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Effects of Pencil Grasp Exercises on Handwriting in Sixth Grade Resource Students

An Action Research Report
By Karen L. Galloway
Effects of Pencil Grasp Exercises on Handwriting in Sixth Grade Resource Students

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Abstract

The purpose of this research was to determine the effects of pencil grasp exercises on the handwriting of sixth-grade resource students. This action research project took place in a public middle school resource classroom located on the outskirts of a suburb. The six-week study had seventeen student participants, ranging between the ages of eleven and twelve years. During the study, the researcher collected data on the placement of the hand and fingers on the pencil, grasp, legibility, letter placement, fluency, and perception of abilities. The data utilized pre and post questionnaires, observations, matrixes, and assessments. Results showed that sixth-grade resource students could change their pencil grasp. Additionally, the data indicated that fluency decreases when legibility and placement increases. Further studies could identify if the change in grasp would decrease hand cramping, how long the decline in fluency lasts, and if the increase in legibility is long term.

Keywords: Pencil grasps, legibility, fluency, motor learning, Montessori
As educators, it is our responsibility to ensure that our students develop the necessary foundations to be successful in all subjects. The coined phrase, the three Rs (reading, writing, and arithmetic), is an example of the critical aspects of these essential academic skills. Schools and teachers have devoted their time and efforts in developing reading and mathematics skills. However, developing the skills of writing is sorely lacking after the third grade (Graham, MacArthur, & Fitzgerald, 2013). According to Graham et al. (2013), the development of penmanship can enhance learning and effective reading abilities. Observations of resource middle school students have shown a discrepancy in the legibility and fluency of handwriting. Resource students qualify by each student falling under one of thirteen special education categories, as defined by the Individuals with Disabilities Education Act (IDEA).

In one particular public middle school, many sixth-grade resource students were observed using substandard pencil grasps. This middle school was located on the outskirts of a suburb and characterized as lower middle class, 31.5% eligible for free lunch and 9.8% for reduced lunch. This school was comprised of 0.7% American Indian, 7.9% Asian, 3.8% Black, 42.6% Caucasian, 40% Hispanic, 0.8% Pacific Islander, and 4.1% two races. The school offered a student to teacher ratio of 22 to 1, with 49% female and 51% male students. The school had a total of 972 enrolled students; twenty-six of these students were sixth-grade resource students.

By communicating with sixth-grade general education teachers, the researcher learned there was observational evidence of the existence of pencil grasp difficulties, in some resource students. Students’ illegible penmanship and lack of fluency could be caused by their trouble in grasping their pencil (Asher, 2006; Feder & Majnemer, 2007; Graham, 2010; Stevens, 2008; Schwellnus et al., 2012). Some sixth-grade general education teachers noted how some of the resource students hold their pencils. These conversations and observations indicated that a
majority of the resource students had an ineffective or immature pencil grasp. The inability of fine motor control and a lack of in-hand manipulation have a connection to immature pencil grasps. Additionally, many of these students produced illegible handwriting, poor fluency, and had a lack of motivation to write. Illegible handwriting is observed by poor mastery of letter formation and an inability to write within boundaries. Poor fluency may be the result of hand cramping and increased fatigue. Through observations, the researcher learned the resource students who had poor fluency also had a decrease of completed academic assignments. A lack of motivation causes avoidance in writing assignments and a reduction of academic achievement (Feder & Majnemer, 2007; Graham, 2010; Schwellnus et al., 2012; Weintraub, Drory-Asayag, Dekel, Jokobovits, & Parush, 2007; Weintraub, Yinon, Hirsch, & Parush, 2009).

All of the sixth-grade resource students, at this school, were mainstreamed, with a resource teacher or a paraprofessional entering the general education classroom for support. This type of service is labeled push-in resource support. Of these students, 50% had additional academic support; these students attend class in the sixth-grade resource room for their elective period. This type of service is labeled pull-out resource support. 100% of the students had active Individualized Education Programs (IEPs). The sixth-grade resource students consisted of nine females and seventeen males. Of these students, 69.2% were eleven years of age, and 30.8% were twelve years of age, with a mean age of 11.7 years. The sixth-grade resource students comprised of 3.8% Black, 38.5% Caucasian, 50% Hispanic, and 7.7% two races.

These resource students qualify for special education with a categorized primary disability, and 38.3% had a secondary disability. 65.4% had the primary, 7.6% secondary, disability of Specific Learning Disability (SLD). Speech or Language Impairment (SLI) was the primary disability of 15.4%, 26.9% secondary. 3.8% had been identified with the primary
qualification of Hard of Hearing (HH). 15.4% of the sixth-grade resource students had the primary qualification of Other Health Impairment (OHI), and 3.8% secondary. It is also important to note the students’ reading levels: 19.3% third grade, 11.5% fourth grade, 34.6% fifth grade, and 34.6% were at grade level. Additionally, 96.2% were dominant right-handed, and 3.8% were dominant left-handed.

The background research indicates that the cause of poor handwriting skills can be ill developed fine motor control (Asher, 2006; Feder & Majnemer, 2007; Howe, Roston, Sheu, & Hinojosa, 2013; Stevens, 2008; Worthington, 2011). This poor fine motor control may be the result of an immature pencil grasp, incorrect writing tools, or too high of a volume of writing (Feder & Majnemer, 2007). Learning Disabilities (LD) may also be the cause. Impairments, such as Attention-Deficit-Hyperactivity Disorder (ADHD) and SLD could cause fine motor coordination problems (Graham, Harris, & Larsen, 2001; Feder & Majnemer, 2007). The background research also indicates that there are solutions to poor fine motor control. By developing motor learning (i.e., fine motor control, in-hand manipulation, and kinesthesia) students can improve their penmanship (Asher, 2006; Feder & Majnemer, 2007; Medwell & Wray, 2007; Stevens, 2008). Additionally, offering instruction with demonstrations on mature pencil grasp and self-instruction strategies may improve legibility (Asher, 2006; Feder & Majnemer, 2007; Graham, 2010; Schoen, 2001; Schwellnus, 2012; Schwellnus et al., 2012; Stevens, 2008).

What effect would exercises to improve pencil grasp have on the fluency and legibility of handwriting in sixth-grade resource students? How does pencil grasp tie into fine motor abilities needed for good handwriting? Will an improved pencil grasp effect academic skills? This paper reviews each of these questions and the hypothesis that Montessori based fine motor activities,
labeled Practical Life in a Montessori classroom, and writing exercises can improve pencil grasps. Additionally, each exercise was tailored to each student’s needs, offers scaffolding techniques; provide self-monitoring strategies, and practices fluency and legibility. With a quantitative scoring system to identify problem areas, development of fine motor control and in-hand manipulation, and a review of mature pencil grasp, students should be able to improve their handwriting.

Solving pencil grasp problems may help the students in one or more ways. The students’ out of context writing can become legible or improve their fluency. Their handwriting can become neat, or they can develop better pencil control. They can also produce a more comfortable grasp when writing (i.e., decrease hand cramping or pressing softer), which might result in the paper no longer ripping. The students could obtain more fluent writing: producing more assignments, or slower more accurate handwriting. The students could also become more motivated to write.

Review of Literature

The critical issue of middle school handwriting abilities is often found in the background of contemporary curriculum reform, regardless of the research reports that state writing legibly and fluency are components necessary for optimal school success (Worthington, 2011). “People present themselves to the world through their handwriting and are inevitably judged by it. From our earliest school days, success and failure are often measured in terms of neat handwriting” (Feder & Majnemer, 2007, pg 312). By examining the importance of pencil grasps through different pieces of literature one can see how grasps are connected to legibility and fluency. Social-constructivist theory and constructivism are two theoretical bases for the developing pencil grasps. Some causes that are connected with students' poor abilities to handle pencils
include weak fine motor control, inability to maneuver in-hand manipulation, and lack of kinesthesia development. Additionally, environmental issues, instruction, learning disabilities, and negative emotions can affect a student’s pencil grasp. There are solutions for these problems, including practice, trick movements, and self-instructional strategies.

**Theoretical Bases**

Vygotsky's theoretical tenets are bases for both the social constructivist theory and the cognitive development theory, or constructivism (Worthington, 2011). Social constructivist theory emphasizes social interaction to achieve optimal student learning (Worthington, 2011). According to Worthington, “an important tenet of social constructivism is the importance of the learner assuming a role in the learning process” (2011, pg 35). Students’ natural curiosity to be involved in their development, learning, and knowledge is emphasized in Vygotsky’s views (Worthington, 2011). Based off of these views, Vygotsky believed that students could achieve higher levels of thinking with proper guidance by those who are more competent (Worthington, 2011). When students are given significant socio-cultural opportunities, they often will search for deeper understanding (Worthington, 2011). This development of schema only happens when students have social interactions with individuals that have more knowledge of the task at hand (Worthington, 2011). Worthington (2011) states this concept is seen in Vygotsky’s principle of the Zone of Proximal Development (ZPD). ZPD refers to differences in learning levels between learning that is reached independently and the knowledge that is achieved through scaffolded instructional guidance (Worthington, 2011). This concept is the difference between what a learner can do without help and what he or she can do with help.

Constructivism, psychological and philosophical epistemologies based on Vygotsky, Piaget, Bruner, and Gagne’s work, contends that people frame or build a lot of what they learn
and understand (Schunk, 2012; Worthington, 2011). Worthington (2011) notes that the theory of constructivism offers logic behind how people learn and obtain knowledge, combine new and prior experience, and construct new meaning. Constructivism can be used in the process of handwriting to stress the self-monitoring need to write, and it promotes a learning environment that offers long-term retention of information (Medwell & Wray, 2007; Worthington, 2011). A key component of constructivism is that individuals are dynamic learners and create learning for themselves (Schunk, 2012). Learners actively construct their own knowledge and meaning from their experiences, which create automaticity and knowledge retention. Automaticity, when referring to handwriting, is the effortless, fluent, and accurate ability to write without stopping to consider format or conscious thought, and it is an essential aspect of constructivism (Worthington, 2011). Teachers know this automaticity has been achieved when writing becomes accurate, swift, and uses no conscious attention to be achieved (Medwell & Wray, 2007). Essentially, learning to write is a constructivist activity.

**Pencil Grasps**

The term pencil grasp is used to describe the position of the fingers used to grip a pencil, with reference to hand and forearm position, and motor learned control (Schoen, 2001; Schwellnus, 2012). Graham (2010) emphasizes that there is not a need for pencil grasps to be perfect, but how a student holds their pencil will affect their handwriting abilities (e.g., a two-fingered “death-grip” will lead to discomfort and fatigue). Schwellnus (2012) suggests that educators identify the optimal pencil grasp for handwriting as the dynamic tripod grasp. Schoen (2001) states, the ability to have and maintain a mature pencil grasp is one essential aspect that is connected to strong handwriting abilities.
Grasps are generally labeled according to the placement of the fingers and palm on the pencil and the movement of the pencil (Schwellnus et al., 2012). The dynamic tripod and lateral tripod grasps, and the dynamic quadrupod and lateral quadrupod grasps are known as mature pencil grasps (Schwellnus et al., 2012). According to Stevens (2008), the pencil is held with the thumb, pointer, and middle fingers in both types of these grasps. Stevens (2008) further states, the dynamic tripod grasp places the pencil between the pads of the index finger and thumb, the thumb is in full opposition, and the control is more dynamic. Stevens (2008) goes on to indicate, the lateral tripod grasp is when the pencil is placed under the pad of the index finger; the thumb adducted to the lateral border of the index finger, and the control is more proximal.

Primitive and transitional grasps are often known as immature grasps (Schwellnus et al., 2012). A primitive grasp is common in children 1.5 to 3 years of age and a transitional grasp is common in children 3 to 4.5 years of age (Schoen, 2001). An immature pencil grasp could be the result of having difficulty isolating and grading fingers and hand movements (Feder & Majnemer, 2007). Feder and Majnemer (2007) often found students who have an immature pencil grasp, use compensatory strategies to manipulate their pencil (i.e., fingers locked to extension or using a whole hand grasp to stabilize their pencil). There has also been research that suggests alternative grasps can produce fluent and legible penmanship and that students use multiple grasp patterns (Schwellnus et al., 2012). Schoen (2001) suggests that immature pencil grasps need remedy; however, there has been little written research on how to improve pencil grasps.

Both Schoen (2001) and Stevens (2008) state developing a mature grasp is a component of intervention from an occupational therapist and one of the many reasons why students are referred for treatment. However, Stevens (2008) views the functional development through
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occupational therapy (OT) for a mature grasp is limited. Rather the pencil grasp should be continuously developed (Schoen, 2001). Learning is constructed over time and mature grasp develops. Feder and Majnemer (2007) note how to support the development of a mature pencil grasp: once the student grasps the pencil, it needs to be translated or shifted in the student's hand, with a linear movement, for writing. “Pencil grasp, however, is not considered to be a functional task. Rather it is a component of the functional task of handwriting” (Schoen, 2001, pg 8). Graham (2010) states the importance of a mature grasp being taught early in students’ academic careers.

**Legibility and Fluency**

According to Feder and Majnemer (2007), legibility and fluency are two of the most critical elements of handwriting. When students write quickly, to keep up with writing notes or having a timed test, often their handwriting legibility declines (Graham, 2010). Legible and automatic writing with adequate fluency and minimum invested effort are necessary tools for middle-school students to keep up with classroom demands (Weintraub et al., 2009; Worthington, 2011). Worthington (2011) states, middle school students that lack legibility and fluency are at an academic disadvantage which can lead to consequences: an underestimation of writing ability, student focus on lower-level writing which leads to a struggle with processing tasks, and a slower development of higher writing skills. This disadvantage is often seen as students being careless and unmotivated, and often is reflected in reduced academic grades (Worthington, 2011).

The research done by Howe, et al., (2013), revealed that students in intensive handwriting practice sessions showed significant improvements in legibility. But according to the six
categories of grasp research conducted by Schwellnus (2012), there are no significant effects on pencil grasps for legibility or fluency.

Pencil grasps are often thought to influence handwriting legibility, however according to Stevens (2008), there are studies that do not support a connection between legibility, fluency, and grasps. Howe et al., (2013) and Worthington (2011) have noted that practice, under varying conditions is required for skill improvement, is a necessary component of mastery and is needed to maintain long-term knowledge. Graham (2010) also states the most effective method to improve fluency is having students frequently write.

Motor Learning

Howe et al., (2013) define motor learning as internal processes that are associated with the experience that lead to permanent changes in motor capability. The information that is available to each student is interpreted with each task performance; it is then depended on the functional difficulties of the work that is connected to motor learning (Asher, 2006). According to research done by Schoen (2001) and Stevens (2008), fine motor development and control have effects on how a pencil is held and is essential in developing the static aspect of pencil grasps and the dynamic component necessary for handwriting movements. Practicing motor learning is the most responsible way to permanently improve the ability to skillfully perform any motor movement (Asher, 2006; Howe et al., 2013). Additionally, Stevens (2008) states that there is a relationship between the accuracy of motor tasks and in-hand manipulation.

In-Hand Manipulation

According to Feder and Majnemer (2007), handwriting is a perceptual and complex motor ability that uses fine motor skills, including in-hand manipulation. This statement is supported with Feder and Majnemer's (2007) findings that students spend 31 to 60 percent of
their time at school performing handwriting and other small motor activities. Asher (2006) also views in-hand manipulation as a requirement for fine motor skills and needed for students to develop handwriting. There are musculoskeletal components that are necessary for a student to establish in-hand manipulation: “open web space, isolated finger movements, thumb opposition, distal finger prehension, and adequate palmar arches” (Asher, 2006, pg 463). Complex and simple rotation, translation, and shift are all necessary for in-hand manipulation (Stevens, 2008). Feder and Majnemer (2007) suggest supporting students in developing in-hand manipulation; they can practice developing their abilities to move objects with their fingers to their palm, and back to their fingers. This motion will help some students develop the fine motor ability to push their fingers toward and away from the pencil point for penmanship (Feder & Majnemer, 2007). Another in-hand manipulation exercise that students can practice is moving a pencil around an axis; this helps develop the student's ability to turn the pencil from a grasp to writing or erasing placement (Feder & Majnemer, 2007). Stevens (2008) states interventions that promote and improve in-hand manipulation skills can lead to improved pencil grasps.

**Kinesthesia**

According to Feder & Majnemer (2007), kinesthesia is the ability to discriminate the amplitude, direction of movement (with and without visual or auditory cues), and position of all body parts. This ability influences the amount of pressure that is applied on the pencil grasp, and the ability to write within the boundaries of the paper (Feder & Majnemer, 2007). Weak or inconsistent skills in remembering movement sequences create a greater focus on the mechanics of writing and require consistent repetition of each pattern (Asher, 2006; Stevens, 2008). Stevens (2008) states increasing the pressure in holding a pencil to obtain additional input is another effect of kinesthesia. Adding extra pressure to a grasp leads to more significant fatigue in the
joints (Stevens, 2008). Asher (2006) points out the importance in remembering that skilled movements take longer to master. However, Feder and Majnemer (2007) state there is conflicting research when it comes to kinesthesia because it is challenging to measure its pure function.

**Environmental Issues**

Feder and Majnemer (2007) point out the type of writing tools students use and volume of required writing are two extrinsic factors that can affect students' pencil grasps. Some students write better with a beginner’s pencil, while other students write better with a regular pencil (Asher, 2006). According to Asher (2006), since students differ in the type of writing tool needed, students should have access to an assortment of writing instruments. Additionally, a mature pencil grasp is more likely to be used when students are provided a short pencil or other writing tool, and a vertical writing surface (Asher, 2006). According to research done by Schoen (2001), there is evidence of positive changes, from a primitive to a transitional grasp and from a transitional to a mature grasp, with an intervention of proper positioning of hips touching the back of the chair and feet resting on the floor. Feder and Majnemer (2007) also note if the duration of instruction is too cumbersome, supplemental handwriting instruction can improve both accuracy and fluency performance.

**Instruction**

According to research done by Feder and Majnemer (2007), there is evidence that has shown handwriting troubles will not be resolved without intervention. “It is critical middle-school teachers, school leaders, and curriculum designers are adequately informed on how to identify and assist students with impaired handwriting legibility and proficiency” (Worthington, 2011, pg 4). Worthington (2011) notes that the need for strategy-based instructional lessons for
improving legibility and fluency often goes unnoticed in middle grades due to a lack of formal screening. Handwriting has a linear progression towards legibility; however, a plateau of quality occurs in middle school students (Weintraub et al., 2009). In Asher’s (2006) research it was found that elementary students require structured instruction to support their development of motor skills needed for writing. “Teachers differed in their methods of instruction, including in the programs and paper used, and practice provided. Teachers of grades 5 and 6 had to continue to review handwriting instruction, because all students could not fluently use handwriting as a tool of expression” (Asher, 2006, pg 461). Therefore, early structured intervention is especially critical for students that are experiencing handwriting difficulties (Asher, 2006; Graham, 2010). Graham (2010) believes teachers also need to capitalize on less formal types of instruction (i.e., teachable moments, frequent writing, and modeling). However, there is no easy or quick fix (Graham et al., 2001).

Learning Disabilities

Children with attention-deficit-hyperactivity disorder (ADHD) may have signs of handwriting difficulties (Feder & Majnemer, 2007). Sustained attention is required for students to perform any extended penmanship task (Feder & Majnemer, 2007). Reduced attention span limits the practice of penmanship, which leads to lack of fine motor control; about half of the students with ADHD show weak fine motor skills (Feder & Majnemer, 2007). Additionally, students with Specific Learning Disabilities (SLD) are challenged with the mechanics of handwriting (Graham et al., 2001). Fluency is a sizable struggle for students with SLD (Graham et al., 2001).
Self-Instruction Strategies

According to Worthington (2011), middle school students have the ability and should be encouraged, to start managing their learning. Self-instruction strategies offer the opportunity for middle school students to have an active role in their education and should include making practical decisions on what and how they learn and how their learning is assessed (Worthington, 2011). When reviewing the needs of middle-school students’ handwriting, it is essential to hear the voices of the students (Worthington, 2011). By nurturing the voices of the students and using self-monitoring strategies, learning becomes more engaging, and students become skilled learners (Weintraub et al., 2007; Worthington, 2011). If the needs these students express are explicit, then scaffolding instruction can be provided (Worthington, 2011). Graham (2010) suggests self-instructed timed copying can be one way students have a role in their education; they simply count the number of words they copied during a set period, and they set their own goals to increase their fluency.

Identify Negative Emotions

Failure to master handwriting skills often has adverse effects on academic success, and affect students’ self-esteem, social interactions, participation in school functions, and perception of abilities (Feder & Majnemer, 2007; Schwellnus et al., 2012; Weintraub et al., 2007; Weintraub et al., 2009). In middle school, when the workload increases, these students often have the feelings of disappointment and frustration; which leads to underachievement (Weintraub et al., 2009). Graham (2010) states handwriting struggles can lead to students’ avoidance of writing activities. Some students’ inability to keep up with the volume of written work can lead to this lower self-esteem and also behavioral issues (Feder & Majnemer, 2007). These negative feelings can place students in a downward spiral; with the mindset that the
students cannot write, they fall further and further behind (Graham, 2010). According to Feder and Majnemer (2007), these behavioral issues are commonly seen as laziness or poor motivation. The labels placed on the students add to their frustration and disappointment (Feder & Majnemer, 2007).

Conclusion

The overall development of handwriting continues to mature throughout middle school (Feder & Majnemer, 2007). Studies have shown 10 to 34% of middle school students have not mastered the required handwriting skills needed for academic success (Schwellnus et al., 2012). The topic of the impact of pencil grasp on handwriting has been under investigation since the early 1940s (Schwellnus, 2012). However, there are several shortcomings in the current literature and research that connects pencil grasps to legibility and fluency. Even though there are inadequate tools currently developed for the assessment of pencil grasp, a mixture of observations, teacher consultation, and use of valid and reliable quantitative assessment tool is key to reviewing handwriting performance and identifying problem areas (Feder & Majnemer, 2007; Schoen, 2001).

There are many different techniques that are stated in current literature that can help support the development of a mature pencil grasp. Fine motor development and control under varying conditions to maintain long-term knowledge is key to developing a mature grasp (Asher, 2006; Howe et al., 2013; Schoen, 2001; Stevens, 2008; Worthington, 2011). Instructors need to show students how to translate their pencil in their hand with a linear movement for writing (Feder & Majnemer, 2007). Students also need to practice developing their motor learning, their abilities to move objects with their fingers to their palm and moving a pencil around an axis (Feder & Majnemer, 2007). Offering supplemental, structured, scaffolded, and strategy-based
intensive instructional lessons, which allow for frequent writing and promotes self-instruction strategies (e.g., self-instruction timed copying) is also beneficial for students (Asher, 2006; Feder & Majnemer, 2007; Graham, 2010; Howe et al., 2013; Worthington, 2011). Students need their voices nurtured and less formal types of instruction with access to an assortment of writing instruments (Asher, 2006; Graham, 2010; Weintraub et al., 2007; Worthington, 2011). Additionally, there needs to be an intervention of proper positioning of hips and feet (Schoen, 2001). “Difficulty mastering handwriting does not mean the game is lost; it just means writing is more challenging” (Graham, 2010, pg 54).

**Methodology**

The action research project lasted six weeks, starting on January 12th and ending on February 23, 2018. Before the research began, the sixth-grade resource students that had pull-out services were sent home with a Passive Consent form for their parents. This form explained the action research project and gave the parents the ability to exclude their child; all parents elected to include their children. Additionally, there were five students identified with an immature pencil grasp that had push-in only services. These students were sent home with an Active Consent form for their parents that also explained the project and required written permission for their child to partake in the research. Within two days, all of the Active Consent forms authorizing participation were returned. One week after the project started, one pull-out student relocated to a new school. Five weeks into the project, a push-in student's data had to be omitted due to refusal to participate. A total of seventeen sixth-grade resource students participated in the entire action research project. Six students attended the sixth-period, and eleven students participated in the seventh-period class. The research consisted of one pre-evaluation, six writing
exercises, five Montessori based practical life activities, and one post-evaluation session; totaling eleven practices and two evaluation sessions.

The pre-evaluation session began with handing out the pre-handwriting questionnaire (Appendix A). The reading levels of the participants range from first to fourth grade. Therefore, the researcher read the questions aloud. Next, the Evaluation Tool of Children’s Handwriting (ETCH) Assessment (Appendix B) was passed out to each student. The researcher explained to the students that each task was to evaluate their handwriting and had separate instructions. The classroom’s Electricity Light Machine Organization (ELMO) projector displayed a timer, and the students were instructed to note the time they completed each job on the top line of that task. The researcher took photos of pencil grasps during the pre-evaluation assessment (Appendix C), and noted each student’s grasp component (Appendix D).

Task I of the ETCH was writing the alphabet, separately, in lower-case letters and then upper-case letters. The students could only erase mistakes once. Task II, the students were asked to write the numbers one through twenty. Task III, the students were asked to copy a nonsense sentence placed at the top of their desk. Task IV was far point copying: the researcher put a wall chart with a nonsense phrase on the whiteboard, in the front of the classroom. Task V was an untimed dictation task: various letters were said aloud to form three nonsense words and five numbers to make a zip code. It was instructed to write each letter in lower-case letters only. The researcher spoke the first three digits, and then paused for three-seconds before the last two digits were said. The VI task was sentence composition: the students were asked to make their own sentence with a minimum of five words. The students had one minute to think of a sentence before the timer was started.
The first week’s writing exercise focused on instructional demonstration of a mature pencil grasp. Each student received two worksheets (Appendix E), a ¾ inch black pom-pom, a standard size pencil, and a twenty-five-millimeter binder clip. A demonstration on how to attach the binder clip to a pencil, to support the development of a mature grasp, was given to all participants (Appendix F). The students were instructed to hold up their thumb, pointer, and middle fingers, in the shape of a ‘C.’ The researcher asked the participants to place their pencil in the center of the ‘C,’ and hold the pencil by placing their thumb on one side of the binder clip and their middle finger on the other side. Finally, the researcher instructed the students to place their pointer finger in between the loops at the apex. Next, the researcher gave a group demonstration of the placement of the pom-pom. Each student was instructed to put the pom-pom in the palm of their dominant hand and hold the pom-pom with their pinky and ring fingers, as a reminder to only use three fingers to grasp the pencil. The researcher used the ELMO for group presentations and then gave individual lessons, as needed. The students used their new knowledge and tools to complete each worksheet (Appendix E). The students had fifteen minutes to complete the first double-sided worksheet and three minutes to complete the second worksheet.

The second week’s writing exercise was developed to support the first writing exercise. Each student received two worksheets (Appendix G), along with all of the tools (Appendix F) from the initial writing exercise session. However, the students had the choice to use the binder clip or hold their pencil with a mature grasp. Next, the researcher reviewed how to use each tool. She then led the students in a discussion of critical aspects of legible handwriting: slant, size, spacing, and proportion. The researcher showed how to correct a mistake. On the whiteboard the word, “rane” was written. The researcher crossed out the error with a single line, and above the
mistake, the word “rain” was written. The researcher read the worksheet to the whole class. As a group, the students evaluated the prewritten notes. As a class, the students circled the main idea of the passage. Then the students wrote the correct letters that did not use the proper spacing, size, or proportion. Individually, the students completed the back of the worksheet and the second page. They had fifteen minutes to complete the second half of the first worksheet and three minutes to complete the second worksheet.

The third week’s writing exercise had a focus on letter size. The researcher gave out three worksheets (Appendix H) to each student, along with tools (Appendix F). The researcher reviewed the use of the tools. As a class, letters that are written small were named and demonstrated on the whiteboard (e.g., 'o' is half the size of 'b'). Letters that are tall were then discussed and shown in the same fashion. The researcher reviewed the first worksheet. She then led an open discussion on the concept of completing a job application. The students were asked to complete an application to the best of their abilities. Next, the students had five minutes to complete the evaluation worksheet and three minutes to copy a telephone message. During the writing exercise, the researcher roamed the classroom monitoring each student’s grasp.

The fourth writing session emphasized the need to close the letters ‘o’ and ‘b’. The researcher gave out three worksheets (Appendix I) to each student, along with the tools (Appendix F). The researcher reviewed the use of the tools. She then led a discussion in the difference between closed letters and open letters with a demonstration of closed letters on the whiteboard. The students completed the first worksheet by practicing writing different addresses. They then wrote the name and addresses of two friends to which they wanted to mail a postcard. This task took approximately fifteen minutes. The students then had five minutes to complete the evaluation worksheet and three minutes to copy the announcements. The researcher then passed
out a fun facts postcard. The students selected one of their friend’s names they listed on their first worksheet, they wrote a message on the postcard and addressed the card to one of their friends. The researcher continued to monitor the students for the use of a mature pencil grasp during their writing. After the researcher reviewed each note for appropriate content, she mailed each letter.

The fifth week’s writing exercise played off of the fourth session. This session focused on closing the letters ‘a’ ‘d’ and ‘g.’ Additionally the researcher reviewed slant, letter size, spacing, and correcting mistakes. The researcher gave three worksheets (Appendix J) to each student, along with the tools (Appendix F). She reviewed the use of the tools and the difference between closed letters and open letters. The students reviewed how good handwriting helps in math. As a class, the students discussed a prewritten answer to a math question. Next, the researcher gave the students a menu. Each student had ten minutes to complete the worksheet. The students then had five minutes to write a paragraph and evaluate their writing. Next, the students had three minutes to complete the worksheet on taking notes. During the completion of the worksheets, the researcher monitored the students for the use of a mature pencil grasp.

The final writing exercise was a review of all aspects of legible handwriting that had already been demonstrated, with an additional emphasis on keeping the letter ‘r’ open. The researcher gave out three worksheets (Appendix K) to each student, along with a pencil. The researcher stored the pom-poms and the binder clips in the material area of the classroom, for easy student access. The researcher reviewed closed and open letters and continued to monitor the students for the use of a mature pencil grasp. The students reviewed how good handwriting helps in science. As a class, the students discussed a prewritten answer to a science question. Next, each student completed the science worksheet. The researcher then reviewed the concept
of leaving the ‘r’ open. The students had five minutes to complete the evaluation worksheet and three minutes to complete the Paul Bunyan worksheet.

The students also partook in five Montessori based practical life activities. For the first practical life activity, each student was given approximately 125 toothpicks in a cup, one 5-ounce container of Play-Doh, and a pom-pom. The students were challenged to make a toothpick structure (Appendix L). The researcher reminded the students how to hold the pom-pom. With the use of the ELMO the researcher demonstrated how to roll pieces of the Play-Doh into small balls, by only using the dominant thumb, pointer, and middle fingers. The pom-pom was required to stay in their dominant hand, but they were allowed to use both hands to assemble the structures. The students were permitted to work alone or in pairs. The objective was to create a long and stable bridge with only the materials given to each student. If they worked in pairs, they were allowed to combine their materials. Each class had thirty minutes to construct their structures. Once completed, the students measured their bridges with a ruler and tested their strength by placing a small book on top of their structures.

The second Montessori based practical life activity was pin poking (Appendix M). A piece of assorted color construction paper, a corncob holder (with one prong removed), one 6x6-inch cork tile, a pom-pom, and a variety of cardstock outlined pictures were passed out to each student. Before the activity started, the researcher reviewed safety rules, directions, and gave a demonstration. A group presentation was given on the correct way to hold the corncob holder and the pom-pom, with the use of the ELMO. The researcher gave individual presentations after the group instruction. Next, she showed how to place their cork tile under their construction paper and how to arrange their outline pictures on top of the tile. Finally, she demonstrated how to poke holes around the outline of the pictures. The researcher, again, reviewed the safety rules.
The students had twenty-five minutes to create a pin poked picture. The students had the option to take their work home.

The third Montessori based practical life activity was sewing a plastic canvas (Appendix N). A 4x4 inch plastic canvas with an identical spiral design pre-drawn on each square, a plastic needle with pre-thread yarn in a variety of colors, and a pom-pom was passed out to each student. The researcher led a group demonstration. With the help of the ELMO, the researcher showed the students how to hold their needles with three fingers, in their dominant hand while holding the pom-pom with their ring and pinky fingers. Next, the researcher demonstrated how to follow the spiral design by pulling the needle and yarn through the holes. She offered individual presentations after the group instruction. The students had thirty minutes to lace their square. Once the activity was over, the students took their lacing home.

The fourth Montessori based practical life activity supported the third activity. The students continued to work on their in-hand manipulation by furthering their development to sew a picture on a cardstock card (Appendix O). One of eight 5x7 inch rectangle cardstock pictures, a metal needle that was pre-thread in a variety of colors, and a pom-pom were passed out to each student. The researcher gave a group demonstration, with the help of ELMO. She showed how to hold their needles with three fingers, in their dominant hand while holding the pom-pom with their ring and pinky fingers. Next, she demonstrated how to poke a hole on all of the white dots on the card. Finally, she reminded the students how to pulling the needle and thread through the holes and the safety rules for using a sharp tool. The researcher offered individual presentations after the group instruction. The students had thirty minutes to sew their pictures. The students took their pictures home, once the allotted time was up.
The fifth and final Montessori based practical life activity was a clay Picasso portrait (Appendix P). The researcher gave each student a 1.5-pound bag of white air-dry modeling clay, 110 grams each of four assorted colors modeling clay, a plate, a sheet of wax paper, and their choice of two modeling clay tools. She then showed the students how to use and hold each modeling clay tool. The researcher displayed an example of a clay Picasso face over the ELMO. She then informed the students that they need to use their instruments while creating their portrait, and it was necessary to let their imaginations thrive. The students had thirty minutes to develop their clay Picasso portrait. Once completed, the students carved their names on the back of their piece and it was set aside to dry. The students took their portrait home the following week after they were dry.

The post-evaluation session was nearly identical to the pre-evaluation session. All aspects of the ETCH Assessment were the same. However, the handwriting questionnaire the students completed was the post-questionnaire (Appendix Q), and the students answered the questions after the ETCH Assessment. Since the students were more familiar with the ETCH assessment, the directions were more comfortable for the students to comprehend. The researcher took photos of the students’ pencil grasp during the assessment and questionnaire, (Appendix C), and notes of each student’s grasp component were checked off (Appendix D). The researcher thanked the students for their hard work and told them that the writing intervention was completed.

**Analysis of Data**

The purpose of this study was to determine if handwriting exercises and Montessori based practical life activities would affect how sixth-grade resource students grasp their pencils. Throughout the study, there were eight different grasps used by the students. With the use of the Grasp Assessment form (Appendix D), seven students were identified using a mature grasp, and
twelve students were observed using an immature grasp before the intervention (Figure 1). After
the intervention, ten students were using a mature grasp, five students maintained their original
immature grasp, and two students changed their immature static tripod grasp to an immature
extended finger grasp. Six students developed the optimal dynamic tripod grasp. Two of the
students’ final grasp assessment might have been affected by the use of acrylic nails.

![Grasp Assessment](image)

*Figure 1. Assessment of students’ pencil grasps, before and after the intervention. Each bar represents the total number of students and their type of pencil grasp.*

The ETCH Score Sheet (Appendix R) scored additional supplemental descriptors of
grasps that affect how the students held their pencil. Web space, thumb placement, and finger
positions are supplemental descriptors that can support the evaluation of the students’ grasp
(Amundson, 2004). Web space is referring to the space between the index finger and the thumb.
There are three standard types of pencil grasp web space: open, elliptical, and closed. Open web
space occurs when the space between the index finger and the thumb is fully expanded and the
finger pulps, opposing the thumb, form a ‘C’ (Amundson, 2004). Elliptical web space is oval-
shaped and occurs when the finger pulps do not successfully oppose the thumb, which mainly
occurs from flating the hand’s arches (Amundson, 2004). Closed web space occurs when the
space between the index finger and the thumb is completely closed. The thumb is often tightly braced against or crossed over the index finger (Amundson, 2004). The phrase “death grasp,” is commonly used to describe a closed web space.

Before the intervention, fourteen students were identified with a closed web space, two students had an elliptical web space, and one student had an open web space (Figure 2). After the intervention, eight students were noted using an open web space, four students had an elliptical web space, and five students remained using a closed web space. During the intervention, seven students developed an optimal web space.

![Web Space Before and After](image)

*Figure 2. Assessment of students’ web space, before and after the intervention. The pieces of the pie represent the type of web space each student has when holding a pencil.*

The Thumb Placement can affect the power of the grasp. There are three ways the thumb can be placed on a pencil when grasping: opposed, over, and under. An opposed thumb placement occurs when the thumb is stable and opposing the other fingers for a balanced grasp (Amundson, 2004). When the thumb is wrapped around the index finger to stabilize the pencil, an over thumb placement occurs (Amundson, 2004). An under thumb placement occurs when the index finger laps over the thumb and the thumb is tucked under, to steady the pencil (Amundson, 2004). Before the intervention, nine students had an over, seven students had an opposed, and one student had an under thumb placement (Figure 3). After the intervention, twelve students had
an opposed, five students had an over, and none had an under thumb placement. Three students developed an optimal thumb placement. The student who started with an under thumb placement changed the grasp to an over placement.

![Pie charts showing thumb placement before and after intervention.](image)

*Figure 3. Assessment of students' thumb placement, before and after the intervention. The pieces of the pie represent how each student positions their thumb on a pencil.*

The finger’s position on the pencil controls the movement. There are three types of finger positions: mid-range, extended, and flexed. Typically, slight flexing and extending movements of the distal interphalangeal (DIP), proximal interphalangeal, and the metacarpal joints control the direction and movement of the pencil (Amundson, 2004). When there is a mid-range between these joints, the finger position is optimal. Extended finger position occurs when the fingers are mostly extended, the DIP hyperextension might be seen, and control the pencil movements (Amundson, 2004). When the fingers are tightly or loosely fitted around the pencil, the fingers have a flexed position (Amundson, 2004). Before the intervention, twelve students were observed using flexed, three had extended, and two had mid-range finger positioning (Figure 4). After the intervention, seven students developed a mid-range, five students had a flexed, and five had an extended finger position. Five students developed the optimal finger placement.
This study also had a purpose of determining if a change in pencils grasp would affect the students’ legibility and fluency of their handwriting. The ETCH (Appendix B) was the first and final assessment given to the students to evaluate their word, letter, and numeral legibility. To find the ETCH word percent (Appendix R), the researcher subtracted the illegible words from the total words possible, then multiplied by one hundred. To calculate the ETCH letter percent, the researcher subtracted the omitted and illegible letters from the total possible, the difference was divided by the total, and then multiplied by one hundred. The numeral percent was found by subtracting the omitted and illegible numbers from the total possible; the difference was divided by the total and then multiplied by one hundred.

Thirteen of the students’ ETCH legibility word percent either stayed the same or increased 5 to 50 percent points (Figures 5). Four students’ decreased their word legibility between 7 and 20 percent points. The range of change in student ETCH word legibility was between -35 and 50 percent points, with a mean increase of 6.47 percent points. Overall there was a thriving increase of ETCH word legibility.
Figure 5. Initial assessment of students’ ETCH legibility. The blue and red bars represent each student’s starting and ending word legibility percent.

Fourteen students’ increased their ETCH letter legibility score between 1 and 13 percent points (Figures 6). Three students’ letter legibility score decreased between 3 and 7 percent points. The range of change in student ETCH letter legibility was between -7 and 15 percent points, with a mean increase of 3.06 percent points. Overall there was a slight increase of ETCH letter legibility.

Figure 6. Initial assessment of students’ ETCH legibility. The blue and red percent represent each student’s starting and ending letter legibility percent.
Twelve students had their numeral legibility percent either stayed the same or increased 4 to 12 percent points (Figures 7). Five students had a decrease in ETCH numeral legibility between 4 and 28 percent points. The range of change in student ETCH numeral legibility was between -28 and 12 percent points, with a mean decrease of -0.47 percent points. Overall there was a decline of ETCH numeral legibility.

\[\text{ETCH Numeral Legibility}\]

*Figure 7. Figure 5. Initial assessment of students’ ETCH legibility. The blue and red bars represent each student’s starting and ending numeral legibility percent.*

The overall ETCH word legibility mean increased by 6 percent points, the letter mean increased by 2 percent points, and the numeral mean decreased by 1 percent point (Figure 8). The amounts of omitted count increased from 0 to 9 in the final ETCH numeral count. This increased could have been the cause of the overall decreased numeral mean. Additionally, the students were learning about Roman numeral numbers, and a student wrote their numbers in this fashion for the last assessment. This action caused a decline of 28 percent points for one student.
In addition to the ETCH legibility assessment; each student had weekly writing exercises that measured their legibility, placement, and fluency. Three students had a steady incline of legibility throughout the writing exercises (Figure 9). Eleven students had an overall increase; however, their scores showed some decreases throughout the writing exercises. Fifteen students had an overall increase in their legibility percent. Two students’ decreased their legibility percent by 3 and 5 percent points. The range of change in student legibility was between -5 and 46 percent points, with a mean increase of 12.76 percent points. Overall there was a significant increase of legibility.
The overall mean legibility difference was thirteen percent points (Figure 10). The overall weekly mean indicates a collective weekly increase of 1 to 5 percent points. The total mean increase was fifteen percent points. The trendline indicates a steady overall increase throughout the six-week intervention.

Randomly placed letters, in contrast to the writing baseline, can affect the legibility of handwriting. The researcher evaluated the students’ letter placement after each writing exercises. Two students had a steady incline of legibility throughout the writing exercises. Fourteen students had an overall increase in their letter placement percent (Figure 11). Two students’ letter placement percent decreased by one percent point, and one student had a decline of twenty-one percent points. The range of change in student letter placement was between -21 and 70 percent points, with a mean increase of 27.06 percent points. Overall there was a substantial increase in letter placement.
The overall mean placement was 68 percent, with a low of 46 percent and a high of 79 percent (Figure 12). The low mean percent occurred in the first week, and the high happened in week three. Each week after the students achieved the mean high, they dropped below the high but did not fall near the mean low. Regardless of this decline, the trendline still indicates an overall increase throughout the six weeks.
the researcher was able to determine if each student was able to keep up with the other students in the study or if they required additional time. The researcher was then able to calculate, if any, the percentage of time that was needed to complete the assignments.

<table>
<thead>
<tr>
<th>Score</th>
<th>Fluency Measurability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&gt;75% longer than peers to complete</td>
</tr>
<tr>
<td>2</td>
<td>Takes 75% longer than peers to complete</td>
</tr>
<tr>
<td>3</td>
<td>Takes 50% longer than peers to complete</td>
</tr>
<tr>
<td>4</td>
<td>Takes 25% longer than peers to complete</td>
</tr>
<tr>
<td>5</td>
<td>Keeps up with peers when completing</td>
</tr>
</tbody>
</table>

Table 1. Fluency scoring system

All seventeen students had an unsteady balance in their fluency scores throughout the writing exercises. Nine students had a lower final fluency score, five students increased their final score, and four students had the same score (Figure 13). The range of change in student fluency was between -2 and 1 point, with a mean decrease of 1.29 points. Overall, there was not an increase of fluency for the majority of students.

Figure 13. Assessment of students’ fluency. The blue and red lines represent the students’ starting and ending fluency scores of the assignments written during the writing exercises.
The trendline indicates a slight overall decline in fluency throughout the six-week project (Figure 14). From week one to week two, the mean fluency score decreased by 1.8 points. The second week showed a fluency mean increase of 1.5 points. The third week had an increase of 0.1 of a point. On the fifth week, the fluency mean increased by 0.5 of a point. The final week, the mean fluency had a significant decrease of 1.3 points.

![Fluency Mean with Trendline](image)

*Figure 14. Mean assessment of students’ fluency. The plots represent the students’ weekly fluency mean score for the assignments written during the writing exercises. The black line is the trendline.*

The Pre Handwriting Questionnaire (Appendix A) and Post Handwriting Questionnaire (Appendix Q) were the data sources for the students’ self-identification of negative emotions during this action research project. The researcher asked the students how they felt about the look of their handwriting, before and after the intervention. Before the project, ten students saw their script as perfect, and they would not change how they wrote (Figure 15). Additionally, five students felt their handwriting was too big and messy and, two thought it was too small. By the end of the project, eleven students saw their handwriting as perfect; three thought it was too big, and five thought their writing was messy.
Figure 15. Students’ before and after self-identification of handwriting proportions and neatness. Each bar represents how each student identifies their writing.

The questionnaires also asked if the students thought everyone could easily read their writing. Before the intervention nine students felt that their handwriting was legible (Figure 16). Four students thought their writing was sometimes easy to read. Three students felt their handwriting was often easy to read. One student stated their handwriting was never legible. After the intervention, eleven students thought that their handwriting was sometimes legible. Four students stated their handwriting was often easy to read. Two students indicated that their handwriting was always legible. This indicates that seven students’ options, about their handwriting, decreased in value and one student developed a higher value in their writing skills.

Figure 16. Students’ before and after self-identification of legibility. Each pie piece represents how each student evaluates their handwriting legibility.
Another question the questionnaires asked was if the students thought they could keep up with their peers while taking notes. Before the intervention, eight students felt that they could sometimes keep up with their peers (Figure 17). Six students thought they could often keep up with their peers. Two students felt they could always keep up with their peers. One student stated they could never keep up with their peers. After the intervention, six students thought that they could always, and six students felt they could sometimes keep up with their peers. Four students stated they often could keep up with their peers. One student indicated that they could never keep up. These results suggest that four students’ options, about their fluency, increased in value and thirteen students’ fluency value stayed the same.

The last four weeks of the writing intervention, the students answered if they thought their handwriting was improving. After three weeks of intervention, nine students did not feel their handwriting was improving (Figure 18). Seven students noticed some improvement. One student was absent. The fourth week the student analyzed their handwriting improvement, was similar to the third week. The only difference was that two students were absent. The fifth week of writing exercises, more students started to notice improvements in their writing. Thirteen students indicated that their handwriting has improved, three students did not note a difference,
and one student was missing the session. On week six, the same amount of students saw an improvement in their handwriting; the only difference is that three students were absent from the session.

![Pie charts showing improvement in handwriting over weeks 3-6.](image)

*Figure 18. Students’ self-identification of improvement. Each pie chart represents week three, four, five, or six of the writing exercises. Each chart describes the percentage of students who saw melioration in their handwriting.*

The last question in the pre-questionnaire was if the students thought if they would benefit from handwriting lessons (Appendix A). Ten students thought they would get help from classes in handwriting, while seven students did not believe they would benefit (Figure 19). The last question in the post-questionnaire was if the students thought they benefited from the handwriting intervention (Appendix Q). Fifteen students stated that they felt that they did benefit from the six-week handwriting intervention. Two students thought that they did not learn anything from the project.
Figure 19. Students’ before and after self-identification of the benefits of handwriting exercises. The top pie chart describes the percentage of students who thought they would benefit from handwriting lessons, before the intervention. The bottom chart represents the percentage of students who saw a benefit in the handwriting intervention.

This action research project took place during a time of higher than normal instances of illness (Figure 20). An average of one student was missing per session.

Figure 20. Amount of missed sessions, per student, throughout the intervention.

Action Plan

As an educator, it is essential to support all students in developing legible and fluent handwriting skills.

Despite the diminished place of handwriting in the curriculum and the broad availability of word-processing programs, fluent and legible writing remains a necessary practical
skill. In the academic world alone, it is needed for adequate note taking, state proficiency tests, and standardized tests requiring handwritten essays. And poor handwriting influences judgments about the quality of written work and even about the education, intelligence, or professional competence of writers (Graham et al., 2013, pg 276).

Within these lessons, activities, exercises, and demonstrations the researcher held to the ideals that young adolescents with special needs could develop the skills required to obtain fluent and legible writing. The handwriting intervention allowed the students to practice their writing skills and develop a better understanding of the effects of illegible handwriting.

The hypothesis that Montessori based fine motor activities and writing exercises can improve pencil grasps was confirmed with this action research project. This project demonstrates that sixth-grade middle school resource students can change an immature pencil grasp, to a mature grasp with the support of intervention. The students’ use of pencil grasp tools, writing exercises, and Montessori based practical life activities supported the students’ development. Additional research to identify if the development of a mature grasp decreases hand cramping would be beneficial. The data also indicates that when legibility and placement of letters are improved, fluency is declined. How long the decrease in fluency last and if the increased legibility is long lasting or just temporary would require additional research.

The students seemed to enjoy the Montessori based practical life activities and were willing participants in the weekly activities. However, they were not excited in partaking in the weekly writing exercises. The majority of the students did apply their new knowledge to writing assignments outside the intervention and their academic assignments, weeks after the intervention was completed, became more legible. Many of the students also made comments about how their grasp had changed and their new grasp felt comfortable and natural.
The increasing abilities of the students to perform each practical life activity, is an indicator that a pencil grasp does tie into fine motor abilities. Additionally, the before and after observational assessment of the students’ web space, thumb placement, and finger positions supports the finding of a link between a pencil grasp and fine motor abilities. How much these abilities are needed for pencil control and good handwriting would also require further research.

The data was unclear if the development of a mature pencil grasp or the writing exercises was the cause of the increased legibility. The researcher believes that the use of the pencil grasp tools, demonstrations, and the Montessori based practical life activities were the reasoning behind the majority of students’ development of a mature grasp. However, she also believes that the writing exercises and class discussions were the cause of the increased legibility. Additional research would be needed to determine the cause of how each student developed an increase in legibility.

The results of the research can change the outlook and practice of offering lessons on handwriting to adolescents. Potentially, this action research project could show the ramifications of students not learning how to hold their pencil with a mature grasp or how to form letters correctly before third-grade. Even though there is evidence that pencil grasp can change, this change can only take place if the student is motivated and willing. If the writing aspect of the three Rs were given more focus, the issues of an immature grasp and poor legibly in middle school students would decline. Additionally, this research shows that handwriting should be included into middle school students’ weekly, if not daily, routines.

This project shows the importance of handwriting lessons and the development of a mature pencil grasp. Poor handwriting has many adverse effects on students and can affect their academic abilities. Students with an immature grasp use larger incorrect muscles when writing.
The use of the whole arm and wrist muscles to write causes the students greater and quicker fatigue. When students use a mature grasp, the thumb does most of the work to control the pencil. These students using their fine motor muscles will have less fatigue. Additionally, this action research shows how students view their handwriting abilities. As a result, many of the students were able to develop a mature grasp, their overall legibility increased, and they were able to evaluate their own handwriting skills.
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EFFECTS OF PENCIL GRASP EXERCISES ON HANDWRITING…

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Pearson Education, Inc.


Appendix A
Pre Handwriting Questionnaire

Handwriting Questionnaire

What I like about my handwriting.

____________________________________________________________________

____________________________________________________________________

What I do NOT like about my handwriting.

____________________________________________________________________

____________________________________________________________________

My handwriting is...

○ too big
○ too small
○ messy
○ perfect (I would not change anything about how I write)

When writing my hand gets tired.

○ Always
○ Often
○ Sometimes
○ Never
When I write, I stay in the lines.
- Always
- Often
- Sometimes
- Never

When taking notes, I can keep up with my peers.
- Always
- Often
- Sometimes
- Never

Everyone can easily read my writing.
- Always
- Often
- Sometimes
- Never

I think I would benefit from handwriting lessons.
- True
- False
Appendix B
ETCH Assessment (Amundson, 2004)

Evaluation Tool of Children's Handwriting
Response Booklet

Name

I. Alphabet Writing
   Lower-Case Letters

II. Numeral Writing

Permission to reproduce for ETCH administration 1995
Appendix C
Pencil Grasp Assessment Tracker

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<tbody>
<tr>
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<tr>
<td>Grasp Type:</td>
</tr>
<tr>
<td>Before Sessions:</td>
</tr>
<tr>
<td>After Sessions:</td>
</tr>
<tr>
<td>Static Quadrupod Grasp</td>
</tr>
<tr>
<td>Lateral Quadrupod Grasp</td>
</tr>
<tr>
<td>Static Tripod Grasp</td>
</tr>
<tr>
<td>Dynamic Quadrupod Grasp</td>
</tr>
<tr>
<td>Cross Thumb Grasp</td>
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<tr>
<td>Lateral Tripod Grasp</td>
</tr>
<tr>
<td>Extended Fingers Grasp</td>
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<tr>
<td>Brush Grasp</td>
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Appendix D
Grasp Component Checklist

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<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td>Forearm is in the pronated position</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole arm movements are used</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forearm is in midposition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrist movements are used</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has full finger isolation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has distal finger isolation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand rests on the desk appropriately</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date:                                                                

Comments:

4- Student has mastered task
3- Most of the time student has corrected the task appropriately
2- Some of the time student has corrected the task appropriately
1- Student is not close to meeting mastery level
Appendix E
Writing Exercise One (Thurber, 2008)

Fun with Handwriting: Comic Strips
Do you like comic strips? Read the one below.

WANNA GO SKATING TONIGHT?
I CAN'T.

WHY NOT?

MY DAD'S CELEBRATING HIS BIRTHDAY

HOW OLD IS HE?
46.

46! WHAT'S TO CELEBRATE?

Now copy the dialogue in the frames below. Use manuscript writing and write capital letters only. Adjust your writing to fit the space.

Check your writing.

Did you use capital letters only?

Did you adjust your writing to fit the space?
Fun with Handwriting: Comic Strips
Write your own dialogue of your own.

Drawing a comic strip of your own. Have fun!

Check your writing.
Did you use capital letters only?
Did you adjust your writing to fit the space?
**Timed Writing**

Darby’s mother was halfway out the door when she remembered to tell him what errands to do for their family party that night. He had to write quickly.

*Clean my room.*
*Buy balloons and napkins.*
*Ask Aunt Millie to bring her blue platter.*
*Take the chicken out of the freezer at 10:30.*
*Dust the folding chairs.*
*Sweep the sidewalk.*
*Take a shower.*

When you have to write a list quickly, use these tips:
- Listen carefully.
- Use either manuscript or cursive, whichever is faster for you.
- Write only the most important words.

Write Darby’s list in the space below. Time your writing. Use a clock, a timer, or have a friend time you. Stop writing when three minutes are up.

Now read what you wrote.
Can you understand it?
Did you finish writing the list?
Appendix F
Pencil Grasp Tools
Appendix G
Writing Exercise Two (Thurber, 2008)

Sanjit took notes on the following paragraph.

Earth’s water cycle has four main stages. In the first stage, evaporation, water forms vapors that rise into the air. When these vapors turn cold, they condense into clouds. Condensation is the second part of the water cycle. The third part of the cycle is precipitation. Precipitation falls to the ground in the form of rain, hail, sleet, or snow. In the final stage, collection, water collects on the ground, and the cycle begins again.

The water cycle has four main stages:

1. Evaporation - vapors
2. Condensation - clouds
3. Precipitation - rain, hail, sleet, snow
4. Collection - water collects on ground

Look at how Sanjit took notes on the paragraph.

- Did he find the main idea and supporting details?  
  - Yes  
  - No
- Do his letters have the correct size, spacing, slant, and proportion?  
  - Yes  
  - No
- Did he fix mistakes carefully?  
  - Yes  
  - No

Which sentence in the paragraph tells the main idea? Circle it.
Which letters do not have the correct spacing, size, or proportion? Write them correctly.
Now you take notes on a paragraph.

There are several different ways to measure and express the amount of water in the air. Two ways for doing this are finding the relative humidity and finding the dew point. The relative humidity tells how much water the air is holding, compared to how much it could hold at a certain temperature. The dew point is the temperature of the air at which dew begins to form.

Check your handwriting.
- Did you find the main idea and supporting details?  
- Do your letters have the correct size, spacing, slant, and proportion?  
- Did you fix mistakes carefully?

Underline the sentence you have written best.
Timed Writing

“My life is dull, sort of all black and white,” said Princess Eudoria to Wally the Winner.
“I can change that,” he said. “Just follow these directions.”

“Stand in the middle of the red circle, facing north.
Walk to the green polka-dot house.
Find two blue pumpkins in the garden.
Give them to the first purple person you see.
Walk east past four orange towers to the yellow dinosaur.
Now turn around and look at the rainbow of colors.”

Use these tips when someone gives you directions.
• Use either manuscript or cursive writing, whichever is faster for you.
• Write down important names, places, and numbers.
• Ask the person to repeat the directions if necessary.

Write Wally the Winner’s directions in the space below. Time your writing. Use a clock, a timer, or have a friend time you. Stop writing when four minutes are up.

Check your writing. Is it easy to read?
Filling Out a Job Application

Imagine you are applying for a job at a summer camp. Fill out the form below. Notice that the form tells you to “print.” This means you should use manuscript. Before you write, see how much space is allowed for each item. Be sure to adjust your writing to fit each space.

Please print.

1. Name  First  Middle  Last
2. Address  Number  Street
3. City  State  ZIP Code
4. Telephone  Area Code  Number
5. Date of Birth  Month  Day  Year  Age
6. Elementary School Last Attended

7. Present Grade in School
8. Where Employed Before

9. Special Interests

10. Special Achievements

Check your writing. Did you adjust it to fit each space? Is your handwriting neat? Did you give all the information requested?
Evaluation

Read the hints. Then write the paragraph below. Make your handwriting easy to read.

Hints for Clear Handwriting
- Make your tall letters touch the top line.
- Make your small letters half the size of your tall letters.

It is fun playing hockey. Jan and Karl are good team leaders. They help us all do our best. If we lose, they just encourage us to try harder. If we win, they urge us to play like that again.

Check Your Handwriting
Is your handwriting improving? Use the marks below to check the paragraph you wrote.

In the first sentence, circle tall letters that do not touch the top line.

In the fourth sentence, write a check mark above small letters that are too tall.

On the lines below, write the number of marks you made.

Low scores mean your handwriting is easy to read!
Timed Writing

How would you like to get this telephone call?

“Hey Al, this is Jan. Guess what! You won the drawing at Ed’s Sports Shop. You and three other people you choose are going to the Super Bowl! Call the store by 6:00 p.m. today. The number is 555-7291. Then your mom or dad has to go with you to pick up the tickets by 9:00 tonight. Got it?”

Use these tips when you take a telephone message.

- Ask the caller to wait until you get a pencil and paper.
- Use either manuscript or cursive writing, whichever is faster for you.
- Write down important information such as name, date, time, and place.
- Ask the caller to repeat information if necessary.

Imagine that you are Al taking this message from Jan. Use the space below. Time your writing. Use a clock, a timer, or have a friend time you. Stop writing when three minutes are up.

Now read what you wrote. Did you include all the important information?
Appendix I
Writing Exercise Four (Thurber, 2008)

Writing Addresses
When you address an envelope or a postcard, use all capital manuscript letters and no punctuation marks. Abbreviate words like Street, Avenue, and North and the name of the state.
Write the names and addresses below in manuscript. Remember to use all capital letters and no punctuation marks.

SUSAN TURKEL
7 JOY DR NW
OFP AL 36467

DAVID GRAHAM
37 S SUN AVE
SACO ME 04072

JODI MARINE
163 N POE DR
AMES IA 50010

ARAM BAYZEE
112 SE IVY RD
ROY UT 84067

Write the names and addresses of two friends or relatives.
Evaluation

Read the hints. Then write the paragraph below. Make your handwriting easy to read.

Hints for Clear Handwriting
• Close letters o and b
• Make your small letter half the size of your tall letters.

Brian went to Orson’s birthday party. His dog Woofie was waiting when he walked home. Brian showed Woofie the prize he won. But Woofie barely looked at it. He wanted Brian to bring water for his dish, and he barked until Brian did it.

Check Your Handwriting

Is your handwriting improving? Use the marks below to check the paragraph you wrote.

In the second sentence, circle every o and b that does not connect.

In the last sentence, write a check mark above every tall letters that are too small.

On the lines below, write the number of marks you made.
O _______ √ _______

Low scores mean your handwriting is easy to read!
Timed Writing

Fun places to go on a summer day—that’s what Chris was thinking about. So when these announcements came on the radio, she wrote down the information as fast as she could.

The zoo is open daily from 10:00 A.M. to 8:00 P.M.
Lifeguards are on duty at the beach from 9:00–9:00.
Free tours at the baseball bat factory, from 10:00 to 3:00, begin every hour on the hour, Monday through Friday.
The roller skating dome admits children ages 10–15 at half price from 9:00–11:00 each day.

Use these tips when you need to write information quickly.
- Use manuscript or cursive writing, whichever is faster for you.
- Write only important facts and information.
- Use phrases rather than complete sentences.

Suppose you are Chris, wanting to get as much information as you can. Write it in the space below. Time your writing. Use a clock, a timer, or have a friend time you. Stop writing when three minutes are up.

<table>
<thead>
<tr>
<th>Time: 3 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
</tbody>
</table>

Look at what you wrote.
Can you understand it?
Did you get down the important facts?
Appendix J
Writing Exercise Five (Thurber, 2008)

Sam used the menu below to answer the test question. Then he told how he got his answer.

Sam has $4.50. He wants to buy one sandwich and one drink. Which combination of sandwiches and drinks can he buy? Tell how you got your answer.

Today's Menu

- Tuna fish Sandwich $3.00
- Ham Sandwich $3.25
- Chocolate Milkshake $1.75
- Lemonade $1.50

He can buy the tuna sandwich for $3.00 and the lemonade for $1.50. Add each sandwich amount to each drink amount to see which he has enough money to buy.

Look at how Sam wrote his answer.

- Did he adjust his handwriting to fit the answer space given? [ ] Yes [ ] No
- Do all of his letters and numbers slant the same way? [ ] Yes [ ] No
- Is his handwriting easy to read? [ ] Yes [ ] No
- Did he fix mistakes carefully? [ ] Yes [ ] No

Circle letters and numbers that do not have the correct slant. Which words are not evenly spaced? Draw a line under them.
Now you answer the test question. Tell how you got your answer.

You have $5.75. You can buy one entree and one dessert. Which combination of entree and dessert can you buy?

Today’s Menu

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macaroni and Cheese</td>
<td>$4.25</td>
</tr>
<tr>
<td>Beef Stew</td>
<td>$4.60</td>
</tr>
<tr>
<td>Vanilla Pudding</td>
<td>$1.25</td>
</tr>
<tr>
<td>Blueberry Pie</td>
<td>$1.75</td>
</tr>
</tbody>
</table>

Check your handwriting.

- Did you adjust your handwriting to fit the answer space given? [ ] Yes [ ] No
- Do all of your letters and numbers slant the same way? [ ] Yes [ ] No
- Is your handwriting easy to read? [ ] Yes [ ] No
- Did you fix mistakes carefully? [ ] Yes [ ] No

Highlight or draw a line under the menu item you wrote best.
Evaluation

Read the hints. Then write the paragraph below. Make your handwriting easy to read.

Hints for Clear Handwriting
- Close letters a, c, d, and g.
- Write m, n, and y with an overhill stroke.

Holidays and birthdays are special. Many people give gifts to family and friends. What is the nicest gift you have given? Anne’s best gift was the ring she gave her grandma. For Don, it was the dinosaur he gave his brother Ned.

Check Your Handwriting

Is your handwriting improving? Use the marks below to check the paragraph you wrote.

In the first sentence, circle every a and d that is not closed.

In the second sentence, write a check mark above every m and n that does not have an overhill stroke.

On the lines below, write the number of marks you made.

☐  □  √

Low scores mean your handwriting is easy to read!
Timed Writing

During a class discussion about saving the environment, Paulette was asked to take notes. Below, read what a few of her classmates said.

"We have to plant more trees all over the world."  "Recycling glass, newspapers, and plastic is important."

"I hate garbage."  "Endangered animals and plants have to be protected."

Use these tips when you take notes.
- Use manuscript or cursive writing, whichever is faster for you.
- Write down important facts and information.
- Use phrases instead of complete sentences.

What did the students say about saving the environment that is important to remember? Write notes about that information in the space below. Time your writing. Use a clock, a timer, or have a friend time you. Stop writing when three minutes are up.

Check what you wrote. Does it make sense? Did you include important facts?
Marcus answered a science test question using the table below.

Name Marcus

What conclusion can you draw about the relationship between exercise and heart rate from this table? Tell how you found your answer.

<table>
<thead>
<tr>
<th>How Exercise Affects Heart Rate</th>
<th>Heart Rate (beats per minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20-year-old Female</td>
</tr>
<tr>
<td>Before Exercise</td>
<td>85</td>
</tr>
<tr>
<td>After Exercise</td>
<td>140</td>
</tr>
</tbody>
</table>

I can draw the conclusion that exercise increases a person's heart rate. The table shows an increase in heartbeats per minute for all four people after they exercised.

Look at how Marcus answered the question.

- Did he answer both parts of the question? Yes No
- Are his letters the correct size and proportion to fit the space? Yes No
- Does he use a consistent amount of space between words? Yes No
- Did he fix his mistakes carefully? Yes No

Which letters are not the correct size? Circle them. Which words have too little space between them? Draw a line under them.
Now you answer this science test question.

Name ____________________________

What additional information would you need to draw the conclusion that periods of increased heart rate are good for you?

<table>
<thead>
<tr>
<th>How Exercise Affects Heart Rate</th>
<th>Heart Rate (beats per minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20-year-old Female</td>
</tr>
<tr>
<td>Before Exercise</td>
<td>85</td>
</tr>
<tr>
<td>After Exercise</td>
<td>140</td>
</tr>
</tbody>
</table>

Check your handwriting.  
• Are your letters the correct size and proportion to fit the space?  
  Yes  No
• Did you use a consistent amount of space between words?  
  Yes  No
• Did you fix your mistakes carefully?  
  Yes  No

Circle the word in your answer that shows your best handwriting.
Evaluation

Read the hint. Then write the paragraph below. Make your handwriting easy to read.

Hints for Clear Handwriting
• Keep r open.

Sharon stared at the starry sky. A small star floated down to the grass. It zigzagged over the flowers. From there, it veered up into a tree. Suddenly it flew right down onto Sharon’s bicycle.

Check Your Handwriting

Is your handwriting improving? Use the marks below to check the paragraph you wrote.

In the first sentence, circle every r that is not open.

On the lines below, write the number of marks you made.

Circle ______

Low scores mean your handwriting is easy to read!
Timed Writing

Read the paragraph below.

The story of Paul Bunyan is a legend. Paul was a giant lumberjack in the north woods of the United States and in Canada. He had a blue ox named Babe. The legend says that when Paul and Babe walked, they left footprints the size of lakes. Eventually these footprints filled with water and became the 10,000 lakes in Minnesota.

Now copy the paragraph.
Appendix L
Toothpick Structures
Appendix M
Pin Poking
Appendix N
Sewing a Square
Appendix O
Sewing a Picture
Appendix P
Clay Picasso Portraits
Appendix Q
Post Handwriting Questionnaire

Post Handwriting Questionnaire

In the last six weeks, my handwriting has improved.

☐ True

☐ False

If you answered True:
My handwriting has improved because...

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

If you answered False:
My handwriting has not improved because...

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

My handwriting is...

☐ too big

☐ too small

☐ messy

☐ perfect (I would not change anything about how I write)
When writing my hand gets tired.
- Always
- Often
- Sometimes
- Never

When I write, I stay in the lines.
- Always
- Often
- Sometimes
- Never

When taking notes, I can keep up with my peers.
- Always
- Often
- Sometimes
- Never

Everyone can easily read my writing.
- Always
- Often
- Sometimes
- Never

I think I benefited from handwriting lessons.
- True
- False
Appendix R
ETCH Score Sheet (Amundson, 2004)

---

**Evaluation Tool of Children's Handwriting**

**Score Sheet**

<table>
<thead>
<tr>
<th>Child's Name:</th>
<th>Date of Evaluation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child's Grade:</td>
<td>Date of Birth:</td>
</tr>
<tr>
<td>Examiner's Name:</td>
<td>Chronological Age:</td>
</tr>
</tbody>
</table>

**I. ALPHABET WRITING**

**A. Lower-Case Letters**

| a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z |
| OMIT/UNAQ | ILLEGIBLE | LF | SZ | AL | SP | CASE |
| OMISSIVE | ILLEGIBLE | LETTER LEGIBILITY % | |

**B. Upper-Case Letters**

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| OMIT/UNAQ | ILLEGIBLE | LF | SZ | AL | SP | CASE |
| OMISSIVE | ILLEGIBLE | LETTER LEGIBILITY % | |

**Hand Preference**

- Left
- Right
- Mixed

**Grasp Descriptors**

- Web Space
  - Open
  - Elliptical
  - Closed

- Thumb Placement
  - Opposed
  - Over
  - Under

- Finger Positions
  - Mid-Range
  - Extended
  - Flexed

---

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EFFECTS OF PENCIL GRASP EXERCISES ON HANDWRITING

ETCH Score Sheet

II. NUMERAL WRITING

<table>
<thead>
<tr>
<th>OMIT/UNAQ</th>
<th>ILLEGIBLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF</td>
<td></td>
</tr>
<tr>
<td>SZ</td>
<td></td>
</tr>
<tr>
<td>AL</td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td></td>
</tr>
</tbody>
</table>

III. NEAR-POINT COPYING

Ships flew by the moon.
(5 words) (18 letters)

<table>
<thead>
<tr>
<th>WORD LEGIBLE #</th>
<th>LETTER LEGIBLE #</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

IV. FAR-POINT COPYING

Cows jumped in our sky.
(5 words) (18 letters)

<table>
<thead>
<tr>
<th>WORD LEGIBLE #</th>
<th>LETTER LEGIBLE #</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

V. DICTATION

boi-xt, cla-ght, shr-um, 582-73
(4 units) (15 letters, 5 numerals)

<table>
<thead>
<tr>
<th>WORD/CODE LEGIBLE #</th>
<th>LETTER/NUMERAL LEGIBLE #</th>
</tr>
</thead>
<tbody>
<tr>
<td>word</td>
<td>combined</td>
</tr>
<tr>
<td>zip code</td>
<td>%</td>
</tr>
</tbody>
</table>

VI. SENTENCE COMPOSITION

Legibility % = \# correct words/letters \times 100 \%
\# total words/letters

<table>
<thead>
<tr>
<th>WORD LEGIBLE #</th>
<th>LETTER LEGIBLE #</th>
<th>SEC</th>
<th>MIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL ETCH LEGIBILITY SCORES

<table>
<thead>
<tr>
<th>TASKS</th>
<th>WORD</th>
<th>LETTER</th>
<th>NUMERAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ia</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ib</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>5</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>5</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>3</td>
<td>15</td>
<td>5</td>
</tr>
</tbody>
</table>

T otal Attained/ Possible

| (13)  | (103) | (25) |

TOTAL

<table>
<thead>
<tr>
<th>ATTAINED/POSSIBLE</th>
<th>LEGIBILITY %</th>
</tr>
</thead>
</table>

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## Legibility and Fluency Matrix

**Student's ID:**

**Hand Dominance:** □ Right Handed □ Left Handed

**Date:**

**Writes from left to right across the page:** □ Yes □ No

<table>
<thead>
<tr>
<th>Overall Handwriting</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Legibility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All letters in the writing are legible</td>
<td>&gt;91% writing is legible</td>
<td>81-90% writing is legible</td>
<td>71-80% writing is legible</td>
<td>&lt; 70% of the writing is legible</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neatness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Writing is always neat without erasures, torn paper or cross outs</td>
<td>&gt; 91% writing is neat without erasures, torn paper or cross outs</td>
<td>81-90% of writing is neat without erasures, torn paper or cross outs</td>
<td>71-80% of writing is neat without erasures, torn paper or cross outs</td>
<td>&lt; 70% of writing is neat without erasures, torn paper or cross outs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Placement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All letters are oriented correctly on the lines</td>
<td>&gt; 75% writing is oriented correctly on the lines</td>
<td>50-75% of writing is oriented correctly on the lines</td>
<td>Little of the writing is oriented correctly on the lines (25-50%)</td>
<td>&lt; 25% of writing is oriented correctly on the lines</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fluency</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keeps up with peers when completing</td>
<td>Takes 25% longer than peers to complete</td>
<td>Takes 50% longer than peers to complete</td>
<td>Takes 75% longer than peers to complete</td>
<td>&gt;75% longer than peers to complete</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Score Out of 20:**