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Improving Reading through Fine Motor Skill Development in First Grade

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Signature Sheet

This thesis, written under the direction of the candidate's thesis advisor and approved by the department chair, has been presented to and accepted by the Department of Education in partial fulfillment of the requirements for the degree of Master of Science in Education. The content and research methodologies presented in this work represent the work of the candidate alone.

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Abstract

Children who struggle with learning to read in first grade, fall behind, and have difficulty catching up with their peers. Research has shown students who struggle to read in first grade, also struggle to read in later years. The purpose of this study was to determine if an intervention to enhance fine motor skills to a select group of students in one class room increased their reading abilities. This was a mixed methods research study which assessed the quantitative data from the running record assessments, and the qualitative data taken by teacher-aide during assessment process post fine motor intervention. This study was conducted with 5 first grade students at a suburban public elementary school in Northern California. Reading assessment data was analyzed for changes in reader accuracy, error management, and comprehension using a text level gradient from the Fountas & Pinnell Benchmark Assessment System that is based on the Complex Literacy Processing Theory developed by Marie Clay; which is the theoretical rationale for this study. The study found that the intervention to enhance fine motor skills improved the overall accuracy and comprehension of the participants.

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Chapter 1 Introduction

Throughout my life I have always been drawn to the struggle of the "underdog". I have cheered the losing team, or rooted for the player who is down, or when teaching, worked hard to find creative ways to support struggling, at-risk students. As a first grade teacher, I am often reminded of my love for the underdog when working with students who are performing below grade level standards in reading and writing. These have been my most at-risk students, the ones who have struggled with the foundational reading and writing skills necessary to be able to communicate and express their thoughts, ideas and opinions to others.

Background and Need

Elementary schools, specifically kindergarten through second grade, focus on developing the reading and writing skills necessary to effectively collaborate and communicate in the 21st century. These skills include but are not limited to reading and writing as a means of self-expression. The State of California has deemed that reading and writing are important skills, and have created a series of academic content standards, organized by grade level, as a structured approach to teaching young children skills to read and write, called the Common Core State Standards (CCSS) (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). California public school teachers develop lessons around these CCSS, and assess students on their progress of obtaining each skill or standard in both reading and writing, as these are the basic forms of communication for expressing and applying learning in an academic setting. However, it can be argued that not all students learn at the same pace, due to developmental, social, economic, or familial influences. Many students need to be retaught concepts, need small group intervention instruction, or direct teacher support to develop the skills necessary to meet the CCSS.

With the current emphasis on the acquisition of reading skills in the early K-2 years, those students who are below the grade level standards, in these early grades, are at risk of falling behind in meeting grade level CCSS for reading. Developing reading skills in the early years is related to later success in school. Children who struggle with learning to read in first grade, fall behind, and have difficulty catching up with their peers (Clay, 1991; see also Juel, 1988; Stanovich, 1986).

Given the importance of learning to read in these early grades, and the effects thereof on later academic achievement, Duncan et al. (2007); Grissmer, Grimm, Murrah & Steele, (2010); and Cameron, et al., (2012), identified new skills to predict kindergarten readiness. These new skills as identified were: "attention abilities, fine motor skills, executive functioning, and general knowledge of the world, and are to be added to the existing list of indicators measuring kindergarten readiness" (Grissmer et al., 2010, p. 8). This study was focused on the importance of fine motor skills for kindergarten readiness based on the findings from each of the above mentioned researchers. Fine motor skills refer to small, coordinated muscle movements, making it possible to write, draw, dress and feed self, button a jacket, and be successful in daily life activities. Fine motor skills are used when writing to develop letter formations, and in reading to decode words as the eyes move across the page.

In my public school first grade classroom in Northern California, through district reading and writing assessments and teacher observations, I found that some students exhibited weak fine motor skills while performing their daily academic tasks. I observed these students demonstrating weaker fine motor skills than their peers when holding a pencil, had difficulties using scissors effectively, forming written letters on a page, and decoding words when reading. The written work samples from these students showed poor letter formations, and their reading

scores using the Fountas & Pinnell Assessment system to determine reading proficiencies show that they are not performing at the level required by the CCSS. The same students also scored below the grade level benchmark in CCSS Reading Foundational Skills Standard 1.3.

However, these students were in a first grade classroom, and outside the developmental kindergarten readiness window denoted for later academic success. As Duncan et al., stated in 2007:

> If learning acquisition of specific academic skills or learning-enhancing behaviors forecasts later achievement, it may be beneficial to add domain specific early skills to the definition of school readiness, and to encourage interventions aimed at promoting these skills prior to elementary school. (Duncan et al., 2007, p. 1429)

From multiple longitudinal studies, fine motor skills are one of the kindergarten readiness skills that predict later academic achievement, and have been linked with future cognitive abilities. (Cameron et al., 2012; Grissmer et al., 2010; Duncan et al., 2007). These first grade students in my classroom were struggling with fine motor skills, two years after when these skills were originally identified as being necessary for kindergarten readiness. These students struggled with fine motor skills that have been linked to cognitive processes, as well as reading skills in the first grade. Morris, Bloodgood, & Perney, (2003) suggest that students who struggle in reading can be identified as early as the middle of the kindergarten year, and benefit from intervention to strengthen reading acquisition skills.

Given the findings about kindergarten readiness and fine motor skills (Grissmer et al., 2010; Cameron et al., 2012), 25% of students in my first grade classroom who struggle with fine motor skills are outside the developmental kindergarten readiness window denoted for later academic success. These students have started first grade already behind in basic foundational

skills necessary to support meeting the CCSS for the first grade level. As Cameron et al. (2012) found:

> Children who struggle to hold a pencil and who must attend to the specific movements that are needed to form letters will not be able to progress as quickly in the cognitive tasks of decoding longer words, reading for comprehension, and connecting letters with their sounds. In line with this interpretation, prior evidence shows that kindergarteners' ability to reproduce letters is related to teachers' ratings of their literacy, vocabulary, and mathematics skills in first grade (Simner 1982). (as cited in Cameron et al., 2012, p. 1240)

The research findings of Grissmer et al. (2010) and Cameron et al. (2012), show these fine motor skills as necessary for kindergarten. These students in my classroom should have had stronger fine motor skills by first grade, as observed during my teaching experiences and interactions with these students in my classroom. Here, one year later, these particular students still struggled with their fine motor skills. These students needed additional support for the strengthening of their fine motor skills. Hence, there is a need to combine intervention opportunities with the development of fine motor skills for such students who were not meeting the CCSS for first grade in reading and writing.

Statement of the Problem

Fine Motor skills are developed skills that coordinate the muscles of the fingers, hands, and wrists. First grade students utilize these skills when writing, holding small items, turning pages in a book, coloring or cutting with scissor; academic tasks common to the daily activities of a first grade student. Some students in a Northern California public school first grade classroom have been observed demonstrating weaker fine motor skills than their peers when

holding a pencil, forming written letters on a page, and decoding words when reading. In this classroom, an examination of student work samples shows 25% of first grade students in this classroom produce poor letter formations. This corresponded with 25% of students from this same classroom observed demonstrating difficulty using scissors effectively. These students seem easily frustrated when unsuccessful in executing the same fine motor tasks as their grade level peers, and have been observed to lack academic confidence when reading. These first grade students in a public school classroom in Northern California demonstrated, through district reading assessments and teacher observations, weak fine motor skills with daily academic tasks. The problem is that 25% of the total students in a first grade, Northern California School public classroom demonstrate underdeveloped fine motor skills, and are also not meeting first grade Common Core State Standards in Foundational Reading standard 1.3.

This standard focuses on foundational skills, meaning students will build upon them year after year while attending public school in California. To be proficient in this standard, students require fine motor skills to demonstrate proficiency. As Armbruster believed, reading failure in the early grades has long term consequences for self-confidence and motivation to learn, and for later school performance (2001). As a teacher I am interested in learning if students, such as the ones in my classroom, benefit from targeted, direct instructional interventions to develop fine motor skills and may lead to an increase in their reading abilities.

Underdeveloped fine motor skills present difficulties for first graders both in and out of the classroom because fine motor skills are those small, coordinated muscle movements necessary for participating in daily life activities. Fine motor skills are also involved in many learning processes such as reading and writing, as well as daily activities for meeting individual needs for survival, such as buttoning a shirt when getting dressed. Fine motor skills are also

necessary to effectively use technology, such as navigate a touch screen device, or type on a keyboard.

Current research scholarship points to a need for additional information and research around fine motor skill instruction during the early academic years (Suggate, 2016).

Statement of Purpose

The primary purpose of this study is to determine if offering intervention to specifically enhance fine motor skills, to a select sample of students in one classroom who are not meeting first grade CCSS RF 1.3 increases their reading abilities.

Research Question

This study seeks to address one primary question as follows: How does targeted, small group direct instruction to improve fine motor skills, affect the reading levels of students who are not meeting CCSS standard RF1.3 in one Northern California public school first grade classroom?

Theoretical Rationale

The Theoretical rationale for this study is grounded in Marie M. Clay's Complex Literacy Processing Theory. Complex Literacy Processing is:

> A reader's decision making about what a text says. It involves many working systems of the brain which search for and pick up verbal and perceptual information governed by direction rules; other systems which work on that information and make decision; other systems which monitor and verify those decisions; and systems which produce responses. (Clay 2001, p.1)

This study focused on intervention for those ‘other working systems’ as stated above that influence reading acquisition. Those systems that may influence reading acquisition specifically are fine motor systems for this study. Marie Clay defined the process of reading as:

> A message-getting, problem-solving activity which increases in power and flexibility the more it is practiced. It is complex because within the directional constraints of written language, verbal and perceptual behaviors are purposefully directed in some integrated way to the problem of extracting sequences of information from texts to yield meaningful and specific communications. (Clay, 2001, p. 1)

Fine motor skills also involve cognitive problem solving, and involve message-getting activities which produce responses, and monitor and verify decisions. Marie M. Clay’s complex literacy theory supports the theoretical basis for this study because reading is an accumulative process of many cognitive and affective skills coming together.

> Information about how children acquire reading and math skills points to the importance of specific academic skills but also indicates that more general, cognitive skills, particularly oral language and conceptual ability, may be increasingly important for later mastery of more complex reading and mathematical skills. (Duncan et al., 2007, p.1429)

This study is focused on reading behaviors before and after fine motor intervention. Fine motor skills have been identified as an early predictor for student achievement (Cameron et al., 2012). Clay believed acquisition of reading builds upon previous skills learned to integrate all learning modalities to understand written text (Doyle, 2003).

Marie Clay’s research opened up a new lens on reading acquisition, and best practices for how to support struggling readers. Marie Clay developed the term “Emergent Literacy” which

encompasses all early aspects of children's reading and writing acquisition processes. Through her own intervention research studies, Marie Clay focused on providing the necessary skills and strategies to strengthen proficiency in struggling readers throughout her career as an educator, researcher, and child psychologist. She felt that small group intervention targeting the skills that students need, and keeping track of their literacy behaviors through a running record was best for the learner. Clay's theory provides an apt theoretical fit, because this study focuses on reading behaviors of participants before and after small group fine motor skill intervention. Clay, who was a constructivist, believed social situations also influence student learning. Thus, a combination of Clay's Complex Literacy Theory and constructivism, enables an effective theoretical fit for this study since it is focused on the acquisition of reading behaviors necessary for proficient literacy.

Fountas & Pinnell

It is also important to note that Marie Clay was a founder of the Reading Recovery program, which was based on much of her research with young student emergent literacy acquisition process, and developed in the late 1970's. The Reading Recovery program is one of the foundational pieces of research for the Fountas & Pinnell guided reading and assessment system. Gay Su Pinnell and Irene Fountas, who worked with Marie Clay in the late 1990's, developed the Fountas & Pinnell Reading Benchmark Assessment System, which is grounded in Clay's Complex Literacy Processing Theory. Marie Clay and Fountas & Pinnell believe that, "reading is a series of behavioral processes, and documenting changes in children's literacy development captures behavioral performance in reading and writing tasks." (Doyle 2003, p.1) Marie Clay found through her extensive observational research that, there are levels of text complexity, and therefore literacy behaviors effective at each level.

The Fountas & Pinnell system “assesses reading behaviors demonstrated at specific levels throughout the reading acquisition process of early elementary students." (Fountas & Pinnell, 2012, p. 269) The Fountas & Pinnell Assessment System uses a running record for the teacher to quantitatively and qualitatively document student errors when reading. A running record tracks errors made by the reader, whereby the teacher knows what areas to work on with that student to support literacy acquisition. The Fountas & Pinnell Reading Benchmark Assessment System quantifies the documented results into a percentage and alphabetic level score, based on a text level gradient through which books are selected and used as benchmarks for specific levels of reading acquisition. Fountas & Pinnell Benchmark Assessment Systems focus on using a text level gradient, to support skills needed for emerging literacy constructs of the student at each given reading level. Complex Literacy Processing Theory supports a scaffolding of reading skills into tiered levels. Fountas & Pinnell took this theory one step further to develop and produced corresponding reading assessments that record literacy behaviors of readers, using a tiered approach.

Since this study utilized fine motor intervention as a means to support reading intervention, assessing student progress through a text level gradient system that yielded both qualitative and quantitative research data, with a pre and postintervention analysis provided an appropriate theoretical fit. Thus, the theoretical rationale for this study originates from Marie Clay’s Complex Literacy Processing Theory. The Fountas & Pinnell Benchmark Reading Assessment system was utilized as the instrument for data collection in this study and was intentionally selected due to its grounding in the theoretical foundations of Complex Literacy Processing Theory.

Assumptions

This study assumed that in-class time spent on developing specific fine motor skills using small group intervention during the first grade year over a six week period, would provide concrete data for the analysis of reading skills and academic confidence among struggling readers.

This study also assumed that the participants from this first grade classroom are representative of other first grade students demographically, academically, socially, and emotionally.

Summary

Fine motor skills are important skills students need for daily activities, both academically, and socially. Researchers have identified fine motor skills as a kindergarten readiness skill, and an early predictor of academic achievement in the later grades.

In one northern California public school first grade classroom, 25% of the students demonstrated weak fine motor skills, and were outside this range of readiness that was identified for kindergartners. These same 25% of students also are below proficiency in CCSS reading foundational standard 1.3.

This study seeks to address one primary question as follows: How does targeted, small group direct instruction, to improve fine motor skills, affect the reading levels of students who are not meeting CCSS standards RF1.3 in one Northern California public school first grade classroom? This study used Complex Literacy Processing Theory (Clay, 1991) as its theoretical construct and the Fountas & Pinnell (2013), reading gradient as the instrument for assessing reading acquisition.

Chapter 2 Review of the Literature

Introduction

This chapter examines the peer reviewed research literature on the relationship between cognitive development and fine motor skills, as well as small group intervention to support struggling readers in the early primary grades. The evolving importance of the early predictors for kindergarten readiness is also discussed as fine motor skills have been added to this list for kindergarten readiness in 2010.

Information was gathered from academic library searches using online and print resources. Cognitive theory and development research scholarship was also reviewed to understand learning processes in the mind as related to reading acquisition.

Historical Context

The past 100 years of research have included massive changes in understanding brain functionality, cognitive development and motor skill development. In the early 1900s, researchers sought to more deeply understand the complicated connections within the brain, and believed components of the brain worked separately from each other. More recent scholarship shows that the components of the brain are much more intertwined than originally thought (Diamond, 2000). During the early to mid-1900's, cognitive development and motor development within the brain were thought to be isolated and therefore studied separately. In 1952, there was the first shift towards understanding how brain systems are connected and influenced. According to Piaget's developmental theory, motor skills contribute to infants' active exploration of the environment, and it is through such actions that infants construct their knowledge of the world. Piaget had one of the first glimpses of how motor skills contribute to cognitive growth; or constructing understanding of the world (as cited in Diamond, 2000).

From the late 1980's through 2010, researchers and psychologists explored the connections between cognitive growth and fine motor growth. Researchers discovered that although cognitive and motor skill development were happening in different sections of the brain, such as the prefrontal cortex and the cerebellum, both of these intertwine to support learning through motor and cognitive development (Diamond, 2000). During this time, researchers also determined that intervention to support struggling readers in the early elementary grade was beneficial, as one cognitive area may in fact influence another cognitive area (Grissmer et al., 2010).

Since the 1980's, and the increase of technology to study brain imagery, the relationship between fine motor skills and cognitive development became more connected than was originally thought of. In 2000, Diamond discovered that when using brain imaging to view the areas of the brain used when doing specific tasks, the same portion of the brain used in fine motor tasks was also shown to be in use in the cognitive reading area of the brain. Diamond also found that these two portions of the brain develop at the same time, together. She also found that these two portions of the brain develop over a long period of time, from early adolescent years, and then continually growing and influencing each other into later adolescent years. This research was exciting, as previous thinking did not connect cognitive achievement and fine motor skills.

The developmental and neuroscience literatures provide theories and evidence to support the use of the neural infrastructure to build motor development during cognitive development. This neural infrastructure includes highly specialized capacities in the basal ganglia and cerebellum that are used in specific types of learning and sophisticated

> adaptive control capacity that may be essential to both motor and cognitive learning (Grissmer et al., 2010, p. 1015).

In the primary grades, students develop skills at different rates and this cognitive process of learning to read can be easy or challenging for the learner. Therefore, teachers put in place interventions to help those struggling students. In the most recent decade, this intervention is called Response to Intervention (RTI), and is offered in six week sessions focusing on the skills struggling students are lacking. Teachers work with small groups of students to support development of a wide range of skills. Significantly, those who finish third grade, one or more years behind in basic reading skills are at risk in an educational system that from fourth grade on, demands grade-level reading ability. This unsettling state of affairs has led reading educators to emphasize the prevention of reading difficulties in the primary grades (Clay, 1991; Juel, 1988; Stanovich, 1986).

As Grissmer et al., pointed out in 2010:

> One possibility that might partially account for a motor–cognitive causal link is that most activities that build or display cognitive skills also involve the use of fine motor skills. Writing requires fine motor skills with the hands as well as hand–eye coordination. Speaking requires fine motor skills that control the production of sound. Reading requires the use of fine motor skills controlling eye movement for word tracking. Poor fine motor skills can make cognitive learning and performance more difficult because of the simultaneous need for fine motor skills in cognitive activities. (p.1013)

Review of the Academic Research

There have been two strands of research that renewed the interest in fine motor development and the relationship with cognitive development over the last two decades. The first

strand involved longitudinal studies showing that fine motor skills in Kindergarten are predictive of later academic performance in literacy (Brown, 2010; Grissmer, Grimm, Aiyer, Murrah & Steel, 2010). These studies build on earlier research linking fine motor development to literacy performance (Reno, 1995), and developmental delays in fine motor development to subsequent educational social difficulties in school (Armbruster, 2001). The second strand of research, using brain imaging, suggests that most activities that develop or display cognitive skills also involve the use of fine motor skills, and although cognitive and fine motor functions are processed in different parts of the brain, these functions develop in coordination and are activated jointly when performing a wide range of tasks (Adolph & Berger, 2006; Diamond 2000; Seger, 2006).

The synthesized scholarship from this review can be thematically categorized under 3 primary areas namely: 1) kindergarten readiness skills, 2) small group intervention, and 3) Complex Literacy Processing Theory.

Kindergarten readiness skills.

Given the importance of reading in early grades, and the effects on later academic achievements, the literature shows a body of inquiry to determine the skills necessary for Kindergarten readiness- or those skills students need in pre-school, in order to be most successful in K-2 (Morris et al., 1998). In 2007, Duncan et al. conducted research on how school entry, academic attention, and social emotional skills contributed to the ‘kindergarten readiness’ of a student. Kindergarten readiness refers to the development of skills in preschool that will be needed later in the academic setting. Duncan’s research was one of the largest longitudinal studies done on kindergarten readiness, and he found some new information. He found that attention abilities, fine motor skills, and general knowledge of the world were strong indicators

of kindergarten readiness and should be considered as necessary foundations skills for future learning success.

In 2010, Grissmer et al., furthered this research and also found that fine motor skills were a strong and consistent predictor of later achievement. The meaning of this finding is bolstered by neuroscience and developmental research that link children's cognitive and fine motor skill development. "Children's newly developing motor skills expand their opportunity to experience more diverse and challenging environments for learning, thereby strengthening cognitive performance" **(**NCRECE 2010 p. 2). Grissmer et al., (2010), also stated that:

> An important part of motor development is a spiraling process whereby newly developed motor skills provide expanding opportunity for children to experience more diverse and ever more challenging environments that, in turn, require more complex cognitive maps. If diverse and more challenging motor environments vary for children, the cognitive capacity brought to kindergarten may also vary. One possibility that might partially account for a motor–cognitive causal link is that most activities that build or display cognitive skills also involve the use of fine motor skills. Writing requires fine motor skills with the hands as well as hand–eye coordination. Speaking requires fine motor skills that control the production of sound. Reading requires the use of fine motor skills controlling eye movement for word tracking. Poor fine motor skills can make cognitive learning and performance more difficult because of the simultaneous need for fine motor skills in cognitive activities. (p.1016)

Small group interventions.

There are several studies that show that small group intervention is important to developing the skills necessary for reading success. At-risk students who are behind in academic

skills have benefited from small group instruction as found by Marie Clay in her forty years of reading acquisition research and use of small group intervention (1991). Clay was interested in the early literacy years, and literacy development, and found that those students who showed very limited progress in the first years remained among the lowest performing students year after year (Doyle 2013).

Clay also found intervention at the early ages has proven to be the most successful route to reading improvement in young students "Reading educators emphasize the prevention of reading difficulties in the primary grades. To this end, intervention programs in first grade- usually tutorial in nature- have helped many at-risk children catch up with their peers in reading." (Morris, 2003, p. 3) Since it is hard to determine those students at risk, and providing intervention is costly to school districts, educators are unsure where to focus their resources (Morris 2003), even though past research has shown that early intervention is supportive for at risk students. Small group intervention has had a positive effect on supporting the strengthening the academic and social skills necessary for reading comprehension in these early elementary years (Clay 1991). When students are behind in their motor development, it is difficult for their brain to multi task at the kindergarten and first grade level all the necessary reading and writing components for comprehension, as they are still working on developing these skills (Rosenbloom 1971).

Current research suggests a shift needs to take place towards intervention focused on building foundational skills such as fine motor skills, through small group intervention. (Grissmer, Murrah, & Steele 2010) "Successful intervention depends on identifying the readiness skills that predict long-term achievement and developing programs that can improve these skills early in the school trajectory." (Cameron et al., 2010, p. 1229)

Complex literacy processing theory.

Through her forty years of research, and small group interventions, Marie Clay, (1991), focused on providing the necessary skills and strategies to strengthen proficiency in struggling readers, specifically the multifaceted, cumulative behaviors readers utilize when decoding text. She was particularly interested in the behaviors of reading and documented varying degrees of reading acquisition on a developmental scale-each skill building upon the one learned previously. Clay discovered readers acquire skills and strategies as they pick up information using many sources to help them decode and comprehend text. Theses reading skills and strategies build upon each other and strengthen as the reader accumulates and masters individual word analysis and story comprehension skills. These reading behaviors provide the foundation of her Complex Literacy Processing Theory which states:

> Many working systems in the brain which search for and pick up verbal and perceptual information governed by directional rules; other systems which work on that information and make decisions; other systems which monitor and verify those decisions, and systems which produce responses. (Clay 2001, p. 1)

Clay was influenced by Rumelhart's Information Processing Theory, when she considered the integration of language sources a reader uses to understand text. Observational research also helped form her theory about reading being a complex and cumulative cognitive process. Clay developed her theories about acquisition of reading skills and strategies into the Complex Literacy Processing Theory which takes into account the many cognitive systems at work when a reader is trying to understand text. From 1966 to 2001, Clay studied the changes over time in the reading behaviors of novice learners. Her research has provided the first rich model and a scientific approach to the study of early literacy. As Doyle (2013), concluded,

Clay's research also "reveals the power of alternative approaches to understanding complex literacy learning." (p. 647)

Summary

Research literature from the past 20 years shows that fine motor skills can be early indicators of future academic achievement. More recent scholarship indicates that cognitive areas of the brain are in use at the same time fine motor skills are in use (Diamond, 2000).Students who struggle with reading in the early elementary years, usually also struggle in the later grades. The development of fine motor skills is important for academic and life based tasks (Grissmer et al., 2010; Duncan et al., 2007, & Cameron et al., 2012). The research literature reviewed also shows that intervention in the early years is a powerful tool for fostering reading skills (Rosenbloom, 1971; Clay, 1991).

Chapter 3 Method

This study used a mixed method research design that collected both qualitative and quantitative reading data from a sample of selected participants. Participant data was collected pre, and post six week fine motor intervention using a mixed method instrument of measure. Participant data included alphabetical and numerical scores, as well as observational notes of participant word accuracy and text comprehension during pre and post assessment procedures.

Research Approach

Mixed method research design "incorporates various qualitative and quantitative strategies within a single project that may have either a qualitative or quantitative theoretical drive." (Tashakkori, 2003, p. 190) A mixed methods research approach was used to quantify changes in participants reading behaviors pre and postintervention, on a text level gradient scale, and then analyzed in concert with pre and postintervention qualitative observational notes.

The Fountas & Pinnell Benchmark Assessment System was used as the data collection instrument at the end of a six week intervention period. Data was then analyzed to compare the pre and postintervention assessments for each participant and for the group of participants as a whole to determine any changes in the following:

- alphabetic score
- accuracy
- number of errors
- number of self-corrections
- comprehension

To minimize potential researcher bias, the researcher recruited a teacher-aide who independently administered the Fountas & Pinnell Benchmark reading assessment for all twenty students in this first grade classroom, including the five participants.

The Fountas & Pinnell Benchmark Assessment System tracks reader behaviors for accuracy in oral reading, self-correcting, and comprehension by recording observational notes, and word by word analysis and comprehension of participant reading behaviors using specific texts on a gradient alphabetic scale system.

The quantitative data collected included an alphabetic score that correlated with the text level gradient system. An accuracy percentage determined by the number of errors participant made when reading the text gradient compared to total number of words in text. The numbers of self-corrections made by participant were also recorded. Other quantitative data included number of comprehension questions correct out of three total predetermined questions from the text level gradient running record.

The qualitative data collected participant reading behaviors at the point of error, and how well the participant comprehended the text. Participant comprehension was assessed through three comprehension questions that determined understanding by how thoroughly the participant retold the story. These notes on participant behaviors and comprehension were documented by a teacher-aide as qualitative data for this study.

Instrumentation.

The Fountas & Pinnell Benchmark Assessment System is a mixed methods approach to data collection, which includes a ‘text level gradient scale’ used to record quantitative scores, and qualitative observations.

The Fountas & Pinnell Benchmark Assessment System ‘Text Level Gradient’ is a series of books alphabetically organized A-Z that gradually gets more complex in accuracy, fluency and comprehension at each level. These texts have been identified, and assigned an alphabetic letter based on their degree of difficulty toward literacy. An “A” level text is picture based, and for emerging readers, while “Z” level texts include all skills needed for proficiency. Each alphabetic level builds upon the reading skills and strategies acquired by the reader, and recorded on a running record. At each level, texts in the Fountas & Pinnell assessment program monitor the reading skills and strategic components necessary, to support successful reading behavior at that specific alphabetic level. The text at each level includes a ‘running record sheet’ to track accuracy, self-corrections, and answers to three comprehension questions. These skills and strategies on the text level gradient scale are based on the same reading behaviors identified in Complex Literacy Processing Theory (Clay, 1991).

The Fountas & Pinnell ‘Running Record’ tracks three main areas of reading acquisition on the text level gradient system: accuracy, self- corrections, and comprehension (Fountas & Pinnell, 2010).

- **Accuracy** is how accurately the reader reads the individual words of the text. Each word read correctly is marked on the running record, and incorrect words were marked as well.
- **Self-correction** is when the reader misreads a word, then quickly corrects that word and continues reading.
- **Comprehension** is how the reader understands what he/she read determined by details of participant answers to three comprehension questions specific to the text level gradient.

Accuracy was scored by marking the number of words read correctly versus the errors a reader makes when reading a text from the text level gradient.

The number of errors were then counted and an accuracy percentage is calculated. The number of errors a reader makes was then cross referenced to a correlation chart for that text level gradient. An accuracy percent score of 97% passed the reader onto the next alphabetic level. A score below 97% means that the reader did not pass the level. This level is called the Independent Reading Alphabetic Score. This score quantified reader accuracy at solving words at the assessed text gradient level.

Self-corrections are identified when the reader begins to say a word incorrectly, and then, corrected the word themselves. This self-correction is not counted as an error, but is noted on the running record as well as how many self-corrections the reader makes when reading. This score is shown as a ratio; that is the number of self-corrections in proportion to the number of errors for each text level gradient read.

Comprehension was scored, and recorded as the number of comprehension questions answered correctly from a total of three questions for each text level gradient. Each participant's comprehension answers were noted with any detailed understanding or lack of understanding based on the participant's retelling of the story and the answers to the three questions. Comprehension was recorded at each text level using an included chart that provided sample answers to determine level of detail and understanding of the text read by each participant. To pass a text level, a participant had to answer two of the three questions correctly.

A teacher-aide administered both the preintervention, and postintervention assessments for the participants in this study to minimize researcher bias. The teacher-aide was bound by a

written confidentiality agreement, and provided all documents to the researcher for protection and confidentiality.

Preassessment.

Participants were administered The Fountas & Pinnell Benchmark Assessment System using the running record with text level gradient as a pre-assessment prior to the six weeks of fine motor intervention by the teacher-aide. The teacher-aide sat one to one with each participant, and administered the assessment system preintervention. The teacher-aide listened to each participant read a pre-determined text gradient and noted participant reading behaviors for word accuracy, self-corrections and reading comprehension using a running record from the F & P assessment system using the respective forms and sheets. Then participants were asked three pre-determined comprehension questions and answers were noted on the running record. Finally alphabetic scores were calculated by cross referencing the percentage chart for the total number of correct words versus the number of errors made by each reader (participant) on the text gradient scale. A corresponding letter based on the numeric score was assigned to reader for fluency rate.

Fine motor intervention.

The fine motor intervention was provided three times a week for six weeks to participants during regular class center activities by the researcher (who was also the instructor of note for this classroom). During the six weeks, the participants participated in small group activities three times a week for 15 minutes each session. Each session included activities that utilized the basic fine motor skills of all the participants. Each week participants used tongs to pick up small items on day one; used play dough to form lower case letters on day two; and assembled pop beads on day three. Each weekly session was within a small group setting

facilitated by the researcher as a part of the regular classroom activities for the entire class of students.

Postassessment.

After the six-week fine motor intervention was completed, the postintervention assessment was administered by the teacher-aide using the same Fountas & Pinnell Benchmark Assessment system and text level gradient for each participant. Post assessment procedures occurred in the same one to one setting as the pre assessment and followed the same protocols as administered in the pre-assessment phase. Upon completion of the postassessment, the scores from this assessment were documented on the respective running record following the same process as the preassessment.

Ethical Standards

This paper adheres to the ethical standards for protection of human subjects of the American Psychological Association (2010). Additionally a research proposal was submitted and reviewed by the Dominican University of California Institutional Review Board for the Protection of Human Subjects (IRBPHS) approved, and assigned number 10602.

This study took place during regular school hours, during regular classroom activities, and participants rotated through centers like the other classroom students. Participation in this study was voluntary, and confidential.

Participant confidentiality was maintained by keeping all documents and assessment data in a locked file, and erased the names of the participants from all records for the purposes of this study. Participants are referred to as Participant 1, 2, 3, 4 or 5, throughout this study.

To minimize researcher bias, both the pre and post assessment data was recorded by another teacher (referred to as the teacher-aide) (bound by a confidentiality agreement, attached in Appendix H) as a part of the regularly scheduled assessments for the entire classroom population of students including the participants. Neither the teacher-aide nor the students in the classroom were aware of sample of participants selected for this study.

Access and Permissions

Written consent was sought and obtained from the Principal of the school to conduct this study, as well as solicit participation from the parent/guardian(s) of the potential student participants (Principal Consent Letter attached in Appendix-F). Since the researcher is the teacher of note for this classroom, potential student participants for this study were identified in the classroom through in-class observation of first grade students who struggled with fine motor skills and also had low reading scores. The researcher then contacted and solicited written permission from their parent/guardians(s) via a detailed written letter, (attached in Appendix G).

Permission to use the Fountas & Pinnell Benchmark Assessment System for this study was solicited and obtained from the school district. Since this system is utilized by the district currently, in all classrooms, and is the main system of reading assessment at this school site, there were no additional permissions that were required. The Researcher contacted and obtained a written confidentiality agreement (attached in appendix H) from another teacher (referred to in this study as the teacher-aide) from the same school.

Sample and Site

This study was conducted in a small, Northern California school. This school had 392 students' enrolled per the school district records. This school had high parent participation, and

relatively low numbers of students who receive free and reduced lunches. This study took place in the first semester of a first grade classroom, three weeks after the start of the school year. Within a first grade classroom at this site, there are 20 students, ages six and seven, 11 are male students and 9 are female students. Table-1 tabulates the demographics of this school below:

Table 1

School Site Demographics

Hispanic or Latino of Any Race	American Indian or Alaska Native, Not Hispanic	Asian, Not Hispanic	Pacific Islander, Not Hispanic	Filipino, Not Hispanic	African American, Not Hispanic	White, Not Hispanic	Two or More Races, Not Hispanic	Not Reported	Total
38	0	22	0	1	1	309	19	2	392

A sample of five students (2 male and 3 female) participated in this study. These five students were selected as they had been observed to struggle with fine motor tasks, such as letter formations and manipulating small objects with their hands. These students were also selected based on their reading assessment scores that were below the district expectations when entering first grade.

Data Collection Procedures

Pre and postintervention data was collected for this study. Then data collection procedures were as follows.

First, for the pre-assessment, the teacher-aide administered the Fountas & Pinnell Reading Assessment to all students in this first grade classroom. The teacher-aide sat one to one with each student including participants, listened to them reading, and recorded observations word by word on a running record sheet while the participant read the leveled text. The teacher-

aide recorded accuracy when and where the reader correctly read a word, omitted a word, substituted a word; self-corrected a mistake, per the text level gradient scale. When finished with the text, the researcher asked participant to re-tell the story, while the researcher checked for comprehension through a series of 3 predetermined comprehension questions, which are included within the assessment materials for each gradient text in the Fountas & Pinnell System. The teacher-aide recorded qualitative notes as to what the participant recalled during this portion of the procedure.

After the preassessment procedure, the researcher completed the fine motor skill intervention over six weeks. At the end of this six-week period, the teacher-aide administered the postassessment using the same Fountas & Pinnell Benchmark Reading Assessment system and followed the identical protocols that were utilized for the preassessment.

Data Analysis Procedure

Participant data was analyzed by reviewing and organizing the running record scores and notations. Both quantitative and qualitative data were analyzed using the theoretical basis of Clay (1991), F & P (2001). Clay's literacy processing theory states that literacy acquisition is a complex process of conceptual and cognitive process systems working together to make sense of the text. (Clay, 1991) These complex systems build upon each other; therefore post assessment reading data was analyzed for any changes in reading behaviors after fine motor intervention. Data was analyzed for changes in accuracy, number of errors, Self-corrections, and comprehension for individual participants and for the group through the running record pre and postintervention assessment on the text level gradient scale. Data was analyzed for any evidence of complex conceptual and cognitive systems working together, as stated in the Complex Literacy Processing Theory and demonstrated through the running record data, post fine motor

intervention. The Complex Literacy Processing Theory considers reading a complex process of many message getting and receiving systems working together. Data was analyzed with this theory to determine changes in reading skills when measured on the text level gradient scale.

Individual participant analysis.

Individual participant data was analyzed for reading accuracy and reading behaviors for both the preintervention assessment and compared to the postintervention assessment. Numeric differences in each participant's alphabetic score, accuracy percentage, number of errors and number of self- corrections and comprehension questions pre, and post assessment were tabulated and compared.

Qualitative data from the notes collected from the individual participant's reading assessments were analyzed to ascertain if there were any identifiable relationships between the pre and post reading behaviors, number of errors and comprehension of the participant.

Group participant analysis.

The group alphabetic text level score was averaged and then analyzed for any changes, themes or relationships in the preintervention assessments and compared to the postintervention assessments. Numeric differences in the group's alphabetic score, accuracy percentage, number of errors and number of self- corrections and comprehension questions pre, and post assessment were tabulated and compared.

Qualitative data from participant notes were analyzed as a group to ascertain if there were any identifiable changes, themes, or relationships between the pre and post reading behaviors of the group.

Summary

This study utilized a mixed methods research design that assessed reading behaviors before and after a fine motor skill intervention. Quantitative and qualitative data was collected from pre and postintervention assessments regarding participant reading accuracy, errors, Self-corrections and comprehension. The F & P benchmark reading Assessment system was used as the instrument for data collection. Data was collected by a teacher-aide pre and post the fine motor skill intervention provided by the researcher.

Chapter 4 Findings, Analysis and Discussion

This study focused on participant reading behavior data collected before and after six weeks of fine motor intervention. Participant and group reading behavior data was examined after the intervention was complete. The data included pre and postintervention Fountas & Pinnell Reading Scores, in the areas of alphabetic score, reading accuracy percentage, number of errors, self-corrections, and comprehension marked on the running record by the teacher-aide. Individual participant and group data findings were analyzed using the text level gradient as a framework, and compared with Clay's Complex Literacy Processing Theory (1991) to determine progress in the reading behavior of the participants.

Findings

Pre, and postintervention raw data for alphabetic scores, accuracy percentages, number of errors, number of self-corrections, and the number of comprehension questions answered correctly are presented in Table 2. Data from the pre and post fine motor intervention findings from this study are reported and organized in numerical order for each participant, and then for the entire group of participants in Figures 3 through Figure 13. Group scores were averaged by adding total participant scores together and then divided by the number of participants, and are shown on the last row of Table 2.

Table 2

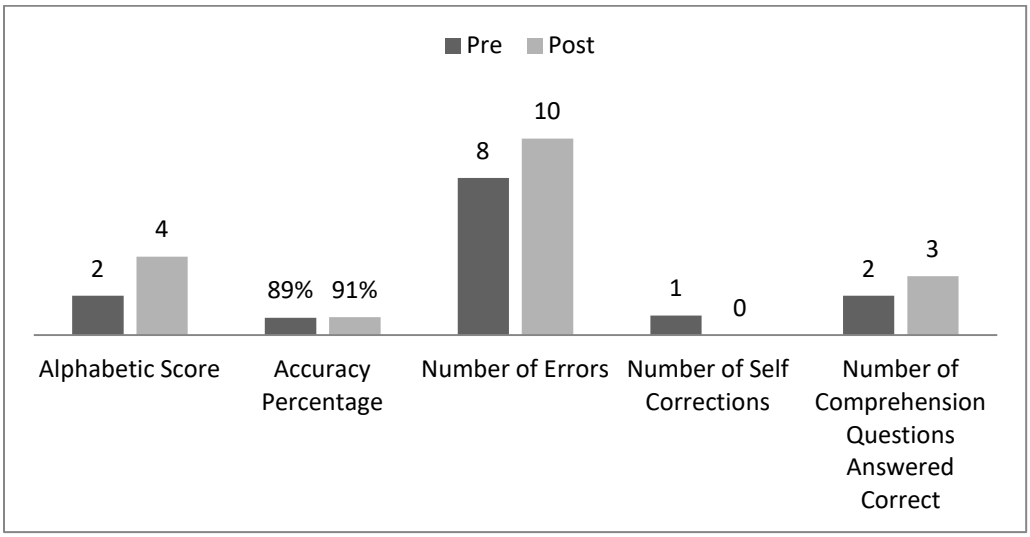
Pre and Postintervention Running Record Data

	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Participant 1	B	D	89%	91%	8	10	1	0	2	3
Participant 2	B	C	89%	90%	10	8	0	3	2	2
Participant 3	B	D	91%	93%	9	7	1	1	2	3
Participant 4	C	F	96%	91%	3	17	0	2	2	2
Participant 5	B	G	89%	96%	9	2	0	1	2	3
Group Score	B	E	91%	92%	8	9	0.4	1.4	2	3

Participant 1 findings.

Figure 3

Participant 1 Findings



Preintervention quantitative data for Participant 1 showed an alphabetic reading score of 'B'. The accuracy percentage at this level was 89%. Participant 1 had eight total number of errors, one Self-correction, and two out of three comprehension questions answered correctly.

Postintervention quantitative data from Participant 1 showed an alphabetic reading score of "D". The accuracy percentage postintervention was 91%. Participant 1 had 10 total errors, no Self-corrections, and 3 out of 3 comprehension questions answered correctly. Preintervention qualitative data, noted the following observations:

- Participant 1 had difficulty with sight words.
- Participant 1 inserted words often into text that were not visually represented
- Participant 1 was distracted and looking around the room, not at the text
- Participant 1 struggled with details during comprehension questions

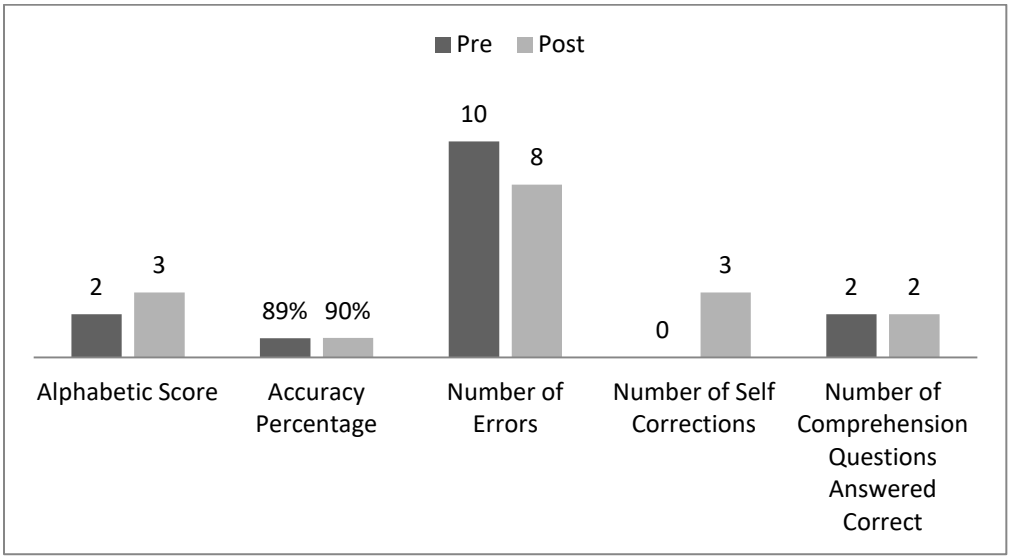
Postintervention qualitative data noted the following observations:

- Participant 1 was able to decode words more easily
- Participant 1 needed prompting to read unknown words
- Participant 1 was able to retell text with more details during the comprehension portion of assessment.

Participant 2 findings.

Figure 4

Participant 2 Findings



Preintervention quantitative data for Participant 2 showed an alphabetic reading score of 'B'. The accuracy percentage at this level was 89%. Participant 2 had ten total number of errors, 0 Self-corrections, and answered 2 out of 3 comprehension questions correctly.

Postintervention quantitative data from participant 2 showed an alphabetic reading score of "C". The accuracy percentage at this level was 90%. Postintervention participant 2 had eight total errors, three Self-corrections, and 2 out of 3 comprehension questions answered correctly. Preintervention qualitative data noted the following observations:

- Participant 2 had difficulty with sight words.

- Participant 2 struggled with decoding words and read letter sound by letter sound.
- Participant 2 needed prompting during the comprehension portion of the assessment.

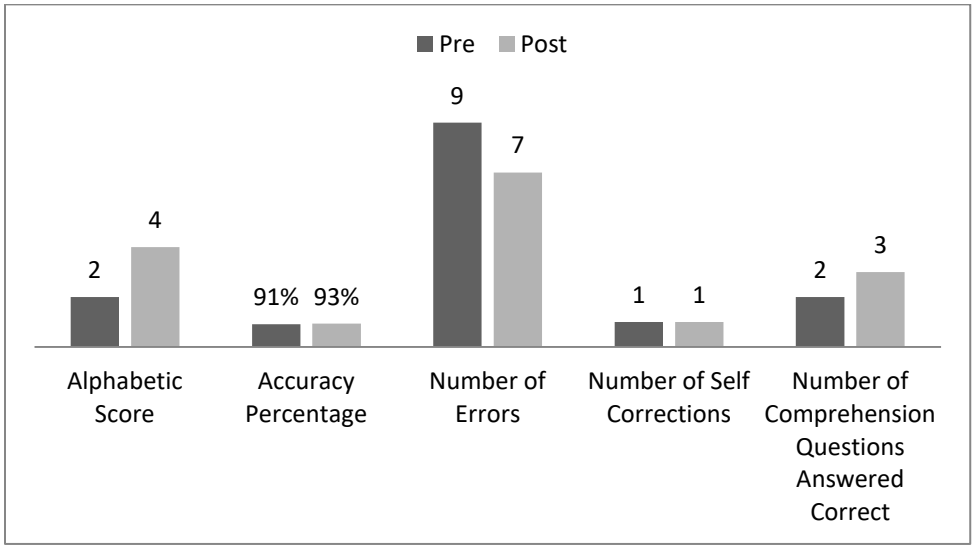
Postintervention qualitative data noted the following observations:

- Participant 2was able to decode words more easily.
- Participant 2 selfcorrected more often at the point of error.
- Participant 2 was not as confident when retelling text during the comprehension portion of assessment.

Participant 3 findings.

Figure 5

Participant 3 Findings



Preintervention quantitative data for Participant 3 showed an alphabetic reading score of 'B'. The accuracy percentage at this level was 91%. Participant 3 had 9 errors, 1 selfcorrection, and answered 2 out of 3 comprehension questions correctly.

Postintervention quantitative data from Participant 3 showed an alphabetic reading score of “D”. The accuracy percentage at this level was 93%. Participant 3 had 7 total errors, 1 selfcorrection, and 3 out of 3 comprehension questions answered correctly. Preintervention qualitative data noted the following observations:

- Participant 3checks the picture to help with unknown words.
- Participant 3 inserted words when reading that were not represented in the gradient text.

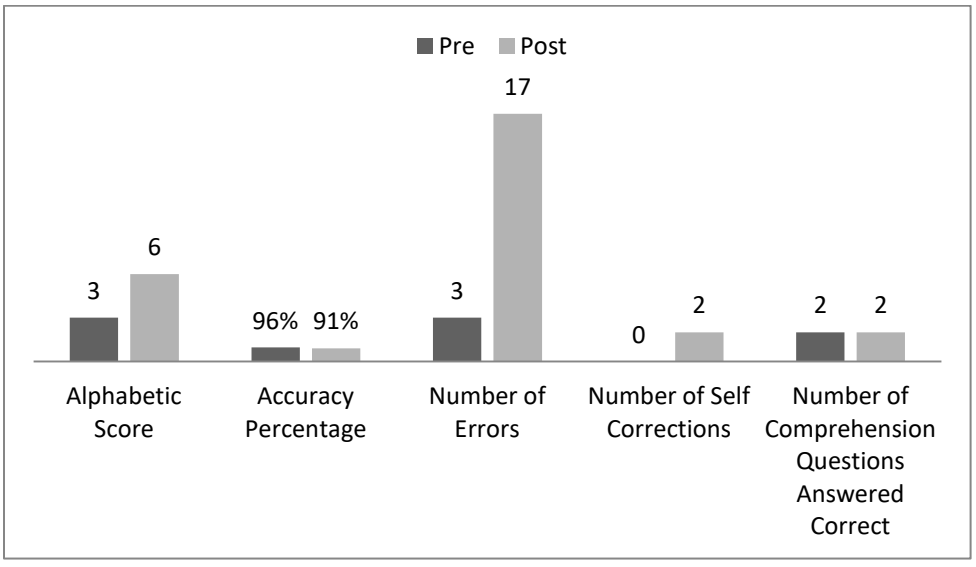
Postintervention qualitative data noted the following observations:

- Participant 3 was able to decode words more easily.
- Participant 3 selfcorrected more often at the point of error.
- Participant 3 was more confident when retelling text during the comprehension portion of assessment.

Participant 4 findings.

Figure 6

Participant 4 Findings



Preintervention quantitative data for Participant 4 showed an alphabetic reading score of ‘C’. The accuracy percentage at this level was 96%. Participant 4 had three errors, zero self-corrections, and answered two out of three comprehension questions correctly.

Postintervention quantitative data from Participant 4 showed an alphabetic reading score of “F”. The accuracy percentage at this level was 91%. Participant 4 had 19 total errors, two self-corrections, and answered two out of three comprehension questions correctly. Preintervention qualitative data noted the following observations:

- Participant 4 checks the picture to help with unknown words.
- Participant 4 would get stuck on unknown sight words.

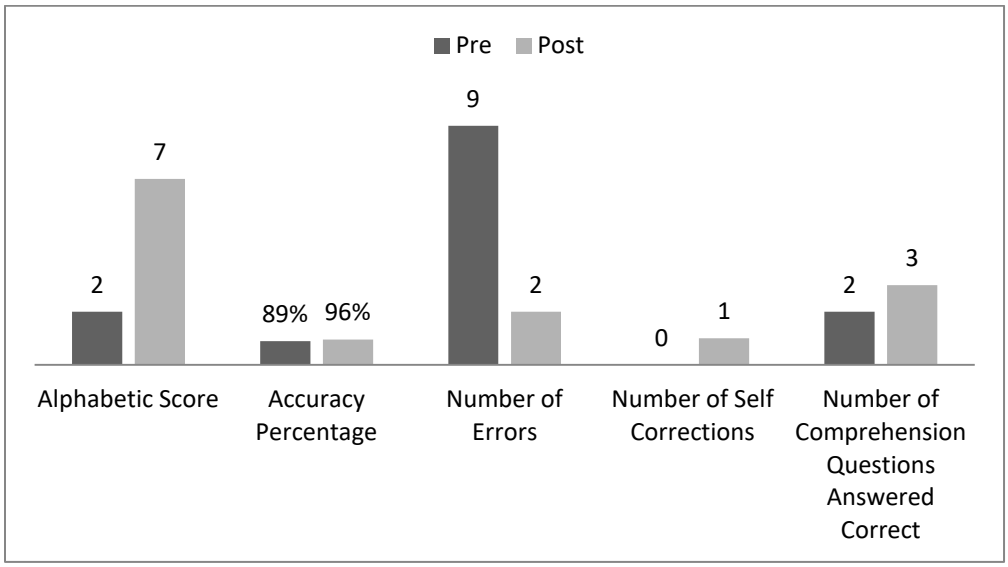
Postintervention qualitative data noted the following observations:

- Participant 4 was able to decode words more easily, but still struggled with sight words.
- Participant 4 self-corrected more often at the point of error.
- Participant 4 was more confident when retelling text during the comprehension portion of assessment, however confused the names of the characters in the text level gradient.

Participant 5 findings.

Figure 7

Participant 5 Findings



Preintervention quantitative data for Participant 5 showed an alphabetic reading score preintervention of 'B'. The accuracy percentage at this level was 89%. Participant 5 had nine errors, zero self-corrections, and answered two out of three comprehension questions correctly.

Postintervention quantitative data from Participant 5 showed an alphabetic reading score of "G". The accuracy percentage at this level was 96%. Participant 5 had two total errors, one self-correction, and answered three out of three comprehension questions correctly.

Preintervention qualitative data showed the following observations:

- Participant 5 was not able to decode unknown words and did not recognize sight words
- . Participant 5 struggled to retell story in preintervention assessment

Postintervention qualitative data noted the following observations:

- Participant 5 was able to decode words more easily.

- Participant 5 self corrected more often at the point of error.
- Participant 5 was more confident when retelling text during the comprehension portion of assessment.

Group findings.

Figure 8

Group Findings

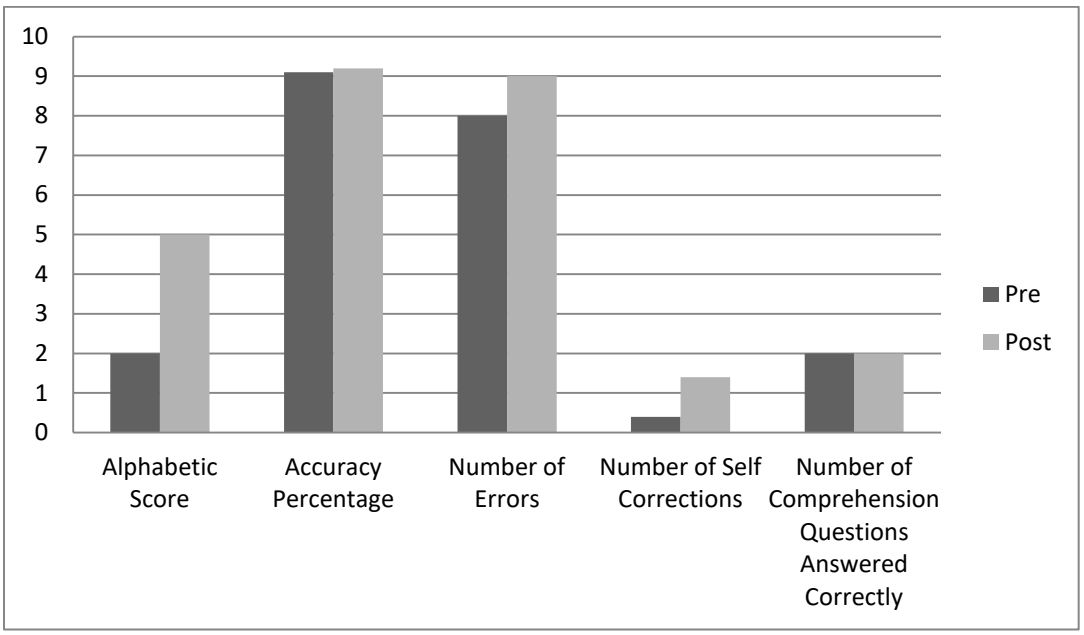


Table notes: Y axis 1-10 corresponds to F & P alphabetic reading levels wherein A = 1, B = 2, 3=C, 4-D, 5=E, 6=F, 7=G, 8=H, 9=I, 10=J

Preintervention quantitative data for the group showed an average alphabetic reading score of 'B'. The average accuracy percentage at this level for the group was 91%. The group had an average of 8 errors, less than one (0.4) selfcorrection, and answered two out of three comprehension questions correctly.

Postintervention quantitative data for the group showed an average alphabetic reading score of "E". The accuracy percentage at this level was 92%. The group averaged nine total

errors, 1.4 self-corrections, and answered two out of three comprehension questions correctly. Preintervention qualitative data from the group noted the following observations:

- Sight words were challenging for participants, as noted on 4 out of 5 post assessment running records.
- Group showed difficulty with story details during comprehension questions for all five participants.

Postintervention qualitative data noted the following observations:

- Group was able to decode words more easily.
- Group scores showed 1 more error postintervention as a group.
- Group self-corrected more often at the point of error postintervention.
- Group was more confident when retelling text during the comprehension portion of assessment.

Analysis and Discussion

Pre and postintervention quantitative and qualitative data indicates that there was an increase in the alphabetic score for each participant, and an average increase of three alphabetic levels for the participant group as a whole. With the alphabetic reading score being an accumulation of the other categories, researcher determined participant reading behaviors improved post fine motor intervention. An analysis of each of the participant's data from both pre and postintervention follows.

The data indicated that even though the scores for Participant 1 increased, they were below benchmark for first grade standards at this point in the school year. This higher score indicated the reading behaviors and complex message getting systems improved two alphabetic

levels for Participant 1. Therefore, it can be derived that Participant 1 remained in the earlier staged of reading acquisition as evidenced by his post assessment alphabetic score of D, and lack of self-corrections at the higher text gradient level.

The data indicated that even though the scores for Participant 2 increased, they were below benchmark for first grade standards at this point in the school year. This higher score indicated that reading behaviors and complex message getting systems improved two alphabetic levels for Participant 2. Therefore, it can be derived that while Participant 2 is still below the grade level benchmark, her reading acquisition process is focused on self-corrections at the point of error as evidenced by her score increase from zero to three post the intervention.

The data indicated that even though the scores for Participant 3 increased, they were below benchmark for first grade standards at this point in the school year. The data indicated that while Participant 3 is reading at the D level postintervention, the number of errors decreased when Participant 3 read at the higher text level gradient. This decrease in errors made, and increase in comprehension points to complex mental systems in play as Participant 3 searched for word meaning and understanding of the text at gradient ‘D’ level. The data indicated that by using more context clues and supportive components of the text, Participant 3 was able to read more words correctly, as evidenced by the lower number of errors postintervention.

The data from Participant 4 evidenced the second highest increase in alphabetic score among the participants, yet her accuracy score decreased, her self-corrections increased, and her comprehension score had no change. Despite the inconsistent data across scored areas, Participant 4 scored above the benchmark for first grade standards at this point in the year. Participant 4 had the second highest alphabetic score increase, and the most number of errors.

This high number of errors at a higher text level gradient provided insight into the cognitive systems in use for reading acquisition at a higher text level gradient.

The data from Participant 5 evidenced the highest increase in alphabetic score, and accuracy score among the participants. The number of errors decreased by seven, self-corrections increased by one, and comprehension increased by one. Overall, Participant 5 scored above the benchmark for first grade standards at this point in the year, and had the highest alphabetic score from this group. As the data evidences, due to the higher text level gradient alphabetic score and the lower number of errors postintervention, Participant 5 may have developed better reading skills through an intervention of multiple elements working together in a complex literacy system.

Use of the text level gradient and the postintervention score increases reflected in the data demonstrate that reading skills and processing systems were being built upon. As Clay found in her years of research complex learning involves many cognitive processes and utilizes a series of message getting and receiving to comprehend text (Clay 2001). Assessing the reading processes of the participants on a text level gradient, specifically looking at overall alphabetic score, accuracy and comprehension, provided an insight into whether fine motor skill intervention contributed to the improvement of the reading skills of these particular participants. Overall scores of the participants show an increase post fine motor intervention, pointing to the many cognitive components, or message getting systems that are involved in reading acquisition.

This increase in Alphabetic Score post fine motor intervention could be due to an increase in the complex working systems participants utilized when decoding and comprehending text. This is supported by Grissmer et al. (2010) who suggests that:

> The developmental and neuroscience literatures provide theories and evidence to support the use of the neural infrastructure build during motor development during cognitive development. This neural infrastructure includes highly specialized capacities in the basal ganglia and cerebellum that are used in specific types of learning and sophisticated adaptive control capacity that may be essential to moth motor and cognitive learning (p.1015)

Thus, the participants may have strengthened their fine motor skills during intervention, which might have possibly influenced their reading acquisition skills.

These message getting systems are also evidenced in the results of participants' error management. As the text level increased, so did participant errors. An increase in errors may point to the message getting systems heightened, or increased. Perhaps these neuropaths were stimulated by the fine motor activities, creating a cross pollination type of effect. Stimulating fine motor skills may have provided an expanded cognitive opportunity for strengthening the cognitive maps, or message getting systems necessary for reading improvement, (Clay, 2001).

By stimulating these motor skills through six weeks of intervention, participant findings support previous research that points to the spiraling process of developing skills. Grissmer posits that "An important part of development is a spiraling process whereby newly developed motor skills provide expanding opportunity for children to experience more diverse and ever more challenging environments that, in turn, require more complex cognitive maps." (2010, p.1440) Adolph sums up this possibility by observing that the importance of strengthening fine motor skills as a precursor to reading acquisition, and how one cognitive area may indirectly influence another occurs because "we learn how to learn during motor development" (in Grissmer, 2010, p. 1015).

The participant and group analysis showed improvement with their alphabetic score, accuracy percentage, and self-corrections post six weeks of fine motor intervention as evidenced on the text level gradient scale. Group comprehension stayed the same pre and postintervention. Complex Literacy Theory states that reading involves integrated ways to the problem of extracting sequences of information from the texts to yield specific and meaningful communications (Doyle 2003)

Data showed some increase in specific areas of alphabetic score and number of self-corrections made by participants postintervention, which may evidence a slight increase or joining of the complex systems working together for literacy acquisition. Comprehension is the total understanding of text read, and an increase here points to a greater understanding by the reader, at a higher text level, indicating more cognitive systems working together to understand what is being read. These complex systems are the foundational building blocks of reading and of Clay's Complex Literacy Processing Theory.

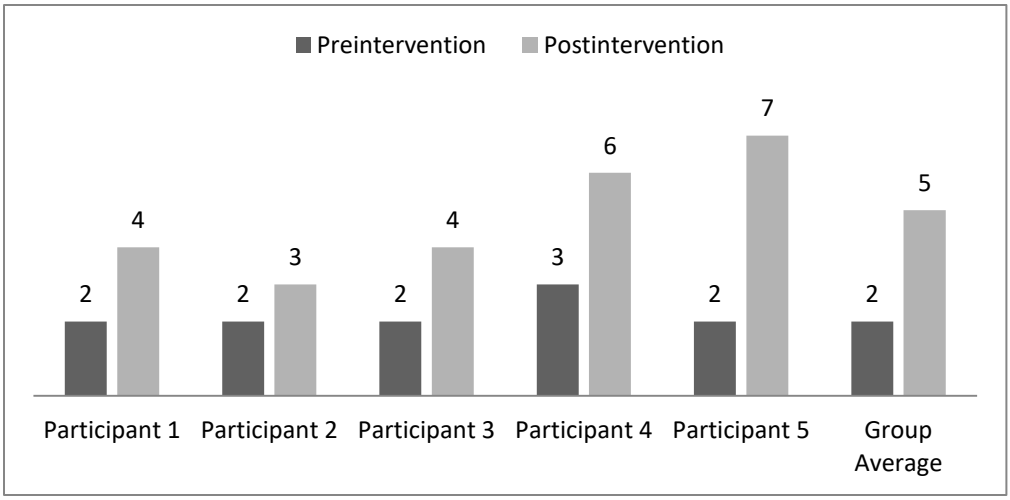
Results

The results from this study show an increase in overall alphabetic score for the group, which reflect an increase in all reading behaviors. In order to move up the text level gradient scale, participants had to decode more words and comprehend more complex texts as evidenced by increased alphabetic scores, and increased errors, self-corrections and comprehension details. This increase could be due to the complex message getting and receiving systems in the brain being stimulated through fine motor activities, simultaneously enhancing reading for these particular participants. The analytical results from this study are presented below based on the five measures per the F & P system gradient and the theoretical basis of Clay. (1991)

Alphabetic reading scores.

Figure 9

Participants Alphabetic Reading Scores



Alphabetic scores correlate to numerical score above. A=1, B=2, C=3, D=4, E-5,F=6,G=7

Preintervention group alphabetic reading scores were below the grade level benchmark for meeting the CCSS reading foundational standard RF 1.3 at the beginning of the first grade year. These students had difficult reading a B level text, when the benchmark for start of year is C level. Qualitatively, participants had been observed by Teacher aide to have struggled with sight words, rarely selfcorrected at the point of error, and averaged 2 out of 3 comprehension questions correctly. Teacher aide noted two of the five participants were distracted and looking around the room during preassessment.

Postintervention group alphabetic reading scores, when averaged, increased by 3 alphabetic levels. Quantitatively, findings showed an increase in alphabetic reading score for the group postintervention. This increase in overall alphabetic score for the group showed an overall increase in reading strategies when encountering more difficult texts from the text gradient.

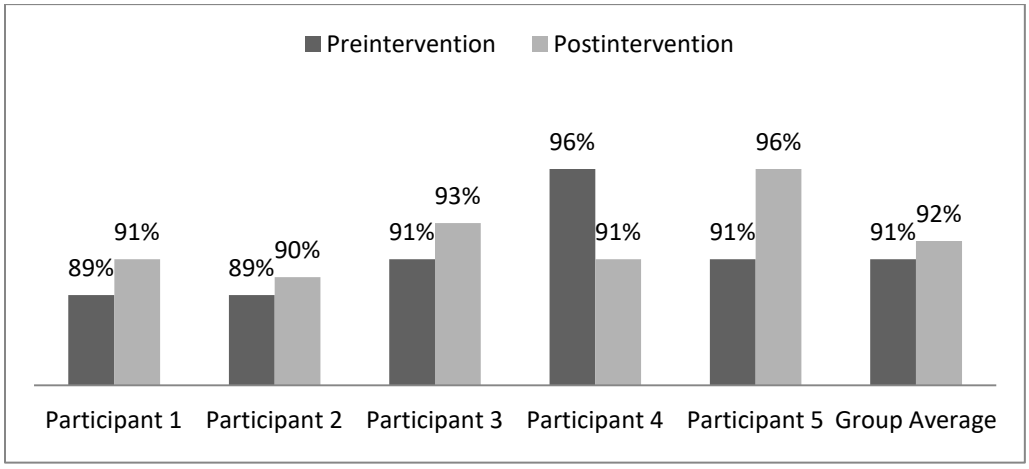
Participant group scores increased 3 levels, which brought three out of five participants to grade level standard after intervention.

With the alphabetic score a representative of all categories collected, postintervention scoring shows an increase on the text gradient. According the Fountas & Pinnell, the text level gradient reflects reading behaviors needed in order to successfully decode and comprehend the text at that specific alphabetic level. With a three level increase for the group average, Reading behaviors show increase in alphabetic score, error management and comprehension post fine motor intervention, combined; therefore pointing to increased literacy systems functioning across all message getting systems, as referred to by Clay in her complex literacy processing theory.

Accuracy percentage scores.

Figure 10

Participants Accuracy Percentage Scores



Participant accuracy percentage varied by participant, but the group average showed a 1% increase in accuracy postintervention. The group preintervention, had an average of 91%, and postintervention an average of 92%. With the text level gradient, each text increases in amount of words within the story, as well as word complexity, and comprehension complexity.

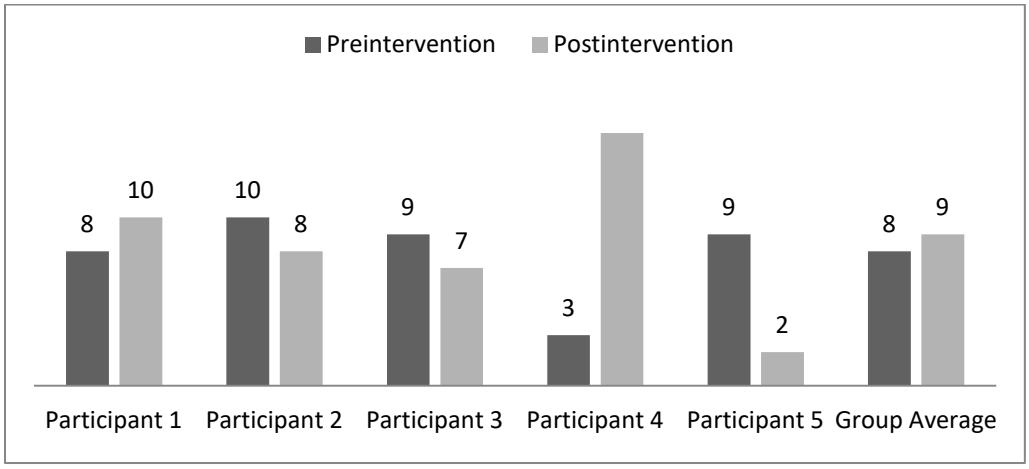
With more words in each leveled text, this score percentage did not change much postintervention, but it also did not go down given more words per text level.

Given the accuracy percentage either passes or keeps the participant at that reading level, Researcher was not surprised by the small change in results within this category, as the accuracy percentage reflects number of words read correctly to total number of words in text level gradient for that specific alphabetic level. As the text gradient increased, and participant could read the text, accuracy percentage did not change much as it was the quantifying data for determining alphabetic reading level.

Number of errors.

Figure 11

Participants Number of Errors



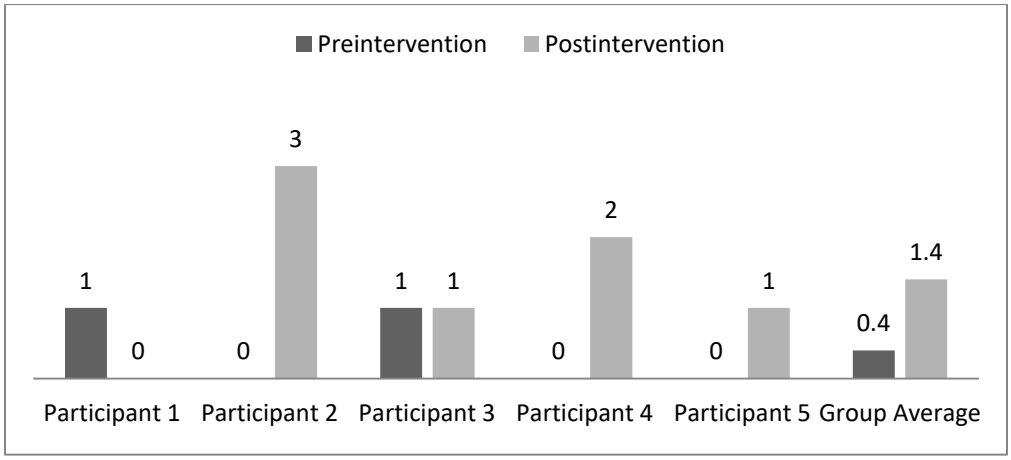
Postintervention, participant group had an increase in number of errors, but also had an increase in number of self-corrections, or abilities to fix up' the word they were stumbling on to say it correct, and not have it count as an error. Data showed number of errors made by group went up postintervention. This could show an increase in more systems working together to try and decode unknown words when there are more words in the text at a higher text level gradient.

This increase in errors across participant postintervention scores, may evidence a strengthening of visual and perceptual skills coming together. Although an increase in errors seems like a negative, researcher felt that the consistency across participants may demonstrate a heightened awareness of more cognitive systems working together to seek out information and make decisions on text. Marie Clay's complex literacy processing theory supports this analysis as reading acquisition is a series of accumulating strengths of mental systems which monitor and verify a reader's decision making about what a text says. The higher number of errors postintervention could show stimulation or increase in cognitive systems possibly influenced by the fine motor intervention of this study.

Number of Self-Corrections.

Figure 12

Participant Number of Self-Corrections



Self-corrections did go up postintervention, and this data shows participants may have had more awareness to getting the word correct than when the pre assessment data was collected and at a higher text level gradient. These varied findings may point to how complex reading acquisition actually is, and how many message getting and receiving systems are in play. The

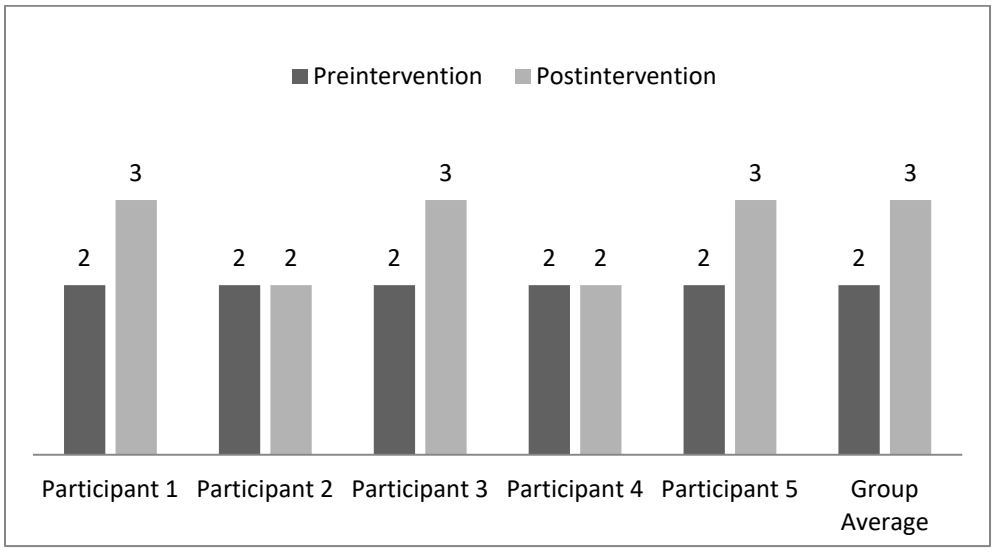
higher the text level gradient, the more opportunities for the participant to commit and or identify errors and selfcorrect, therefore pointing to more literacy skills being utilized postintervention.

One pattern of behavior that appeared in this study also appeared in Clay's original data was the unprompted, spontaneous self-correction of reading errors by young learners. In Clay's research, self –corrections were observed in the earliest readings of stories and first appeared when the child noted his or her speech did not correspond to the movements for printed words on the page. Based on monitoring all sources of reader information, the reader revised, or corrected his reading. This early behavior indicated a learner's willingness to choose between alternatives in order to read a precise message and maintain a fit between the language and visual information sources for reading. (Doyle 2010, p.642) With an increase in errors for all participants, the findings from this study support Clay's suggestions that, "a learners willingness to choose between alternatives leads to a search for more information and this can potentially take processing to new levels of complexity" (Clay, 2001, p.120) The increase in errors are evidence of more cognitive systems in play, potentially strengthened from the fine motor intervention experiences.

Comprehension.

Figure 13

Participants Comprehension



Two thirds of participants showed an increase in comprehension questions answered correctly postintervention. Qualitative notes taken postintervention also show an increase in participant confidence when recalling text details, and is also shown in an increase in group scores for comprehension answering 3 out of 3 correct in post assessment. Comprehension of a higher text level gradient also points to more reading behavioral systems being used, as more of those message getting and receiving systems must work together to comprehend literally and inferential components of the story. Again, these components increase in difficulty as the text level gradient increases in alphabetic score.

The qualitative notes postintervention also show an increase in confidence when retelling story read. This increase in confidence is also evidence of the Complex Literacy Processing Theory in play. This theoretical explanation of reading acquisition focuses on the building of understandings for specific, perceptual and cognitive behaviors involved in reading and writing.

Participant's successful explanation of story comprehension demonstrates the integration of complex cognitive systems working together. "Reading acquisition is an emergence of a network of complex neural processing systems, the perceptual and cognitive working systems directed to complete reading tasks successfully." (Doyle 2010, p. 646) In order for participants to comprehend a text on a specific level within the Fountas & Pinnell Assessment system participant must decode, process, and apply meaning to the words read, in order to retell the story. The use of Clay's described message getting systems combine during reader comprehension. This combination created stronger reader understanding as evidenced by participant ability to answer and pass more challenging comprehension questions as the text level gradient increased.

The group results from this study show an increase in participant group reading behaviors post fine motor intervention in all areas measured by the running record. These areas are; Alphabetic Score, Accuracy Percentage, Number of Errors, Number of self-corrections and Number of Comprehension questions answered correctly. Overall group alphabetical scores went up three levels. Three out of five participants increased reading behaviors as number of errors went down, and number of self-corrections went up. An overall increase for group alphabetic score also shows improved reading behaviors for the group, as evidenced by postintervention participant data.

Participant Group data for Alphabetic score, Number of Errors and Number of self-corrections saw an increase postintervention. This increase points to an increase in the complex message getting and receiving systems that are working when decoding and comprehending texts. Field notes from the teacher aide showed that some participants were distracted during the preintervention assessment, and had difficulty with sight words. Postintervention, the

researcher's field notes observed that the participants showed more confidence with decoding words, made no mention of sight word difficulties, and demonstrated greater confidence when answering comprehension questions. These qualitative themes across participant data also point to complex mental systems working together to access and make sense of literacy information when reading. By looking at these results on a text level gradient system, the reading behaviors can be viewed through the Complex Literacy Processing Theory of Marie Clay to determine if the message getting and receiving systems of the brain involved with reading, were stimulated by fine motor intervention. With Diamond's research showing that fine motor skills and reading develop in the same portion of the brain, it is possible that exposure to fine motor skill intervention, may have influenced the message getting and receiving systems, or the reading behaviors of participants. Looking at these behaviors across a text level gradient scale shows increase in alphabetic score, or a cumulative gaining of skills necessary to read and comprehend text at an increasing difficulty.

Group participants may have also benefited from the social components of small group intervention. As students worked together to perform fine motor activities, they communicated with each other. Learning happens with in a social context, and the small group intervention provided this context and may have also influenced the postintervention reading behaviors.

The postintervention quantitative data and qualitative behavioral notes point to a strengthening of the mental processes participants used when reading gradient level text post fine motor intervention. Although not all areas show growth for all participants, the varied growth in each area reflected the development and strengthening of these systems.

The theoretical components of the Complex Literacy Theory developed by Marie Clay are also evidenced through the running record post assessment data of this study. By using the

text level gradient within the Fountas & Pinnell Benchmark Assessment System, the data denoted that participant reading behaviors showed a slight increase post the fine motor intervention. This increase in accuracy, and self-corrections, even at a higher text level gradient, demonstrated participant reading behaviors improved, as more complex literacy processing systems were involved at the point of error during post fine motor intervention assessment.

The Complex Literacy Theory states reading skills are a series of behaviors that are message getting and receiving processes in the brain. This research data showed that participants experienced more message getting systems as their reading levels increased as did the self-corrections or awareness to decoding words at the point of error. More message getting systems were in play during the post assessment than the pre assessment for all participants as each experienced an increase in reading level. Through the research of Diamond, who studied the neuropathways of the brain made the discovery that reading and fine motor develop in the same portion of the brain. By utilizing and strengthening these systems through fine motor tasks as intervention, reading sills improved. Data from this study showed that these message getting systems improved and strengthened with experience and exposure. For this study that exposure would be to the fine motor activities. The mental and physical fine motor work of participants when focused on the fine motor tasks, may have also built a greater focus and attention to reading, specifically to self-corrections and understanding of the text.

Summary

Pre and postintervention quantitative and qualitative data indicated that there was an increase in the alphabetic score for each participant, and an average increase of three alphabetic levels for the participant group as a whole. With the alphabetic reading score being an accumulation of the other categories, researcher determined participant reading behaviors

improved post fine motor intervention. This increase in reading scores when measured with a text level gradient provided evidence that the message getting systems in the brain, referred to by Clay (1991) improved post fine motor intervention. These message getting systems are also evidenced in the postintervention results of participants' error management and greater confidence with comprehension. The increase in errors and self-corrections postintervention, and increased comprehension may show participants willingness to engage and utilize more complex message getting systems in the brain to de-code words, and try to figure them out at the point of error. As the text level gradient increased, so did the number of words read by participants increase, as well as the number of reading errors. Targeted small group instruction may have improved the reading levels of those students who were not meeting CCSS standard RF1.3 in this particular classroom as evidenced by the overall alphabetic score increase of three text levels postintervention.

This increase in reading ability as measured on the text level gradient scale is also evidence of Clay's Complex Literacy Processing Theory at work because reading acquisition is a spiraling process of accumulating message getting and receiving processes in the brain. (Clay, 1991; Doyle, 2003)

Chapter 5 Conclusions

The results of this study indicated that both individual participant and group reading scores increased post assessment based on the running record and text level gradient. Postintervention scores demonstrated participant increases in reading accuracy, fluency and comprehension for all participants, notable in the three areas quantitatively assessed by the instrument of measure and included in complex literacy processing theory. Qualitative notes from teacher-aide also showed improvement in the confidence of the participants and as a group when decoding words and comprehending text.

The intervention was provided in a social setting which may have influenced the outcomes of this study. Students worked individually yet together to perform fine motor tasks. When viewed through a constructivist lens, this social interaction may have influenced participant message getting systems, or cognitive development. Vygotsky's model of complex functional learning systems defines learning as “These systems are in the brain on the basis of the child's communication with other children and adults in the process of learning. They embrace different levels and different components each making its own contribution to the final structure of mental activity.” (Doolittle, 1997 p. 91)

This intervention has revealed that fine motor instruction to support reading acquisition in the first grade classroom may be beneficial to some students in a similar sample and site. With a slight increase in all assessment areas postintervention, this study reached the conclusion that these activities may have helped struggling readers in this particular first grade classroom. These fine motor activities may have helped support reading acquisition by contributing to the complex cognitive systems the brain uses when learning to read. By stimulating the fine motor skills in young readers, perhaps reading behaviors for word decoding are also stimulated. By working

both, the participants showed stronger reading behaviors to managing and comprehending increasingly more difficult texts. Academic research shows that fine motor skills are important to academic learning and had been added to the list of kindergarten readiness skills in 2010 (Grissmer et al., 2010). In 2016, The Center for Childhood Creativity produced a report also supporting fine motor skills as important experiences to strengthen and promote other learning:

> Hands-on experiences in art, science, and making- such as ripping tape, handling Legos, painting and building with clay are terrific and developmentally appropriate ways for young children to build their fine motor coordination and the musculature for later writing. (Rood 2016, Changing the Checklist)

The results of this study indicate that targeted small group fine motor instruction may have contributed to the improvement of reading levels for the five participants in this study who were not meeting CCSS standard RF 1.3 in this Northern California first grade class room. By supporting different learning modalities, it may be possible to strengthen the cognitive components to encourage growth in reading acquisition.

Limitations of the Study

This study took place during the regular day-to-day activities in a first grade classroom, wherein the intervention was one part of the overall learning activities during a school day. Participants were exposed to regular math, phonics, and writing during the regular school day and as part of the regular grade level curriculum. Therefore, that the results of this study are constrained to these specific participant reading behaviors and thus not generalizable to other populations of similar students.

Additionally, this study is limited by the fact that there is no evidence to support any claims that the fine motor skill intervention was solely responsible for the increases in reading

behavior due its very narrow context, and the small population of participants. This study took place in a school which had high parent participation, and a lower number of students who received free and reduced lunches. As such, another imitation is that this sample of participants may not be reflective or even typical of the population of students who are struggling with reading in kindergarten.

Significance of the Study

The significance of this study shows that there may be a connection between fine motor skill intervention and increased reading behaviors when measured on a text level gradient scale. There also may be a connection between the increased levels of confidence derived from the participants' experiences of strengthening their fine motor skills within a small group peer environment. This study could be used as a basis for more intervention research of fine motor skills. More research needs to be done on whether focused time strengthening fine motor skills may have the cumulative capacity to support reading skills during the early school years. More research needs to be done on whether small group intervention to perform fine motor tasks may help confidence through peer intervention interactions while using language and building conversational skills. The potential for students to have a positive experience while performing these tasks may also help to increase their positive experiences and outlook at school. These intervention opportunities also give teachers the time to teach proper fine motor skills that would benefit letter formations and fine motor based tasks needed for other academic areas.

Implications for Future Research

Given that reading in a necessary skill for students to be successful in a school setting, any opportunity to help those who fall behind should be explored. Fine motor skills and it's identification as an important kindergarten readiness skill points to an opportunity for early

childhood educators to emphasis intervention opportunities for these fine motor skills as a way to support reading acquisition and skills in the later grade.

Intervention to strengthen fine motor skills and potentially impact reading behaviors at a first grade level could be beneficial for classroom teachers and their students. By providing this intervention in a small social group setting such as a classroom, other social components may be influencing reading acquisition. Therefore, performing these activities at home such as a homework type experience would not be as beneficial due to the absence of the social construct.

Fine motor intervention opportunities and activities should be further explored as a way to engage struggling readers who are performing below CCSS reading standard 1.3. More emphasis could also be placed on strengthening these skills in Kindergarten to support reading acquisition in first grade.

About the Author

Tyler West-Higgins is a first grade teacher at a San Francisco Bay Area Public Elementary School. She enjoys being able to combine her love of literacy and developmental milestones of adolescents within her classroom to benefit her students learning. As a relatively new teacher, Tyler is eager to continue to widen her pedagogical understanding of reading acquisition and find new ways to support struggling readers. Tyler earned her Bachelor's Degree in Fine Art at Dominican University, as well as a Multiple Subject Teaching Credential. She lives in Marin County with her family and enjoys taking advantage of the outdoor activities the area is known for. When not lesson planning and deepening her understanding of teaching, Tyler can be found spending time with her family, pets, and friends.

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Appendices

Appendix F

LETTER OF PERMISSION TO AGENCY DIRECTORS

Ms. _____
Principal _____ School, _____ School District
_____
San Anselmo, CA 94960

Dear _____:

This letter of permission confirms that you have been provided with all relevant information regarding my thesis research study which is required for the completion of my Master's degree in Education at Dominican University of California. The study involves using small group intervention for five students in my classroom 3 times a week, with a focus on fine motor skill development. The Fountas & Pinnell (Fountas & Pinnell 2011) reading score for participants both pre and post interventionpostintervention will be a part of the measures used in this study. The school district has purchased the rights to use Fountas & Pinnell Benchmark system 2011. This Fountas & Pinnell Benchmark Assessment System is the instrument of measure permitted and currently used by all teachers in the district. This research study was approved by the Institutional Review Board for the Protection of Human Subjects (IRBPHS) at Dominican University of California, and was assigned approval number 10602. I will ensure that my data collection does not interfere with my teaching responsibilities in this classroom. I believe that it will actually enhance my program.

Based on your permission and consent, I will contact the parent/guardian(s) of the potential participants for this study, and solicit their consent. Please note that the parent/guardian(s) of the participants in this study will be informed that their child's participation in this study will be voluntary, anonymous, confidential, non-paid and that they reserve the right to withdraw from this study at any time. If you have questions about the research you may contact me at 415-846-5590. If you have further concerns or questions, you may contact my thesis advisor, Dr. Appavoo at 415-482-3598 or the Institutional Review Board for the Protection of Human Subjects at Dominican University of California by calling (415) 482-3547.

If my request to conduct this research in my classroom meets with your approval, please sign and date this letter below and return it to me in the enclosed self-addressed, stamped envelope as soon as possible. Please feel free to contact me if you have any questions about this study. Your signature on this letter also confirms that you provide informed consent for me to conduct this research during regular school hours within my classroom. Thank you very much for your time.

Sincerely,

Tyler West-Higgins
San Anselmo, CA 94960

Permission and Informed Approval

I have been given a copy of this permission form, signed and dated, for my records. I have been made aware that my permission and approval for this study is voluntary and is not required. I am aware that I am free to decline the participation of my school including the students, or to withdraw my school including the students from participating in this study at any point. My signature below indicates that I agree to permit my school, and the use of district approved Fountas & Pinnell Benchmark Assessment system to selected students in order to participate in this research study. I approve and grant permission to the undersigned and named researcher to conduct this research study and use our district approved instrument of measure.

Name and Signature of Principal:

_____Date_____

Name and Signature of Researcher:

_____Date_____

Appendix G

PARENT/GUARDIAN CONSENT FORM

1. I understand that my child is being asked to participate as a subject in a research study conducted by Ms. Tyler West-Higgins designed to assess certain fine motor skills of first graders in a northern California public school classroom. This research study is required for the completion of a Master's degree at Dominican University of California. This research project is being supervised by Dr. Suresh Appavoo, Associate Professor of Education, Dominican University of California. This research study was approved by the Institutional Review Board for the Protection of Human Subjects (IRBPHS) at Dominican University of California, and was assigned approval number 10602.

2. I understand that participation in this research will involve my child working with the researcher/teacher in a small group within the regular classroom 3 times a week for 15 minutes each time over a period of six weeks.

3. I understand that my child's participation in this study is completely voluntary and I am free to withdraw participation at any time.

4. I have been made aware that observations will be recorded. All personal references and identifying information will be eliminated when these recordings are transcribed, and all subjects will be identified by a different name only; the master list for these names will be kept by Tyler West-Higgins in a locked file, separate from the transcripts. Named transcripts will be seen only by the researcher and her faculty advisors. One year after the completion of the research, all written and recorded materials will be destroyed.

5. I am aware that all study participants will be furnished with a written summary of the relevant findings and conclusions of this project. Such results will not be available until December 31 2017.

6. I understand that my child will be working with a small group to focus on specific skills, and if that causes my child distress or seems an invasion of my privacy, I may elect to stop the participation at any time.

7. I understand that my participation involves no physical risk, but may involve some physical or mental fatigue for my child. If my child experiences any problems or serious distress due to my participation, Ms. Tyler West-Higgins will provide, at no cost to me, a one-time consultation with a licensed therapist. Ms. Tyler West-Higgins may be contacted at tyler.west-higgins@students.dominican.edu.

8. I understand that if I have any further questions about the study, I may contact Ms. Tyler West-Higgins at tyler.west-higgins@students.dominican.edu.or her research supervisor, Dr. Suresh Appavoo at (415) 482-3598. If I have further questions or comments about

participation in this study, I may contact the Dominican University of California Institutional Review Board for the Protection of Human Subjects (IRBPHS), which is concerned with the protection of volunteers in research projects. I may reach the IRBPHS Office by calling (415) 257-1310 and leaving a voicemail message, by FAX at (415) 257-0165 or by writing to the IRBPHS, Office of the Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

9. All procedures related to this research project have been satisfactorily explained to me prior to my voluntary election to participate.

10. PROXY CONSENT FOR RESEARCH PARTICIPATION

Purpose and Background

Ms. Tyler West-Higgins, is doing a study on fine motor skill interventions and reading in a first grade classroom. This study is being conducted to implement an intervention that can help develop grade level fine motor and reading skills. This proxy consent outlines the research process and activities and is used because of the age of my child who is a minor.

Procedures

If I agree to allow my child to be in this study, I understand that the following will happen:

1. My child will work with the regular classroom teacher (researcher) for six weeks and other classroom children in a small group 3 times a week for 15 minutes each time.
2. My child will be assessed on their reading behaviors using the Fountas and Pinnel System. This means Pre and post interventionpostinterventionpostintervention, my child will sit down with another teacher to read a book, while notes are being taken by that teacher as to what strategies my child uses when reading. At the end of the story, my child will be asked questions about what they understood in the story.
3. The researchers will work with my child in his/her regular first grade classroom during a time when the other students are also working on differentiated tasks in small groups. .

Risks and/or discomforts

I understand that my child will engage in small motor skill building activities during the 15-20-minute small group intervention period. This intervention will occur as a part of the regular instruction in the classroom. I understand that there is a small risk that some of the fine motor skill activities may lead to temporary discomfort for my child due to the repetitive use of fingers and that the researcher will discontinue such activities if observed, and help my child transition back into the general classroom activity going on concurrently. I understand that the researcher will make every attempt to prevent any risks or discomfort from occurring during my child's participation in this intervention.

Confidentiality

I understand that all hard copy records and documents from this study will be maintained confidentially by the researcher in a secure location under personal lock and key. All electronic and digital information will be maintained on a secure personal device that is password protected. No individual identities will be used in any reports or publications resulting from this study. All personal references and identifying information will be eliminated from this study, and all participants will be identified only by a pseudonym. Only the researcher will review any data and or documents. One year after the completion of the research, all written and recorded materials will be completely destroyed.

Benefits

I understand that there may be no direct benefit to me or to my child from participating in this study. I understand that my child may experience indirect benefits such as better fine motor and reading skills. I also understand that my child may or may not develop better fine motor and reading skills as a result of participating in this study.

Costs/Financial Considerations

I understand that there are no material costs to me or to my child for taking part in this study.

Payment/Reimbursement

I understand that participation in this study is voluntary and non-paid. Neither my child nor I will receive any payments and or reimbursements for participation in this study.

Questions

I understand that if I have any further questions about the study, I may contact Ms. Tyler West-Higgins at tyler.west-higgins@students.dominican.edu.or her research supervisor, Dr. Suresh Appavoo at (415) 482-3598. If I have further questions or comments about participation in this study, I may contact the Dominican University of California Institutional Review Board for the Protection of Human Subjects (IRBPHS), which is concerned with the protection of volunteers in research projects. I may reach the IRBPHS Office by calling (415) 257-1310 and leaving a voicemail message, by FAX at (415) 257-0165 or by writing to the IRBPHS, Office of the Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

Consent

I understand that I am free to decline permission for my child be in this study, or to withdraw my consent and my child from participating in it at any point. I understand that my decision to permit my child, and or continue participation in this study will have no influence on my child's present or future status as a student in this researcher's classroom. I have received a signed and dated copy of this consent form and document. My signature below indicates that I agree to allow my child to participate in this study.

I understand that if I have any further questions about the study, I may contact Ms. Tyler West-Higgins at tyler.west-higgins@students.dominican.edu or her research supervisor, Dr. Suresh Appavoo at (415) 482-3598. If I have further questions or comments about participation in this study, I may contact the Dominican University of California Institutional Review Board for the Protection of Human Subjects (IRBPHS), which is concerned with the protection of volunteers in research projects. I may reach the IRBPHS Office by calling (415) 257-1310 and leaving a voicemail message, by FAX at (415) 257-0165 or by writing to the IRBPHS, Office of the Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

_____

I HAVE READ AND UNDERSTAND ALL OF THE ABOVE INFORMATION CONTAINED ABOVE IN THIS FORM AND DOCUMENT INCLUDING ITEMS #1 THROUGH #10 REGARDING THIS STUDY. I VOLUNTARILY GIVE MY CONSENT AND PERMIT MY SON/DAUGHTER NAMED BELOW TO PARTICIPATE IN THIS STUDY. I HAVE RECEIVED A COPY OF THIS DOCUMENT IN ENTIRETY FOR MY REFERENCE AND RECORDS.

Name of Participant: _____

Name and Signature of Parent/Guardian of Participant:

_____Date_____

Name and Signature of Researcher:

_____Date_____

Appendix H

CONFIDENTIALITY AGREEMENT FOR DATA RECORDING

NAME AND ADDRESS OF DATA RECORDER

Dear _____:

This letter confirms that you are voluntarily agreeing to record in-class data for my research study "Improving Reading through Fine Motor Skill Intervention". You specifically agree to record all instructional assessment data from all students present during my class during the regular fall 2017-2018 school semester. You are explicitly agreeing to keep any and all in-class data that you record confidential, and agree to not share information with anyone else, for any reason, excepting the researcher named below. You are agreeing to submit all recorded data in hard copy and or electronic to the researcher immediately after the recording is complete. You also agree that you will not make, and or retain any copies, duplicates in any form of the recorded data from my classroom during the fall 2017-2018 school semester.

This research study was approved by the Institutional Review Board for the Protection of Human Subjects (IRBPHS) at Dominican University of California, and was assigned approval number_____. If I have questions I understand that I may contact Ms. Tyler West-Higgins at tyler.west-higgins@students.dominican.edu or her research supervisor, Dr. Suresh Appavoo at (415) 482-3598. If I have further questions or comments about participation in this study, I may contact the Dominican University of California Institutional Review Board for the Protection of Human Subjects (IRBPHS), which is concerned with the protection of volunteers in research projects. I may reach the IRBPHS Office by calling (415) 257-1310 and leaving a voicemail message, by FAX at (415) 257-0165 or by writing to the IRBPHS, Office of the Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

Please sign and date this letter below to indicate your consent and approval to serve as a confidential, voluntary, unpaid, in-class data recorder and return it to me in the enclosed self-addressed, stamped envelope as soon as possible. Thank you very much for your time.

Sincerely,

Tyler West-Higgins
San Anselmo, CA 94960

I have read and understand the contents of the document above, and agree to record in-class data. I understand that I am not a participant and or a co-researcher for this research study, and only

serve as a recorder of data in-class. I agree that I will maintain the confidentiality of all information that I record and submit all hard copy or electronic documents and or records only to the researcher named below.

Name and Signature of Teacher aide:

_____Date_____

Name and Signature of Researcher:

_____Date_____

Appendix I

DOMINICAN UNIVERSITY of CALIFORNIA 1890

September 22, 2017

Tyler West-Higgins
50 Acacia Ave.
San Rafael, CA 94901

Dear Tyler:

I have reviewed your proposal entitled *Improving Reading through Fine Motor Skill Intervention* submitted to the Dominican University Institutional Review Board for the Protection of Human Participants (IRBPHP Application, #10602). I am approving it as having met the requirements for minimizing risk and protecting the rights of the participants in your research.

In your final report or paper please indicate that your project was approved by the IRBPHP and indicate the identification number.

I wish you well in your very interesting research effort.

Sincerely,

Randall Hall, Ph.D.
Chair, IRBPHP

Cc: Suresh Appavoo