benefited from this research study, as all of their writing scores improved. Through the different cycles implemented, I was able to find interventions that would work for each student. As each student is uniquely different, classroom action research allowed me to develop unique interventions specific for each student, and modify as needed. Ultimately, this research study helped me to understand the skills necessary for handwriting development and how to incorporate those into a kindergarten classroom.

Limitations

Due to classroom constraints, the ability to collect and record data may have limited the cohesiveness of this study. The most significant limitation of this study was absences and schedule conflicts. For example, during the month of January, Katie was absent for six out of the eleven small group sessions. Any time a student missed a small group lesson it was rare for him or her to be able to make it up. Therefore, when students were absent or there were schedule conflicts such as testing, the student did not receive interventions. In addition to classroom constraints, the findings of this study are not generalizable to all kindergarten classrooms.

When working with five and six year old children who are rapidly developing reading and writing skills, it is hard not to wonder what role natural development plays in their progress. It is not possible to determine whether the interventions from this study or the natural development of each child are what contributed to the results of this study. I believe that both of

those areas go hand in hand and that the interventions helped to develop the skills that each child was developing naturally.

Conclusion

The findings from this study support that fine motor skill development has a positive impact on student handwriting skills in the kindergarten classroom. The more time that students had to develop their fine motor muscles through interventions, the more their handwriting improved. Handwriting is a crucial step for beginning writers and readers. In kindergarten, students are learning the foundational skills for literacy development and it is the role of classroom teachers to determine what methods are effective in developing those skills. This looks different for each child and teacher but I do believe that fine motor skills development should be purposefully incorporated into all kindergarten classrooms.

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ABSTRACT

HANDWRITING AND FINE MOTOR SKILL DEVELOPMENT IN THE KINDERGARTEN CLASSROOM

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The primary purpose of this action research study is to investigate the effects of fine motor based interventions on handwriting development in the kindergarten classroom. The study was conducted in a general education kindergarten classroom located in an urban school district. The three participants in the study were selected based on teacher observation and preliminary handwriting data collection. Over 12 weeks, each of the three participants participated in fine motor skill and handwriting interventions. The interventions were done in a small group several times a week. Student writing samples, handwriting checklists, and anecdotal notes were analyzed every two weeks to determine student handwriting development. Based on the data, the interventions were modified to meet the needs of each participant. The results of this study suggest that fine motor based interventions can help to improve student handwriting skills.