

THE USE OF CURSIVE WRITING IN A DIGITAL AGE:  
A MIXED-METHODS ANALYSIS OF THE DIFFERENCES  
BETWEEN MODES OF TRANSCRIPTION IN PRIVATE SCHOOLS

A Dissertation

Presented in Partial Fulfillment of the Requirements for the

Degree of Doctor of Philosophy  
with a  
Major in Educational Leadership in the  
Department of Graduate Education

Northwest Nazarene University

by

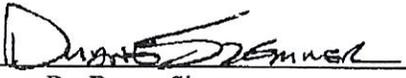
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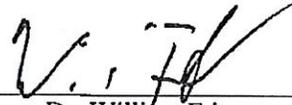
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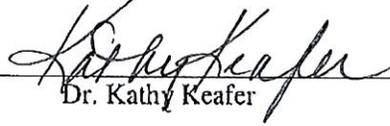
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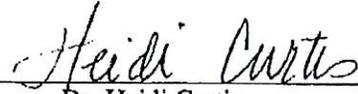
## AUTHORIZATION TO SUBMIT DISSERTATION

This dissertation of Tony Ryff, submitted for the degree of Doctor of Philosophy in Education with a major in Educational Leadership and titled "The Use of Cursive Writing in a Digital Age: A Mixed-Methods Analysis of the Differences Between Modes of Transcription in Private Schools" has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies.

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## ACKNOWLEDGEMENTS

Earning a doctorate is a huge milestone in a person's life and career, and an accomplishment of this magnitude cannot happen alone. It is through the significant investment of others in my life that this goal has become a reality, and I want to acknowledge them with sincere gratefulness.

First, I want to thank my wife, Kathy, for her sacrifice, love, and support. I logged over 1,100 hours working on doctoral coursework and this dissertation in the past 24 months. That's a lot of time spent on the computer and away from home while she kept our family moving forward. She provided prayer support and constant encouragement that I was on a worthy path. She kept reminding me that I should not "grow weary while doing good, for in due season we shall reap if we do not lose heart" (Galatians 6:9).

The professors at NNU have been tremendous. I want to especially thank Dr. Curtis and Dr. Studebaker who guided and cheered me on from the starting block to the finish line. Their wisdom, commitment to excellence, and unwavering belief that I could finish well inspired me to press forward. It has also been an incredible joy to share the journey with the other 15 members of our cohort. You are an incredible group of educators and friends!

I am very grateful for each member of my committee. As chair, Dr. Slemmer patiently supported and guided me through draft after draft. He was always available to provide encouragement, offer suggestions, and answer questions. Dr. Fritz was the expert with statistics, and his guidance and great thinking was invaluable. Dr. Keafer's participation on my committee was very special in light of our friendship over the past 30 years and our shared love for handwriting and its benefits.

## DEDICATION

This dissertation is dedicated to my Lord and Savior, Jesus Christ who has given me new life and the opportunity to experience abundant life. His Word, which is His written expression to us, provides tremendous instruction and encouragement. It is through His precious gift of salvation and daily empowerment that I am able to claim I Samuel 12:24 as my life verse: “Only fear the Lord and serve Him in truth with all your heart, for consider what great things He hath done for you.” He truly is the Master Teacher.

I also want to dedicate my dissertation to my grandmother, Minnie Gladys Beem. She gave unconditional love and support to her family and served as an elementary teacher for nearly 40 years. She inspired me to become a teacher and believed that I could do it. I marveled as a child watching her grade papers in the evenings and on weekends. She had beautiful cursive writing. I remember walking up to the dining room table and seeing her grade papers with her left hand (she was right handed). When I inquired about it, she smiled and said, “Teachers know how to write with both hands.” She is greatly missed, and I wish she could know the path that God had for me. I look forward to our reunion in Heaven.

## ABSTRACT

Cursive writing is a skill that contributes to learning, yet in the digital age it is no longer considered a necessary part of the curriculum in America's schools. Research demonstrates the importance of handwriting, particularly cursive, in the development of fluency, compositional complexity, and literacy skills. Because of the ever-expanding use of technology, it is necessary to understand the value that cursive brings to the thinking and writing process.

This study compared the differences in fluency and compositional quality between two modes of transcription (cursive and keyboard) among fifth- and eighth-grade students. It also examined the attitudes and beliefs of today's educators and students regarding cursive's value and benefits as compared with the value and benefits of keyboarding. Students from three private schools in the midwestern United States wrote two stories each, one in cursive and one by keyboard using the *Test of Written Language-4*. The researcher tabulated the total word count (fluency) for each story and compared the results by grade level and mode of transcription. The researcher also compared the standard scores for each story measuring compositional quality by mode of transcription, grade levels, and schools. The students and their teachers completed a survey expressing their views on cursive writing and the use of a keyboard. The teachers also participated in follow-up phone interviews.

The researcher conducted a series of parametric and non-parametric tests, and the results indicated that the keyboard-generated stories in both the fifth and eighth grade generally scored higher in fluency and compositional quality over the cursive stories. In contrast, the teachers and students placed a substantial value on learning and using cursive as indicated by the qualitative data. Future studies should focus on understanding this dichotomy and how cursive writing may enhance best practices in educating the next generation of digital natives.

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## **Chapter I**

### **Introduction**

Handwriting has been a fundamental method of written communication in America for many generations (Dougherty, 1917; Hopkins, 2016; Thornton, 1996). Handwriting skills are used for both business and personal communication, and they have traditionally been considered necessary and valuable (Berninger, 2012; Blazer, 2010; Graham & Weintraub, 1996). Current research demonstrates the importance of handwriting, particularly cursive, in the development of fluency and compositional complexity (American Handwriting Analysis Foundation, 2016; Gentry, 2016; Kersey & James, 2013; McCarney, Peters, Jackson, Thomas, & Kirby, 2013). As the use of technology has expanded, the focus on time spent on handwriting instruction has dramatically decreased. The use of tablets, cell phones, and other electronic devices has frequently replaced the pen and paper in both formal and informal communication (Aragon-Mendizabal, Delgado-Casas, Navarro-Guzman, Menacho-Jimenez, & Romero-Olivia, 2016; Bromley, 2010; Duran & Frederick, 2013; Karavanidou, 2017).

Integrating technology into the classroom has been a compelling topic of interest in recent years for researchers, educators, and software developers alike (An, Alon, & Fuentes, 2015; Kumi-Yeboah & Campbell, 2015; Moge & Fluck, 2015; Shorter, 2001). Finding ways to enhance student engagement and to foster learning for today's digital natives through the use of technology seems like a natural path for classroom teachers to pursue (Simpson, 2013). There are seemingly endless options for the use of mobile apps, interactive games, online tutorials, videos, and collaborative tools for learning (An et al., 2015; Mentor, 2015; Reichert & Mouza, 2015). While the use of technology provides incredible opportunities for enhancing the learning environment (Bromley, 2010; Ciampa & Gallagher, 2013; Myers, 2013), key skills have been

minimized or eliminated from the established curriculum in America's schools (Parker & Lazaros, 2014; Simpson, 2013). One such skill is that of teaching cursive. The "paperless" school is replacing the traditional transcription modes used in the classroom, and more is being lost than legible handwriting (Bounds, 2010; Gentry, 2016; Hopkins, 2016; Klemm, 2016; Mangen & Balsvik, 2016; Medwell & Wray, 2008).

Common Core Standards have been adopted in many states that limit or eliminate handwriting instruction (Blazer, 2010; Common Core State Standards Initiative, 2016; Heavens, 2015; Kelly, 2006; Saperstein, 2012). Currently, only 15 states require instruction in cursive writing (American Handwriting Analysis Foundation, 2016; Associated Press, 2017). Due to the adoption of Common Core Standards, the instructional time that once was devoted to handwriting in every classroom has been replaced by preparation for high-stakes testing and enhanced technology instruction (Cahill, 2009; DeCuir, 2014; Dianis, Jackson, & Noguera, 2015; Parker & Lazaros, 2014; Zubrzycki, 2012). As a result, some school districts are spending as much as 165 hours per school year preparing and testing students (Breiner, 2015), and cursive writing instruction has been replaced by an emphasis on preparing for standardized tests, on using technology, and in learning what is considered to be more important educational content (Armstrong, 2014; Blazer, 2010).

Cursive is now viewed as a luxury as opposed to a practice that has sound educational rationale (Bromley, 2010; Heavens, 2015; Karavanidou, 2017; Medwell & Wray, 2008). There is a limited amount of instructional time in a given school day, and there is competition for what subjects are deemed important enough for that time (Grapes, Parsons, & Towne, 2014; Sharp & Titus, 2016). Computer literacy instruction, including keyboarding, is now integrated into the curriculum at earlier grade levels, and a greater percentage of written work produced by students

is now done by harnessing technology (Blazer, 2010; DeCuir, 2014; Dianis, et al, 2015; Parker & Lazaros, 2014; Zubrzycki, 2012).

There is simply not enough time in the school day to incorporate these new elements and still retain every aspect of the existing curriculum, so handwriting is now considered largely unnecessary for today's learner (American Handwriting Analysis Foundation, 2016; Klemm, 2013). Teachers are now directed to focus on content that will be assessed on annual state assessments. Since handwriting is not part of that assessment, it has fallen by the wayside (Berninger, 2012; Zubrzycki, 2012). Even though handwriting is not part of state assessments, handwriting instruction can indirectly assist students in meeting the state's standards in various content areas (Berninger, 2012). There are tangible benefits beyond handwriting itself to include this skill in the schools' daily curriculum.

As advancing technology has changed the landscape of the teaching and learning process across the years, the writing process and the importance of handwriting have received a greater research focus (Berninger, 2012; Flower & Hayes, 1981; Healy, 1999; Shorter, 2001; Simpson, 2013). In light of the shift to keyboarding, a key area of investigation has been on the efficacy of handwriting, both manuscript and cursive (Armstrong, 2014; Berninger, 2012; Heavens, 2015; Stevenson & Just, 2012). Numerous studies have focused on the differences in writing fluency and compositional quality among students of various ages (Berninger et al., 2002; Berninger, Abbott, Augsburger, & Garcia, 2009; Connelly, Gee, & Walsh, 2007; Kiefer et al., 2015; Wollscheid, Sjaastad, & Tomte, 2016).

Research suggests that the process of writing by hand is highly complex and allows students to gain cognitive and literacy skills that cannot be duplicated when using a keyboard (Alonso, 2015; Gentry, 2016; Healy, 1999; Kelly, 2006; Kersey & James, 2013;

McCarney et al., 2013; Pape & Ryba, 2004; Sharp & Titus, 2016; Stevenson & Just, 2012; Trond, 2011). Handwriting practice wires the brain for reading and writing success and contributes to reading fluency (Berninger, 2013; Gentry, 2016; Healy, 1994, 1999; Hopkins, 2016). The motor areas of the brain that are simultaneously activated while engaged in reading and writing activities are clearly evident (Alonso, 2015; Trond, 2011). Writing and reading go hand in hand, and they share common characteristics such as providing feedback and encouraging higher order thinking skills (Emig, 1977; Flower & Hayes, 1981; Medwell & Wray, 2007; Vygotsky & Kozulin, 1986).

Writing is a learned behavior fostered in an abstract fashion, whereas oral speech is a natural occurrence (Emig, 1977; Vygotsky & Kozulin, 1986). The process of formulating written thought requires conscious focus and action as a learner, and a number of developmental milestones must be achieved in the development of writing skills (Pape & Ryba, 2004). Talking is generally spontaneous, occurring without a specific structure. Oral speech takes place in the context of the situation, but written language must create its own context. Unless oral speech is recorded, it does not result in a tangible product like writing (Emig, 1977; Vygotsky & Kozulin, 1986).

The rationale for the continued use of handwriting, particularly cursive, includes its impact on the quality of written work, literacy, and executive function (Gentry, 2016; Kersey & James, 2013; McCarney et al., 2013). The process of handwriting is highly complex and involves fine-motor movement, visual-motor coordination, and other cognitive skills. One study concluded that second- to fourth-grade students wrote longer stories more quickly by hand than by keyboard (Berninger et al., 2009). Additionally, numerous studies have shown that taking notes by keyboard instead of by hand results in shallower processing and poorer recall of

material (Aragon-Mendizabal et al., 2016; Duran & Frederick, 2013; Mueller & Oppenheimer 2014; Pevery et al., 2012). Other studies indicate a higher compositional quality and writing fluency on essays written by hand than those written by keyboard (Berninger, 2012; Berninger et al., 2009; Mangen & Balsvik, 2016).

Classroom teachers understand and appreciate the value of cursive and the significant connection between handwriting and literacy (Heavens, 2015; Hopkins, 2016; Kelly, 2006; Kocsis, 2016; Myers, 2013; Sharp & Titus, 2016). With direct and continuous interaction with students, educators are able to provide keen insights regarding the benefits of students using cursive. The use of digital devices in the classroom can provide valuable learning opportunities in many school subjects, but for the development of writing skills and for the enhancement of cognitive skills that benefit the student holistically, handwriting needs to be a mainstay in the American classroom (Datchuk, 2015; Heavens, 2015; Hopkins, 2016; Mueller & Oppenheimer, 2014; Wollscheid et al., 2016; Worthington, 2011).

### **Statement of Problem and Purpose**

The ever-expanding use of technology in the classroom is quickly replacing traditional methods of instruction, and it is necessary to understand and validate the intrinsic value that learning cursive brings to the thinking and writing process (Armstrong, 2014; Berninger 2013; Blumenfeld, 1994; Bounds, 2010; Healy, 1994, 1999; Hopkins, 2016; Sharp & Titus, 2016). Educational research on the beliefs and practices of classroom teachers is needed to understand if there are irreplaceable benefits for retaining cursive as the primary mode of transcription in the teaching and learning environment. The primary goals of the study were to compare the differences in fluency and compositional quality between two modes of transcription (cursive and keyboard) among fifth- and eighth-grade students and to analyze the attitudes and beliefs of

today's educators and students regarding cursive, including its benefits, its usage, and its correlation to the rest of the curriculum within the digital age.

Today's learners spend more and more instructional time in front of a screen and keyboard, and it is important to understand what may be lost if students do not learn using the traditional mode of paper/pencil tasks, particularly cursive. Additional research is needed to determine the benefits of cursive as a connecting factor across the curriculum and as a means of encouraging higher order thinking skills (Armstrong, 2014; Berninger, 2013; Berninger et al., 2009; Grapes et al., 2014; Healy, 1994; Hopkins, 2016; Kelly, 2006; Thornton, 1996).

Legislators and educational leaders share the responsibility for decisions on what should be taught in the nation's public schools. In that decision-making process, it is important to understand what current classroom teachers believe about relevant educational issues (Kagan, 1992; Myers, 2013; Heavens, 2015). Handwriting has a long history of being a necessary aspect of the elementary curriculum in America's schools, and teachers have provided cursive instruction in a systematic fashion (Berninger, 2012; Hopkins, 2016; Myers, 2013; Thornton, 1996). Classroom teachers are direct witnesses to the dramatic technological changes in the classroom and can speak authoritatively on the impact these changes have on students' learning (Kagan, 1992; Heavens, 2015; Sharp & Titus, 2016). As the primary method of writing moves from paper/pencil to digital means, it is important to understand the ramifications and the impact on student learning.

In addition, it is beneficial to gain students' perspectives on the value of cursive (Chemin, 2014). While students may not possess the maturity to provide a holistic viewpoint on this topic, their opinions are meaningful and should be considered (Healy, 1999). Today's students are growing up as digital natives using both keyboard and paper/pencil. Those students who have

learned cursive are able to articulate more effectively their views on the efficiency of note taking, writing compositions, journal writing, etc., when writing in cursive than by keyboard (Simpson, 2013).

## **Background**

Teaching manuscript and cursive in the elementary grades has been a staple in the American educational system for decades and is a foundational skill for school success (Askov, 1995; Cahill, 2009; Dougherty, 1917; Goodness, 1958; Hopkins, 2016; Thornton, 1996; Zaner-Bloser, 2015a). This training, coupled with foundational reading skills such as letter recognition, is fundamental to learning to read and spell (Berninger et al., 2009; Blazer, 2010; Blumenfeld, 1994; Keim, 2013; Klemm, 2013). Handwriting practice wires the brain for reading and writing success and contributes to reading fluency (Berninger, 2013; Gentry, 2016; Healy, 1994, 1999; Hopkins, 2016).

Handwriting instruction remained an integral part of school curriculum until the adoption of Common Core standards in the early 2000s (Berninger, 2003; Blazer, 2010; Kelly, 2006; Klemm, 2013; Supon, 2009). With less handwriting practice and the shift to using digital communication, the handwriting quality of today's students has diminished (Berninger, 2013; Duran & Frederick, 2013; Thornton, 1996; Vachon, 2014), but there is inherent value in teaching and using cursive (Berninger, 2013; Berninger et al., 2009; Grapes et al., 2014; Healy, 1994; Kelly, 2006; Lund, 2016; Sharp & Titus, 2016).

Learning to write is an important and foundational skill in the academic life of every student (Arslan, 2012; Berninger, 2013; Heavens, 2015). Taught in tandem with reading, writing skills are formally introduced in the early childhood classroom and are then reinforced at each grade level. Manuscript and cursive are the two primary types of handwriting taught in

English-speaking schools, although educators are not unified in which type should be taught to students first (Armitage & Ratzlaff, 2015; Berninger, Graham, & Weintraub, 1998; Blumenfeld, 1994). The general practice in America's schools is to formally introduce manuscript first with a transition to cursive three to four school years later (Armitage & Ratzlaff, 2015; Sharp & Titus, 2016; Thornton, 1996; Zaner-Bloser, 2015a). Because students learn both manuscript and cursive in their elementary school years, they often adopt what is considered a mixture of the two types of writing. The term "handwriting" can be used interchangeably to denote any of these writing styles, and there is a need to differentiate between them (Berninger et al., 1998).

School districts across the nation have allocated significant funding to introduce and maintain the implementation of tablets and laptops, and the thrust of student output is shifting from paper/pencil to a paperless format (An et al., 2015; Banister, 2010; Mentor, 2015; Reichert & Mouza, 2015). The use of tablets and laptops represents a monumental shift in how students communicate using written expression (Black, 2015; Kumi-Yeboah & Campbell, 2015; Shorter, 2001). In the typical public school in the United States, there is now one computer for every five students, and more students take standardized tests on the computer than by paper/pencil (Herold, 2016). Technology is used in every aspect of society, and the tools used for teaching and learning have followed accordingly (An et al., 2015; Berninger, 2012; Heavens, 2015; Myers, 2013; Wollscheid et al., 2016).

An, Alon, and Fuentes (2015) discussed the role of technology use in the classroom and the general lack of empirical data supporting long-term usage of a particular device. The technology landscape changes rapidly, and there isn't an easy way to validate that a particular technological advancement is beneficial in the classroom over another. Within the educational community, there is a perception that the use of the newest technology is necessary in order to

demonstrate best practice in education (Grapes, et al., 2014; Hong, Mongillo, Lawrence, & Donnantuono, 2015). In the wake of this philosophy, many tried and true methods and strategies for student engagement and performance are quickly uprooted without sufficient validation. New technology enamors teachers and students alike, but the teacher's instructional approach is more focused on student success than on the level of technology access (Hong et al., 2015; Milman, Carlson-Bancroft, and Vanden Boogart, 2014). These factors signify the need for intensive, ongoing professional development for teachers and a structured accountability for the use of that technology in daily practice (Bledsoe & Pilgrim, 2015; Hauman, Kastner, & Witte, 2015; Heavens, 2015; Morgan, 2014).

In today's technology-laden classrooms, teachers need to demonstrate great maturity and wisdom by looking beyond the glamour of technology and recognize that there are key elements in a traditional educational program that students need to learn (Berninger, 2013; Grapes et al, 2014 ). Mangen and Balsvik (2016) caution that the allure of the newest gadgets could distract educators from focusing on foundational skills such as reading comprehension and higher-order thinking skills. There are wider socio-cultural issues in relationship to the introduction and integration of technology. The teacher as the mature mediator in the room must balance what needs to be taught with what students need to learn. Students should be encouraged to continually assess and reflect on how the learning activity at hand is helping them gain understanding. Therefore, it is the teacher's role to ensure that students clearly understand why using cursive is relevant in building cognitive connections and how cursive proficiency impacts reading and other subject areas (Brandon & All, 2010; Zaner-Bloser, 2015b).

It is important to understand the intrinsic value of cursive and its impact on the academic and cognitive development of the learner. The process of handwriting is highly complex and

involves fine-motor movement, visual-motor coordination, short- and long-term memory skills, automaticity, and other cognitive skills (Berninger et al., 2009; Klemm, 2013). Klemm (2013) states that cursive leads to cognitive specialization that integrates sensation, movement control, and thinking. This training, coupled with foundational reading skills such as letter recognition, is fundamental to learning to read and spell (Berninger et al., 2009; Blazer, 2010; Blumenfeld, 1994; Keim, 2013; Klemm, 2013). Arslan (2012) found that automaticity with handwriting frees up the memory resources for composing and understanding the content at hand. Berninger (2013) goes further by stating that at each developmental level, writing by hand is the best predictor of how many words can be written within a constant time limit. If letter formation and the actual mechanical act of writing become automatic, cognitive areas are freed to invest in the development of ideas and writing fluency (Arslan, 2012; Cahill, 2009).

Handwriting is one of the most essential components of classroom instruction as it unifies and promotes the ability to spell, compose, and read (Berninger, 2013; Blumenfeld, 1994; Vygotsky & Kozulin, 1986). Writing by hand is fundamentally different from writing on a keyboard, and handwriting has a much greater impact as a tool for learning (Klemm, 2013; Lund, 2016). As technology moves forward, it is important to consider the benefits of retaining handwriting instruction, particularly cursive writing, within the established school curriculum.

### **Theoretical Framework**

There are several important constructs of language development and cognitive theories of learning that provide a deeper understanding of the nature of written language. Russian psychologist Lev Vygotsky in his foundational work *Thought and Language* (Vygotsky & Kozulin, 1986), explains the integrated connection between oral and written language development. The interdependent relationships between oral and written language and the

cognitive structures of learning are inherent in social constructivism, a learning theory popularized by Vygotsky (Dunn, 2005; Emig, 1977; Presseisen & Kozulin, 1992; Vygotsky & Kozulin, 1986). Language development is highly social, and the underpinnings of social constructivism are built on the interactive nature of communication (Vygotsky & Kozulin, 1986). As the learner develops, oral language becomes inner language, and inner language provides the framework for written language. Written language is an outflow of the inner language that is consciously constructed in the writing process and requires the establishment of systematic connections and relationships (Emig, 1977).

Current research from the field of cognitive psychology validates the interrelationship between handwriting and cognitive development, with the connection being language (Berninger et al., 2002; Flower & Hayes, 1981; Gentry, 2016; Hopkins, 2016; James & Englehart, 2012; Klemm, 2016; Lund, 2016; Ortiz & Wright, 2010). Verbal language within a socially rich learning environment plays an irreplaceable part in the learning process (Karagiorgi & Symeou, 2005; Vygotsky & Kozulin, 1986). Verbal language, therefore, becomes the foundation for building written language as new information is transformed and understood based upon previous learning (Brandon & All, 2010).

There are additional constructs that support and enhance Vygotsky's views. Flower and Hayes (1981) have popularized the "cognitive process of writing," stating that thought and language are inextricably connected. According to their model, the act of composing written language involves complex, hierarchical thinking where the brain monitors and manipulates planning, constructing, and reviewing in a goal-directed process. Dr. Virginia Berninger's "simple view of writing" centers on the role of working memory and its prominence in the writing process. The components of transcription (handwriting, keyboarding, and spelling),

executive functioning (conscious attention, planning, reviewing, revising, and strategies for self-regulation), and text generation (words, sentences, and discourse) are dependent upon working memory. If more working memory is needed for one of the three components, the other two will not receive the cognitive resources needed (Berninger et al., 2002; Berninger et al., 2009; Connelly, et al., 2007).

### **Research Questions**

The purpose of the study was to compare the differences in fluency and compositional quality between two modes of transcription (cursive and keyboard) among fifth- and eighth-grade students and to analyze the attitudes and beliefs of today's educators and students regarding cursive's values and usage as compared to the value and usage of keyboarding. The focus was on cursive as the primary writing method of upper-elementary and middle-school students over digital methods of writing (Berninger, 2013; Berninger et al., 2009; Blumenfeld, 1994; Grapes et al., 2014; Heavens, 2015; Hopkins, 2016; Karavanidou, 2017; Kelly, 2006; Kocsis, 2016; Sharp & Titus, 2016). Teacher attitudes and beliefs on the current state of handwriting were also analyzed (Kelly, 2006; Sharp & Titus, 2016). The following research questions guided this exploration:

1. Do student-generated stories demonstrate a greater fluency and compositional quality in cursive than what is produced by keyboard?
2. What are teachers' attitudes and beliefs regarding the value and usage of cursive compared to the value and usage of keyboarding?
3. What are students' attitudes and beliefs regarding the value and usage of cursive compared to the value and usage of keyboarding?

This study used a combination of methodologies to gain a comprehensive understanding of cursive and its use in today's schools.

### **Description of Terms**

There are a number of common terms that are prevalent within the peer-reviewed literature surrounding this topic, particularly because several words related to writing are often used interchangeably. The following terms provide clarification for this particular research study.

**Attitude.** “Manner, disposition, feeling, position, etc., with regard to a person or thing; tendency or orientation, especially of the mind” (Myers, 2013, p. 10)

**Automaticity.** The completion of a task without conscious thought.

**Beliefs.** “Personal constructs that can provide an understanding of a teacher's practice” (Myers, 2013, p. 10).

**Compositional Quality.** The structure and complexity of sentence formation measured by the number of multi-syllabic words and descriptive words (adjective and adverbs). Conventions of the language are also considered (spelling, punctuation, and capitalization).

**Cursive.** Flowing handwriting often with the strokes of successive characters joined and the angles rounded (Myers, 2013).

**Digital Means.** Written work that has been produced through the use of a keyboard.

**Digital Native.** A person who is born or reared during the age of digital technology and is therefore familiar with computers and the Internet from an early age.

**Fluency.** The number of individual words and complete sentences written within a given time frame.

**Handwriting.** Something written with a pencil, pen, or other marking utensil.

**Keyboarding.** Putting information into a computer or other electronic device by using a keyboard.

**Manuscript.** Handwriting that is not joined and is made with characters like the print found in a book.

**Mode.** The way in which something is done. In this case, the mode is the method by which the writing sample is produced.

**Practices.** The application or use of a teaching method as opposed to theories about the same.

**Translating.** The act of getting one's thoughts on paper.

**Transcription.** The method by which written work is expressed, either handwritten or electronically printed.

**Written language.** "The comprehension and expression of thoughts through the use of characters, letters, or words that are etched, traced, or formed on the surface of some material" (Hammill & Larsen, 2009, p. 1).

**Writing skills.** The written expression of ideas in a coherent fashion with a keen focus on the organization of thoughts in a coherent, unified fashion, on the structure and flow of writing, and on the use of descriptive language.

### **Significance of the Study**

Handwritten work is gradually disappearing from America's classrooms in favor of keyboarding for student output (Berninger et al., 2009; Grapes et al., 2014; Hopkins, 2016). America's schools have allocated significant resources in providing students technological tools for learning, and they will continue to do so (Banister, 2010; Mentor, 2015; Reichert & Mouza,

2015). There is emerging research that leaving the traditional mode of writing for keyboarding is negatively impacting the cognitive development of the learner (Berninger, 2013; Grapes et al., 2014; Karavanidou, 2017; Kersey & James, 2013). If schools are embracing technology at the expense of the development of cognitive skills, including executive function, then new empirical data can be used to promote dialogue and collaboration on this important issue (Armstrong, 2014; Kersey & James, 2013; McCarney et al., 2013).

This study provided pertinent knowledge for educators on the benefits of teaching and emphasizing cursive skills alongside the use of technology (Heavens, 2015). The results of the study also added credence to the findings of other researchers in promoting the benefits of cursive. Finally, this study established the relevance of providing formal instruction in cursive in American classrooms. School leaders are now able to use data to recognize the applicability of cursive in the development of the learner.

### **Overview of Research Methods**

A growing body of research indicates the value of cursive as the primary writing method of upper-elementary and middle-school students over using keyboarding for writing (Berninger, 2013; Berninger et al., 2009; Blumenfeld, 1994; Grapes et al., 2014; Heavens, 2015; Hopkins, 2016; Kelly, 2006; Karavanidou, 2017; Kocsis, 2016; Sharp & Titus, 2016). Because best practices in education stem from a clear understanding of effective methodology and resulting student growth, classroom teacher attitudes and beliefs on the current state of handwriting in America were also analyzed (Kelly, 2006; Sharp & Titus, 2016).

In order to gain the greatest understanding of the issues related to the use of cursive in a digital age, a mixed-methods approach was utilized (Creswell, 2015; Marshall & Rossman, 2016; Plano Clark & Ivankova, 2016). Using a convergent mixed-methods design enabled the

collection of both quantitative and qualitative data simultaneously. By collecting several sources and types of data, the reliability of the study was strengthened (Marshall & Rossman, 2016).

For the quantitative aspect of the study, fifth- and eighth-grade student participants from three private schools were asked to write two stories, one in cursive and one by keyboard. These writing tasks were part of a norm-referenced written language test, the *Test of Written Language-4* (TOWL-4) (Hammill & Larsen, 2009). Using a picture prompt, the students were given 15 minutes to spontaneously compose a story in cursive. Two days later, the same students were given a different picture prompt to compose a story using a keyboard (laptop, Chromebook, iPad, etc.). The TOWL-4 provides age and grade-based norms to calculate a scaled score and percentile rank from the Contextual Conventions subtest and the Story Composition subtest. The two subtest scores are then combined into one Spontaneous Writing composite index score and percentile rank. The composite scores were used to compare the two modes of transcription.

In addition to the student-generated stories, the students provided qualitative data by completing a Likert-scale survey to answer Research Question 3 regarding their attitudes and beliefs of the value and usage of cursive in their schoolwork as compared to the value and usage of keyboarding (See Appendix H). The participating teachers also provided data through the use of a Likert-scale survey and through the use of open-ended survey questions (See Appendix G) and follow-up semi-structured phone interviews (See Appendix I). Research Question 2 was directed to ascertain teachers' attitudes and beliefs about the value and usage of cursive writing as compared to the value and usage of keyboarding.

The data were analyzed separately and triangulated for comparison and contrast (Creswell, 2015; Plano Clark, & Ivankova, 2016). The results from the open-ended teacher

survey questions and follow-up interviews were coded and analyzed qualitatively to understand teacher beliefs and attitudes about: 1) any perceived benefits of students using cursive and its impact on thinking and learning, 2) their classroom practices regarding cursive instruction, and 3) the use of cursive in a digital age.

The quantitative and qualitative data are triangulated in the discussion in chapter 5. This design method provided objective data using student-produced stories, student and teacher ratings on a Likert-scale, and subjective data related to teacher attitudes and beliefs on the benefits of cursive and its use in the digital age. Collectively, the quantitative and qualitative data gathered from teachers and the quantitative data received from students provide an understanding of the value of cursive instruction and usage in the digital age. As technology use in today's classrooms continues its increase, the results of this study provide empirical evidence for dedicated instruction in cursive alongside the use of keyboarding.

## **Chapter II**

### **Literature Review**

#### **Introduction**

Written communication is a hallmark of an educated society, and systematic writing instruction has always been an essential part of the educational program (Dougherty, 1917; Hopkins, 2016; Thornton, 1996). Regardless of the method or mode used, connecting thought and language in a written, permanent fashion provides a record of man's knowledge and understanding. Even with the rise of electronic technology making it easier and quicker to communicate, current research has underscored the importance of handwriting, particularly cursive, in the development of fluency and compositional complexity (American Handwriting Analysis Foundation, 2016; Gentry, 2016; Kersey & James, 2013; McCarney, et al., 2013). As much as 60% of a student's school day is spent performing fine-motor tasks such as writing; thus the way written communication is taught is of utmost importance (Rosenblum, Parush, & Weiss, 2003; Zaner-Bloser, 2012).

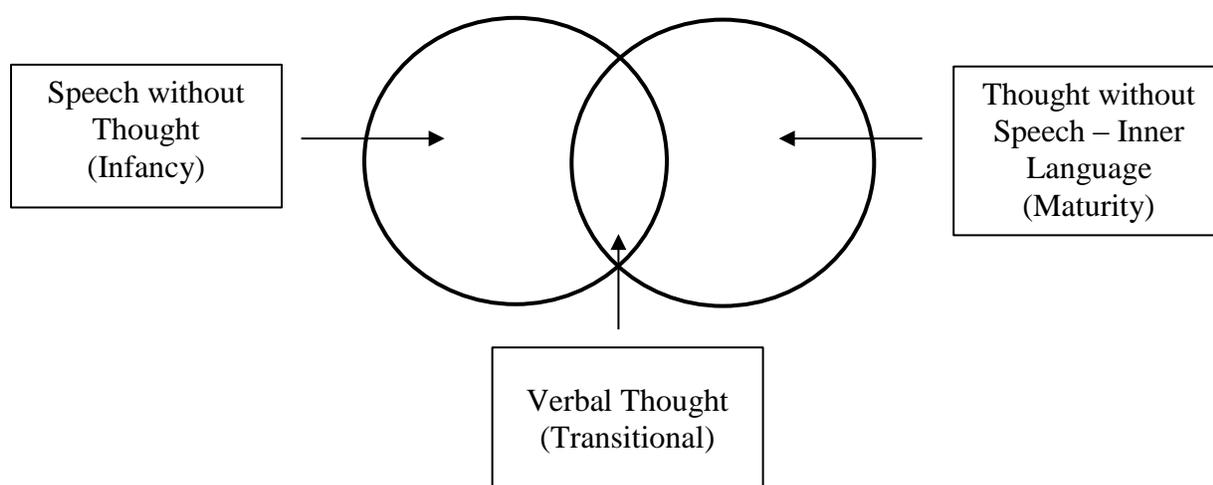
Due to the rapid technological advances in our society, today's classroom teachers are faced with the challenges and opportunities of integrating digital teaching and learning into their instructional practice (An et al., 2015; Banister, 2010; Heavens, 2015; Karavanidou, 2017). Tablets and laptops are gradually replacing paper and pencils as the means of accomplishing written work, and as a result, handwriting and its consistent use has been marginalized (Berninger, 2009; Berninger et al., 2013; Carpenter, 2007; Grapes et al., 2014; Mueller & Oppenheimer, 2014). In order to understand handwriting and its continued and important role in the 21<sup>st</sup> century classroom where technology continues to grow in prominence (An et al., 2015; Kiefer et al., 2015; Mentor, 2015), the literature review will explore the following topics: 1) the

history of handwriting in America and its use in today's classroom, 2) the framework for the development of the writing process, 3) the development of writing skills, 4) written expression and the different modes of transcription, 5) the use of technology in teaching and learning for the 21<sup>st</sup> century learner, and 6) the rationale for the continued use of cursive in light of the prevalence of student-driven technology use. The review of literature will demonstrate that there is growing debate between empirically based recommendations and current practice in relationship to handwriting instruction (Sharp & Titus, 2016).

### **The Theoretical Framework for the Development of Written Expression**

Written communication is an important cognitive skill and the “glue” that records and preserves culture (Healy, 1999; Vygotsky & Kozulin, 1986). The process of handwriting and written expression is highly complex and involves fine-motor movement, visual-motor coordination, and other cognitive skills (Berninger et al., 2009; Datchuk & Kubina, 2013; Flower & Hayes, 1981; Hawkyard, Dempsey, & Arthur-Kelly, 2014; Wollscheid et al., 2016). Other language systems are interwoven in the students' overall language development. These include listening comprehension, reading comprehension, and oral expression (Berninger et al., 2006; Kandel & Perret, 2014). In the production of oral language, the learner is not acutely aware of the cognitive aspects of speaking. In written language, however, the learner must be cognizant of the sound/symbol relationships of language – skills that he/she has actively memorized in advance (Wolfe, 2001). Vygotsky stated that oral language is spontaneous and involuntary, and that written language is abstract and conscious. Written language translates oral language into a highly complex cognitive and abstract form of communication (Vygotsky & Kozulin, 1986; Wolfe, 2001).

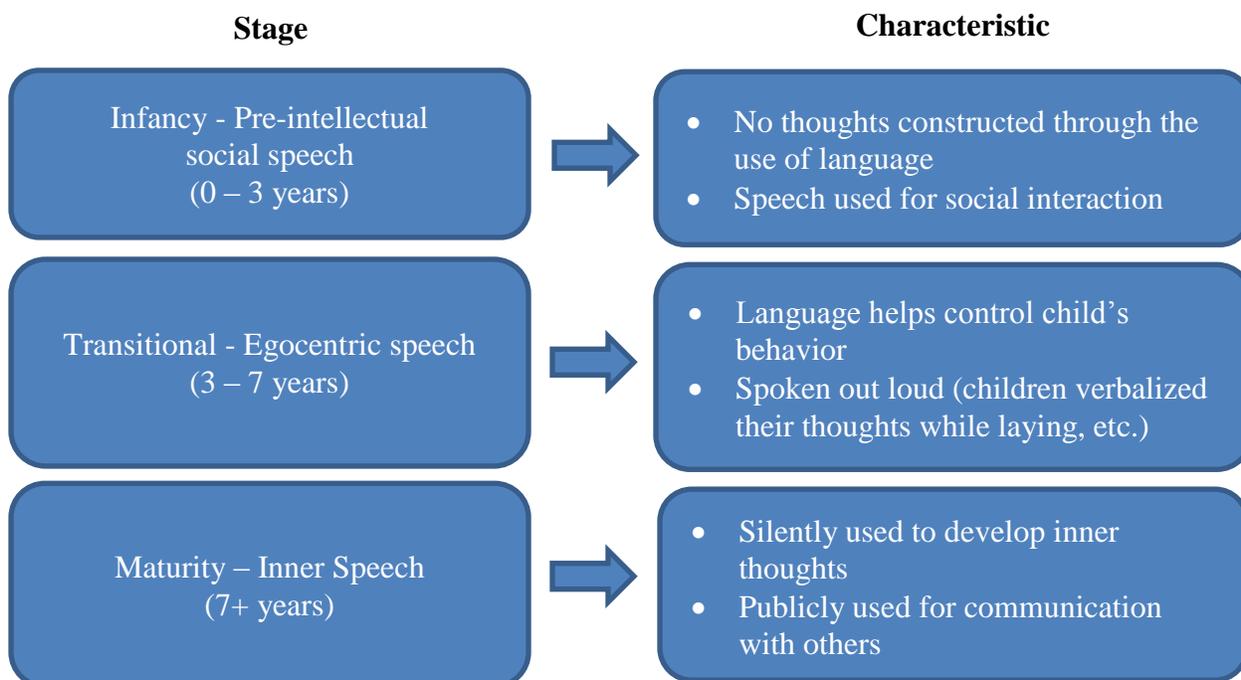
Written language is a discourse with a blank sheet of paper addressed to no one in particular. Therefore, writing requires translating oral speech into its written counterpart, and it requires the learner to participate in a dialogue in the absence of a conversational partner (Vygotsky & Kozulin, 1986). Emig (1977) also affirms the unique nature of written language as “a cluster of attributes that correspond uniquely to certain powerful learning strategies” (p. 122). Writing, which requires hand, eye, and brain coordination, reinforces learning in a multi-representational way (Emig, 1977; Gentry 2016; Presseisen & Kozulin, 1992; Vygotsky & Kozulin, 1986; Wolfe, 2001). Therefore, the development of written language is fostered by the learner’s ability to construct meaning from oral language and translate it to the written page. Written speech and oral speech originate in different areas of the brain and are separate, noninterchangeable linguistic functions (Emig, 1977).



*Figure 1.* Vygotsky – Thought and Language Diagram

The bridge between oral language development and written language expression is inner language (See Figure 1). Written language is an outflow of the inner language that is consciously constructed in the writing process (Emig, 1977; Presseisen & Kozulin, 1992; Vygotsky & Kozulin, 1986). Vygotsky postulated that young children speak aloud as they play,

count, and mimic others, and that as they mature the “outer” language becomes “inner” language directing their increasingly abstract thoughts (Dunn, 2005; Presseisen & Kozulin, 1992). Dunn (2005) further stated that inner language, a condensed and abbreviated speech, directs cognitive actions including communication, memorization, thinking, behavior, and abstraction (See Figure 2).



*Figure 2. Vygotsky – Thought and Language Characteristics*

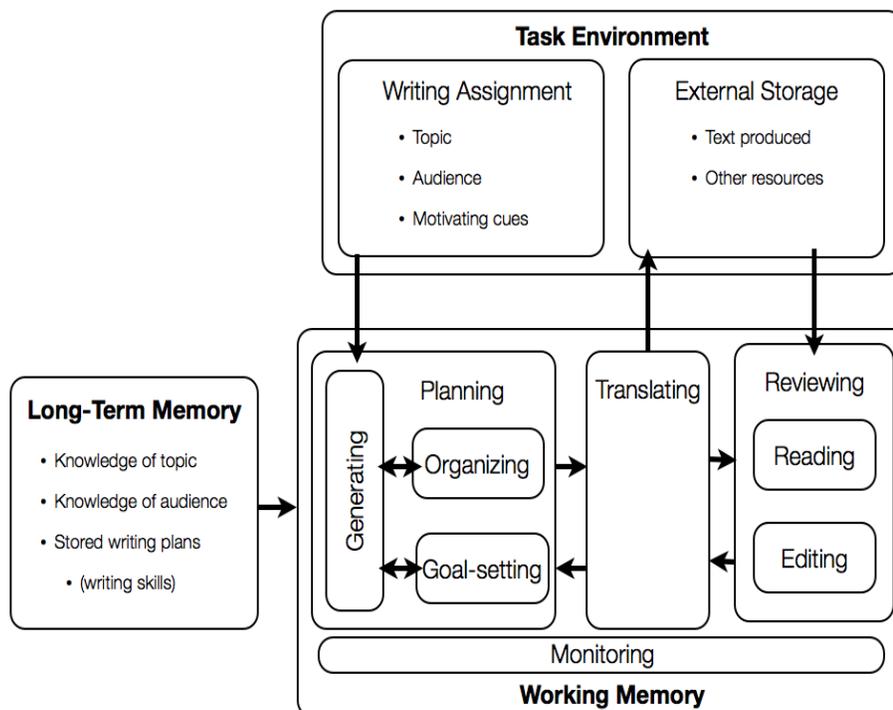
Vygotsky’s social constructivism theory states that young children learn from the social interactions they observe, and that through the skill of the mediator (teacher), the students are able to achieve higher levels of thinking and productivity than they could achieve on their own – the Zone of Proximal Development (Vygotsky & Kozulin, 1986). The student learns new concepts with manipulatives and other concrete experiences through the guidance of an adult mediator; with time and experience, this new understanding is internalized (Karpov & Bransford, 1995). Social constructivism centers on the premise that language is the integral tool that determines how the learner will learn to think - and that the teacher provides opportunities to

support the development of thinking and the acquisition of knowledge (Brandon & All, 2010; Dunn, 2005; Gallagher et al., 2015).

Contemporary social constructivists state that today's learners use written language in different ways, although it is inextricably connected to oral language. Traditional paper/pencil methods of written language and digital technology are both socially connected and culturally mediated (Gallagher et al., 2015). Today's learning environments have technology embedded in them. As a result, the social-constructivist theory, which was formulated before the digital revolution, has evolved to another theoretical perspective known as connectivism. Within connectivism, the social context of the learner's environment is bridged with the virtual world of knowledge available through non-human networks, such as the Internet (Bates, 2015; Gallagher et al., 2015). The role of the teacher is to connect the learner with this larger network of knowledge, which allows the learner to naturally assimilate knowledge (Bates, 2015; Gallagher et al., 2015; Kop & Hill, 2008). Just as traditional writing modes fit within the constructivist model, digital writing modes now fit within the connectivist model (Gallagher et al., 2015; Koohang, Riley, & Smith, 2009).

Complementing Vygotsky's construct is the cognitive process of writing theory developed by Flower and Hayes (1981). In this view, cognitive processes used in composing are distinct; the learner orchestrates and monitors his own thinking in a hierarchical fashion (see Figure 3). Upon receiving the writing task, the brain draws upon its long-term memory and acts as its own monitor in conducting the writing process by continuously planning, translating (putting thoughts on paper), and reviewing (Berninger et al., 1997; Flower & Hayes, 1981). Another key aspect of this construct is the focus on the writer's goal setting, which grows into an increasingly elaborate network of goals and sub-goals as the writer progresses (Flower and

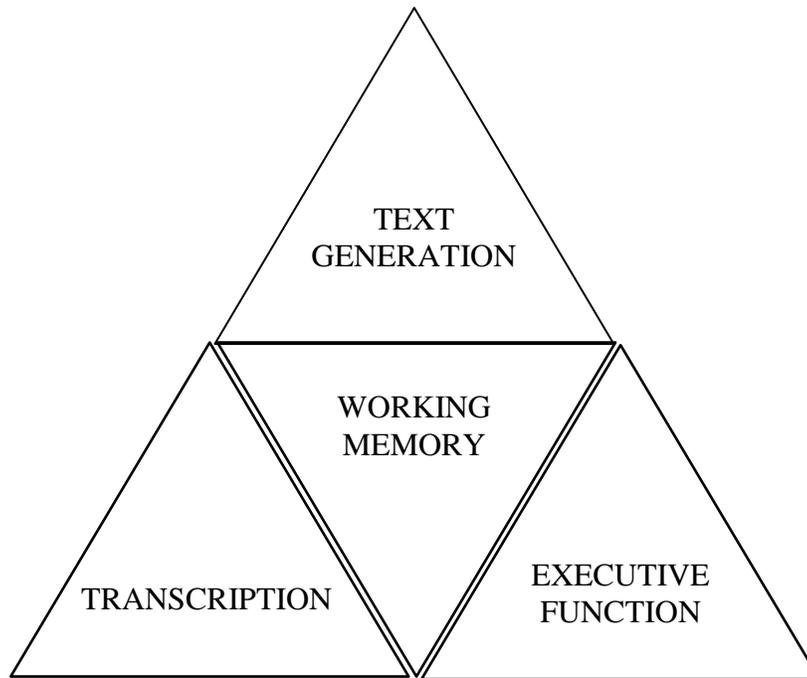
Hayes, 1981). Therefore, as the writer continuously consolidates, revises, and creates new goals he exemplifies the learning process in action.



Flower, L., & Hayes, J.R. (1981). A Cognitive Process Theory of Writing. *College Composition and Communication* 32: 365-387

Figure 3. Flower and Hays – The Cognitive Process of Writing Theory Diagram

A third construct that supports the cognitive nature of writing is Virginia Berninger’s “simple view of writing” (Berninger et al., 2002; Berninger et al., 2009; Connelly, et al., 2007). This construct is represented by a large triangle broken into smaller triangles (See Figure 4). The three triangles (components) represent transcription (handwriting, keyboarding, and spelling), executive functions (conscious attention, planning, reviewing, revising, and strategies for self-regulation), and text generation (words, sentences, and discourse). At the center of the triangle is working memory. In this view, all three components are dependent upon working memory. If more working memory is needed for one of the three components, the other two will not receive the cognitive resources needed (Berninger et al., 2002).



*Figure 4.* Berninger – The Simple View of Writing Diagram

### **The History of Handwriting in America**

Handwriting is considered foundational in learning the skill of writing and encourages growth in spelling, sentence structure, and fluent written expression (Armstrong, 2014; Berninger et al., 2002; Healy, 1994, 1999; Heavens, 2015; Hopkins, 2016). Handwriting has always been a prominent aspect of instruction in America's classrooms (Dougherty, 1917; Heavens, 2015; Myers, 2013). In the colonial period from 1600-1800, the ability to write in cursive indicated one's status in society and was recognized as an extension of one's personality (Hopkins, 2016; Thornton, 1996). Schools devoted exclusively to the purpose of teaching writing were common (Dougherty, 1917). Learning to write was a valuable skill, but during this time the process of teaching students to write was highly laborious. The quill pen was the main writing instrument, and it was difficult to create and maintain (Hopkins, 2016; Thornton, 1996).

Paper was costly and of poor quality, and most students used birch bark and ruled their own “paper” with a lead plummet (Dougherty, 1917).

The business world in the 18th and 19th centuries was largely governed by handwritten communication in the form of correspondence, contracts, bills of sale, financial ledgers, etc. As a result, men were adept at writing, whereas many women, especially those in a poorer class or the South, were not able to read or write (Hopkins, 2016; Thornton, 1996). As public-school education became popular in the mid to late 19th century for both boys and girls, the literacy rate (which included reading and writing) grew proportionally (Hopkins, 2016; Thornton, 1996).

In the early 1800s, cursive became an integral component of American curriculum (Armstrong, 2014; Dougherty, 1917; Eaton, 1985; Emblidge, 2007; Hopkins, 2016; Thornton, 1996). Penmanship during this time was considered highly decorative and pretty, but not practical. The main approach for penmanship during this time was developed by a businessman/philosopher, Platt Spencer. His handwriting approach, called the “Spencerian Key to Practical Penmanship,” became very popular; it was even more so after his death in 1864 (Emblidge, 2007; Hopkins, 2016; Thornton, 1996). This rigorous form of handwriting required great mental concentration, carefully prescribed hand and arm position, and repeated drill, although it wasn’t very practical (Armstrong, 2014; Eaton, 1985; Hopkins, 2016; Thornton, 1996). Making and repairing pens, mixing ink, and securing quality paper made handwriting even more arduous (Thornton, 1996). A breakthrough came in 1884 when George Parker and Lewis Waterman independently developed fountain pens (Emblidge, 2007).

While several other handwriting methods came and went, the Spencerian method ruled the schoolhouse until the 1880s when a new rival named Austin Palmer revolutionized the approach to penmanship. The Spencerian handwriting method with its artistic qualities was

replaced with the cultural demands for efficiency and speed (Sharp & Titus, 2016). The Palmer method, formally called “Palmer’s Guide to Business Writing” (Thornton, 1996), replaced the ornately formed Spencerian writing that required extensive lifting of the pen and exacting movements with an approach that was advertised as “plain and rapid” (Thornton, 1996). The contrast between the two approaches could not have been greater. One Spencerian writer said, “As the hand is only the instrument of the mind, it cannot acquire skill to execute beyond the power of the mind to conceive and direct...the letters should be analyzed and studied until the pupil can shut his eyes and see a perfectly formed letter on his eye-lids” (Thornton, 1996, p. 68). Palmer’s response to Spencer’s idealistic approach to writing was this: “If the movement is right, and its application right, the letter will take care of itself; and good letters must be the result” (Thornton, 1996, p. 68).

Palmer’s cursive alphabet, which is replicated in the Zaner-Bloser approach widely used today, emphasized muscle control through repeated movement drills and some use of rhythm by counting, much like the repeated exercises that an athlete performs in strengthening, toning, and building automaticity. Correct body position, hand position, and pencil grip were all continually reinforced. Classroom teachers were required to have the knowledge of proper handwriting skills so they could provide explicit instruction that focused on execution and form (Sharp & Titus, 2016). Critics of Palmer’s method cited loss of individuality by prescribing standardized formation of all the letters (Dougherty, 1917; Eaton, 1985; Thornton, 1996). The Palmer approach required the classroom teacher to be vigilant in having his/her students practice continually, and because it was extremely repetitive and unappealing to students, there were some educators who sought to replace it with an approach that they felt was “student-friendly” (Thornton, 1996).

In the early 20<sup>th</sup> century, manuscript surfaced as a streamlined option to cursive, particularly the Palmer Method. Marjorie Wise popularized manuscript when she arrived at Teacher's College, Columbia University, in 1922. Manuscript, a simplified printing method, was promoted as an easy and simple approach designed for children, and its popularity grew rapidly. Students made incredible gains in handwriting in a very short amount of time, and teachers were ecstatic about the results (Enstrom, 1969; Goodness, 1958; Thornton, 1996).

Cursive was in the DNA of the American culture, and the idea of teaching manuscript in the early grades and then having students transition to the more “adult” cursive was adopted (Eaton, 1985; Hagin, 1983). The Palmer Method faded in popularity in the mid-20<sup>th</sup> century, but Zaner-Bloser's cursive alphabet, which was originally developed by Charles Zaner in the same time period as Palmer's method, was used in nearly every classroom throughout the 20<sup>th</sup> century. Zaner died prematurely, but his business partner, Elmer Bloser, continued the business. Workbooks from the newly named company, Zaner-Bloser, were used weekly to teach, practice, and hone handwriting skills (Eaton, 1985; Goodness, 1958; Thornton, 1996). Like other school subjects and because of its importance, handwriting also stood alone on school report cards (Supon, 2009; Thornton, 1996).

Until the 1980s, the primary emphasis in handwriting curriculum was on letter formation and neatness. As the educational pendulum moved away in reaction to that approach, students were encouraged to express themselves on paper without concern for letter formation, spelling, writing conventions, or even legibility. This “free writing approach” focused the writing process on the cognitive skills needed to be a good writer. This change in focus led Flower and Hayes (1981) to develop their cognitive theory of writing.

Cursive's enduring popularity stems from the simplicity of moving from letter part to letter part and from letter to letter in a faster and easier fashion than any other style of writing (Enstrom, 1969). This relaxed, flowing approach to written communication has proven durable over longer writing sessions and with the broadest population of learners.

### **The Use of Handwriting in Today's Classrooms**

In the last 30 years, handwriting skills have drastically decreased due to the significant increases in technology (Dinehart, 2014; Heavens, 2015; Myers, 2013). As the culture has changed, so too has the emphasis on handwriting (Armstrong, 2014). Due to Common Core State Standards, cursive writing instruction has been minimalized; handwriting instruction is primarily centered on the teaching of manuscript with a greater and earlier emphasis being placed on the teaching of keyboarding skills (Berninger, 2013; Dinehart, 2014; Supon, 2009). The amount of practice time with a given methodology is directly related to the methodology most commonly used by the students. It would be surprising to see students of any age use cursive as their predominant, automatic method of writing if they had received limited or no instruction or practice with cursive (Berninger et al., 1998).

Instructional curriculum on cursive is still widely available, although its market has diminished significantly in favor of keyboarding as the primary means of written communication (An et al., 2015, Herold, 2016; Kumi-Yeboah & Campbell, 2015). One study indicated that only 12% of today's teachers reported taking a course on how to teach cursive writing. This lack of knowledge contributes to the challenge of providing adequate and consistent handwriting instruction (Blazer, 2010).

Handwriting instruction begins with the formal introduction of manuscript printing as early as preschool, but generally it begins in kindergarten or even first grade. (Koenke, 1986;

Zaner-Bloser, 2015a; Zhang, Hur, Diamond, & Powell, 2015). The common rationale for teaching manuscript first is that the printed letters in books use letters typeset in manuscript (Berninger, 2013; Myers, 2013). The amount of time per week devoted to handwriting instruction varies widely; group practice sessions can last from 15 to 30 minutes each (Koenke, 1986). For teaching manuscript, the Zaner-Bloser curriculum is the leader in the industry, although D'Nealian and other italic-style printing approaches are also widely used (Koenke, 1986; Saperstein Associates, 2012). Coupled with the idea of manuscript is the use of special, wide-lined paper and beginner pencils. Beginner pencils and crayons have a larger circumference than regular-size writing utensils, although research has not proven that the larger pencils promote better writing skills (Koenke, 1986; Moss, 1989; Readdick, 1994).

In schools where cursive is formally taught, instruction typically begins in late second grade or in third grade (Koenke, 1986; Myers, 2013). The number of years of instruction in cursive varies from school to school, but this instruction generally ends before middle school (Koenke, 1986; Myers, 2013; Zaner-Bloser, 2015b). At that point, students are typically allowed to write using their preferred method. While the optimal amount of time that should be devoted to handwriting instruction and practice is a topic of debate, Fitzpatrick, Vander Hart, and Cortesa (2013) suggest that short periods of instructional time and practice lead to deeper learning compared to infrequent or condensed practice. They further state that 75-100 minutes of handwriting instruction and practice each week has been found to be most effective.

The focus during handwriting instruction changes as the student matures. In preschool and kindergarten, students are taught to form manuscript letters, write their name, and practice other fine-motor skills such as cutting with scissors, drawing, etc. (Zaner-Bloser, 2015a). As the learner progresses in the lower elementary grades, forming letters the correct direction and

working on speed (fluency) becomes the focus. Cursive is then introduced and the upper elementary student gains in fluency and automaticity. At each grade level, spelling and written expression are connected to the handwriting process (Zaner-Bloser, 2015b).

There is a common myth that the lack of motor skills and muscular dexterity in young learners (i.e. kindergarten and first grade) prevents them from successfully being able to learn cursive, and therefore they should be taught manuscript instead (Bledsoe & Pilgrim, 2015). Blazer (2010) found that there can be a significant degree of confusion for a child to first learn manuscript and then move to cursive. When children learn to write, they often incorrectly hold the writing instrument with a three- or four-finger grip in a perpendicular position to the paper while exerting a significant amount of pressure. After practicing this incorrect grip/position for several years before formally learning cursive, the students may struggle with the change between writing methods. Unlearning bad habits is nearly impossible (Blumenfeld, 1994).

Writing difficulties are second only to reading difficulties as the cause of referral and placement in special education programs (Cahill, 2009). Cursive, if taught properly as the primary mode of writing, is highly effective for students with visual-motor deficits, commonly referred to as dysgraphia (Berninger et al., 1997; Berninger et al., 2009; Blumenfeld, 1994; Enstrom, 1969; Hagin, 1983; Maldarelli, Kahrs, Hunt, & Lockman, 2015; Rosenblum, et al., 2003). Instead of having dysgraphic students use computer-based handwriting remediation or a keyboard for writing assignments, the use of cursive has been found highly beneficial in helping them express their thoughts (Berninger et al., 2002; Berninger et al., 2009; Roberts, Derkach-Ferguson, Siever, & Rose, 2014; Roberts & Samuels, 1993).

## **Handwriting and the Development of Written Expression Skills**

The writing process begins when the toddler first holds a crayon or marker in his hand. The development of fine-motor skills is encouraged through those first attempts at drawing lines, tracing, scribbling, and coloring (Berninger 2013; Vygotsky & Kozulin, 1986; Zaner-Bloser, 2015a). Scribbling, drawing simple geometric shapes, and eventually “drawing” letters and/or numbers are seen as the natural progression of orthographic milestones. In one study, 77% of a group of three-year-olds were able to produce some letters of the alphabet, and by age five that number jumped to 95% (Dinehart, 2014).

In the preschool years, writing letters connects with letter recognition (McCarney et al., 2013). Preschoolers drawing letters without an understanding of the phonological connection with letter sounds and patterns is viewed as a precursor to writing (Berninger 2013; Dinehart, 2014). The act of writing has meaning, whereas mimicking the shapes of letters or numbers is rudimentary fine-motor practice. When the child learns the specific letters for his/her name and the corresponding sounds that written letters make, the formal process of writing begins. As the student progresses from kindergarten through the primary grades, the percentage of tasks that require a paper/pencil response increases proportionately. The complexity of the task also increases proportionally. Writing skills taught formally become “handwriting,” which is defined as writing that is legible and rapid. Good handwriting, according to the research, influences achievement in significant ways (Dinehart, 2014).

Teaching handwriting has also shown to facilitate the development of reading, communication, and fine-motor skills in the lower elementary grades (Berninger, 2013; Blazer, 2010; Heavens, 2015; Kandel & Perret, 2014; Seton, 2012; Zaner-Bloser, 2015a). In kindergarten and first grade, students practice writing both by sight and by memory – first the

letters of the alphabet, then words and sentences. These early writing skills are essential for academic achievement (Wollscheid et al., 2016). Legibility and automaticity are emphasized in the second and third grade, and during this time, cursive has traditionally been introduced (Thornton, 1996; Vachon, 2014; Worthington, 2011). It has been shown that composing text by hand promotes the brain's focus, encourages long-term memory, gives the brain time for reflection, and facilitates higher-order thinking skills (Alonso, 2015).

Handwriting requires skill in the physical movement needed to form symbols (letters) and alphabetic knowledge (Berninger et al., 2006; Blumenfeld, 1994; Datchuk, 2015; Feder & Majnemer, 2007). The brain's natural propensity is to draw curves and curls (cursive letters) as opposed to straight lines and perfect circles (manuscript letters). Cursive consists of three basic movements: the undercurve, the overcurve, and the up and down. Blumenfeld (1994) goes on to explain that the brain learns the initial method of writing well; it becomes the anchor point for the brain. This fact is commonly seen in America's children who learned manuscript first, were later introduced to cursive, and ultimately (naturally) went back to writing in manuscript as a teen and adult because that is the foundational method they were taught (Blumenfeld, 1994).

There are three key aspects of handwriting: fine-motor movement, visual-motor integration, and orthographic coding. Fine-motor movement refers to the small changes made in the position of the fingers, hands, and arms during writing. Visual-motor integration is the connection between what the brain is thinking and what the hand is doing. Orthographic coding is remembering the letter shapes, names, and sequence (Bounds, 2010; Feder & Majnemer, 2007). All three of these characteristics are foundational in the development of written expression (Datchuk 2015; Feder & Majnemer, 2007; Fitzpatrick et al., 2013).

Handwriting speed and automaticity are additional factors that impact writing proficiency, and these factors can be negatively impacted when a greater emphasis is placed on writing neatly (McCarney et al., 2013; Medwell, Strand, & Wray, 2009; Medwell & Wray, 2007). The hand gestures used in writing need to accelerate in order for handwriting movements to become automatic. The automaticity in writing allows the cognitive focus to be placed on other components of writing such as spelling, sentence structure, and content planning. Until writing becomes automatic, the retrieval of letters and their formation is a parallel cognitive activity with the retrieval of spelling words; it is this “dual thinking” that prevents students from writing proficiency (Fitzpatrick et al., 2013; McCarney et al., 2013). As students are able to visually anticipate upcoming letters and their formation while writing, the fluency of writing increases (Berninger, 2013; Berninger et al., 2002; Berninger et al., 2009). The process of writing fluency (spelling, sentence structure, and content planning) requires the automaticity of forming and writing letters.

Automaticity is a key indicator that cognitive resources have been “freed up,” which allows the learners to focus on the content of their writing. In one study, Berninger et al., (1998) found that about 39% of the students used a mixture of cursive and manuscript. It seemed that moving simultaneously between the two methods was an indication of automaticity with certain letters in both approaches. The percentage of students using cursive only was about 30%, and the percentage of students using manuscript only was about 31%. This study found that legibility and writing speed had little to no relationship to the handwriting method. The automaticity of forming and writing letters is dependent on the quality of direct instruction that the student receives, and most importantly, the amount of practice time the student has to achieve automaticity (Kandel & Perret, 2014).

Learning handwriting is a conceptual procedure (Berninger, 2012; Heavens, 2015; Ortiz & Wright, 2010). As students learn how to direct a writing utensil (crayons, pencil, pen, paintbrush), they are cognitively learning the procedures of how to use that utensil in producing units of written language. Handwriting skills must be explicitly taught and modeled (Berninger, 2012). As students repeatedly and consistently practice writing, the conceptual learning becomes easier, and automaticity is developed. It is this automaticity that is measured as writing fluency (Berninger et al., 2009; Heavens, 2015; Ortiz & Wright, 2010). Automaticity in the production of strokes, letters, and words gives the brain the freedom to understand the context of the task at hand (Arslan, 2012).

The lack of automaticity significantly affects the ability of young students to express ideas on paper (Berninger et al., 2009; Medwell & Wray, 2007). It is crucial that students develop smooth and efficient writing (Hagin, 1983; Medwell & Wray, 2007). The results of one study indicated that teachers were more concerned with legibility and speed of handwriting than neatness or handwriting style. In that same study, students generally considered pencil grip as important since it minimizes strain and fatigue when writing for extended periods of time (Hawkyard, et al., 2014).

Berninger (2012) asserts that handwriting is more than a motor skill; it is also a written language skill. She discusses the cognitive benefits of traditional handwriting from brain research. The following non-motor processes are engaged:

- Working memory – the brain views, analyzes, stores, and processes letters and written words as we read and write (Alonso, 2015).
- Naming letter/planning to form letters – long-term memory is enhanced and exercised long before the motor system writes them (Stevenson & Just, 2012).

- Visual and sensory information – as the brain’s “movie screen” produces and displays the letters, the hands and fingers move to duplicate them.
- Orthographic loop – the working memory integrates what the student’s brain says to write with the corresponding hand and finger movements as he writes. This also includes spatial awareness of the text going onto the page, choosing words, building sentences, and addressing one’s audience (Berninger, 2012; Cahill, 2009).

The role of working memory is important in both handwriting and composition. If primary-aged students have to devote a significant amount of their memory to letter formation and other components of handwriting, they may have little working memory left for generating ideas, selecting appropriate vocabulary, conceptualizing the narrative, etc. Younger learners are only able to do one cognitive function at a time, and automaticity must be developed intentionally and systematically, or the future skill of composing will suffer dramatically (Medwell & Wray, 2007).

Handwriting and written expression are not synonymous. Handwriting is much more than the fine-motor skill of writing on a page (Medwell et al., 2009). As Vygotsky (Vygotsky & Kozulin, 1986) and Berninger et al., (2009) found, handwriting is communicating language by hand; it is training the memory and hand to work synchronically to move from mental images, letter patterns, and then symbols to constructing words and complete thoughts (Berninger, 2012; Berninger et al., 2009; Vygotsky & Kozulin, 1986). Handwriting is an important part of written expression rather than an exclusive motor response to record writing (Medwell et al., 2009; Vygotsky & Kozulin, 1986). Furthermore, a lack of handwriting automaticity affects written expression. Handwriting enhances the student’s ability to write words, to synthesize thought, and to better recall what has been learned. This skill improves fluency and the quality of student

writing. Without being taught handwriting skills, research indicates that spelling, memory of content instruction, and summarizing skills are negatively affected (Medwell et al., 2009; Saperstein Associates, 2012).

Written expression is the complex placing of ideas, concepts, stories, etc., onto the written page (Medwell, et al., 2009; Vygotsky & Kozulin, 1986). Students need proficiency in handwriting, spelling, and composing to be successful writers (Berninger, 2012; Connelly et. al, 2007). These three components are interdependent, and each plays an integral part in the writing process. The handwriting aspect depends on generating and writing symbolic language spontaneously. This natural formation of written symbols directly contributes to writing fluency (Connelly et al., 2007; Vygotsky & Kozulin, 1986). Spelling is dependent on a well-developed working memory allowing the student to correctly recall words' spelling patterns (Berninger, 2012; Medwell & Wray, 2007). Medwell and Wray (2008) refer to studies done in England in the 1980s that connected cursive writing to improved spelling. Composing text is a higher-order skill than handwriting. As students become automatic in the act of handwriting, there is a reduced impact on cognitive load, which allows for a greater expression of ideas in written work (Berninger et al., 1997; Connelly et al., 2007). Those who advocate for cursive writing say that higher SAT scores are the result of students writing faster in cursive, yielding longer essays (Carpenter, 2007; Mattern, Camara, & Korbin, 2006).

### **Written Expression and Modes of Transcription**

Student writing is primarily done by one of two modes: through handwriting or by keyboard. Formal handwriting instruction begins in preschool, and formal keyboard instruction is typically introduced in the elementary grades with an emphasis on moving from the “hunt and peck” method to focusing on the screen with systematic touch-typing (Banister, 2010; Berninger,

2013; Berninger et al., 2006). Just as students need multiple years of practice in developing automaticity in handwriting, keyboarding requires repeated practice for mastery (Crook & Bennett, 2007). Therefore, the amount of explicit instruction given to each of these modes correlates directly with the skill level and speed demonstrated by students (Berninger, et al., 2009; Connelly et al., 2007; Hawkyard et al., 2014; Kanel & Perret, 2014).

In one study, the developmental differences between the three primary modes of transcription (manuscript, cursive, or keyboard) were analyzed for fluency and compositional quality. Student speed and accuracy increased as the students became older, but task speed varied based on the mode used. The results indicated slight differences between the modes used, with keyboarding being the fastest mode, especially with older students. The results also indicated that one cannot separate the language systems (reading, spelling, writing, listening, etc.) from one another as they are interconnected (Berninger, et al., 2006).

Proponents of cursive cite its connection with the development of specific brain functions, which foster reading skills (Bounds, 2010; Connelly et al., 2007; Grapes et al., 2014; Moge & Hartley, 2013; Willis, 2011). In other words, handwriting is not an end unto itself. Students who take notes by hand and not by keyboard are more likely to remember the information written for a longer period of time (Hotz, 2016; Stacy & Cain, 2015). In one study, most students who took notes by keyboard largely forgot the information they transcribed. By contrast, students who took notes by hand could remember what the teacher taught much longer (Mueller & Oppenheimer, 2014).

Keyboarding is changing the balance between the quantity and quality of note taking. The quantity of notes taken increases when using a keyboard, but in that mode, the note taker is acting more as a robotic transcriber. Students who take notes by keyboard tend to write them

down verbatim without distilling them in their own words. This results in poorer retention of the material. Therefore, the process of taking notes by hand provides a powerful indicator of retention and learning (Stacy & Cain, 2015). Notes taken by hand are not as long, but the synthesis of information is greater. When taking notes by keyboard, the amount of memory needed to complete the task is lessened because the note taker is simply moving data from one modality to the electronic page. The amount of time given to moving the information into long-term memory is diminished significantly when the information moves quickly from the stimulus (i.e. lecture) to the computer screen through keyboarding. Handwritten notes, which cannot be taken as quickly, require the note taker to distill the information into key thoughts and phrases – requiring more cognitive activity (Aragon et al., 2016).

In addition, cursive teaches spatial discipline. Manuscript promotes letter reversals and erratic spacing in comparison to cursive, which promotes joining letters in proper sequence in a connected fashion (Hopkins, 2016). The spatial discipline of writing in cursive creates neural pathways which develop patterns that facilitate correct spelling and hand movements – in much the same way that pianists or typists learn hand-movement patterns through repetition. Connected writing makes it nearly impossible to reverse letters, so the knowledge acquired by hand is transferred to learning how to read (Blumenfeld, 1994).

Many educators understand the intrinsic value of cursive and know that writing is highly cognitive, but because educators can't look inside the brain to empirically state what is happening, it is necessary to look to the world of neuroscience (Peverly et al., 2012). Handwriting requires writing with one hand, which activates the opposite side of the brain (Berninger, 2012). Conversely, keyboarding requires the use of both hands with communication to and between both sides of the brain (Berninger, 2012). The connections that support this

communication are not fully mature until adolescence, which could explain the advantage of handwriting over keyboarding in the elementary grades (Berninger, 2012; Kiefer et al., 2015). Gentry (2016) states that handwriting helps students develop cognitive structures for reading. The brain shares the same neural systems for reading as it does writing. Research (brain scans) on preschoolers has shown that learning manuscript helped students learn their letters. Letter learning sets up the foundational neural systems for reading. Writing also improves spelling ability and written composition.

Young students demonstrate superiority in writing letters versus typing letters, and the corresponding sensory-motor representations that are made through writing actually are quicker than typing (Kiefer et al., 2015). Recognizing and typing a letter by keyboard do not require the same involved, fine-motor response that writing by hand requires. As a result, the imprint made on the brain through keyboarding is not as substantial or beneficial as handwriting (Longcamp et al., 2008). According to Berninger (2013), “Writing letters improves letter recognition, as shown in brain imaging studies; and teaching handwriting leads to improved reading” (p. 1). She goes on to report that handwriting over keyboarding has the advantage in the speed of composing text (writing essays or copying notes, for example).

In addition, different neural pathways are activated based on mode of transcription, and work done by handwriting matches areas of the brain that are connected to literacy and writing (Berninger, 2013; Berninger et al., 2009; Longcamp et al., 2008; Sylwester, 1995). In one study, students’ experience with pencil versus keyboard revealed that second- to fourth-grade students wrote longer essays with faster word production rate by pencil than by keyboard (Berninger et al., 2009). The authors considered additional factors, including the students’ experience with pen versus keyboard, levels of language, and spelling ability.

The connecting of the writing process with cognition is highly reciprocal as the brain organizes, generates, evaluates, and revises continuously under the direction of another area of the brain that is monitoring and guiding the whole process (Dinehart, 2014). The writer's long-term memory facilitates the knowledge of the topic, the audience, and the writing plans (Flower & Hayes, 1981). Mangen and Balsvik (2016) explain the paradigm of "embodied cognition" and the development of writing skills from this viewpoint. Embodied cognition is a framework that combines modality-specific systems (vision, audition, olfactory, and gustatory); the body and its movements, postures, and actions; the physical environment; and the social environment in understanding the nature of cognition. Cognition is not limited to what is happening in the brain but is interconnected and dependent on the body and the physical environment. Within this framework, the learner's perceptual and motor abilities are connected with memory, language, and emotion. The brain, body, and environment work together in creating a real time interaction of cognitive activity as opposed to the traditional view that the brain alone is the central processing unit (Berninger et al., 2002; Mangen & Balsvik, 2016).

The complexity of writing is greater with the use of the traditional handwriting mode versus the use of a keyboard (Berninger et al., 2009; Datchuk, 2015; Mueller & Oppenheimer, 2014). As the writer forms letters by hand, the brain "feels" the stroke, visualizes the letter, and creates the neural connection for future reference. In keyboarding, hitting a key produces the visual image on a screen (not the brain), so the visual imprint is separated from the visual display. In other words, the symbols produced by handwriting resulted in greater memory of those symbols than ones produced by keyboard. Writing by hand produces continual, kinesthetic feedback to the brain, whereas tapping keys on a keyboard does not encode this information on the brain (Datchuk, 2015; Mangen & Balsvik, 2016; Mueller & Oppenheimer, 2014).

Grapes et al., (2014) state that the use of a keyboard serves only to associate a letter with a directional movement relative to the fingers. Armstrong (2014) states, “Brain imaging studies reveal that multiple areas of the brain become co-activated during the learning of cursive of pseudo-letters, as opposed to typing or just visual practice” (p. 3598).

A comparison study by Mueller and Oppenheimer (2014) found that the processing that occurs while taking notes by hand improves learning and retention over notes taken by keyboard. An important result of this study was that students who took notes by keyboard tended to transcribe information verbatim, whereas the students who took notes by hand synthesized the information, which resulted in higher scores on tests of both factual and conceptual understanding (Mueller & Oppenheimer, 2014). Notes taken on paper are more beneficial in moving the information from short-term to long-term memory for retention (Duran & Frederick, 2013). While the transmission speed (the ability to write smoothly, coherently, and quickly) is significantly faster for adults when using a keyboard, at the elementary level, students produce sentences more quickly when writing with a pencil and paper than when composing on a keyboard (Grapes et al., 2014).

As teachers encourage students to take notes and do other written work using tablets and laptops, the use of handwriting, particularly cursive, has become less emphasized and is largely considered irrelevant (Cahill, 2009; Grapes et al., 2014). The focus of instruction has transformed to the development of technological skills and knowledge (Sapperstein Associates, 2012; Sharp & Titus, 2016; Supon, 2009). The Common Core State Standards, which originated in 2010, have been approved by 45 states and govern the educational benchmarks of nearly 80% of the nation’s students. These comprehensive standards have largely eliminated handwriting, only calling for legible manuscript writing in grades kindergarten through second grade

(Universal Publishing, 2012; U.S. Department of Education, 2016). In the place of handwriting instruction, the Common Core State Standards set into place criteria for teaching keyboarding skills (U.S. Department of Education, 2016). As a result of this change in focus, the use of handwriting (and cursive in particular) has been marginalized.

The use of cursive is declining because more and more work is being done on tablets and computers, including compositional writing. Researchers are connecting the decrease in compositional writing ability to reductions in teaching cursive in the classroom (Berninger et al. 2002; Mattern et al., 2006). According to the National Center for Educational Statistics (2012), nearly 75% of the nation's seniors lack basic proficiency in compositional writing, whereas only 2% of those students were classified as "advanced" in their writing skills. Despite these findings, The National Assessment of Educational Progress requires eighth- and eleventh-grade students to compose on computers, and fourth grade students will be doing the same in future years (National Center for Educational Statistics, 2012).

The use and benefits of cursive writing are not without controversy. Bromley (2010) paints a vivid picture of technology's power and the fragility and irrelevance of traditional means of communicating by written text. Claiming that speech will replace writing altogether, Bromley (2010) states that, "Software will free us from the physical tension of writing and it will be freeing once we are over the awkwardness of speaking into a machine" (p. 102). Bromley goes on to say that the need for critical thinking skills surpasses the need for skills in handwriting or even keyboarding. According to Blazer (2010), handwriting is now obsolete, especially as there is no inherent value in writing by hand when the computer can do the job faster and more legibly. The author also states that because learning cursive is hard, it should be avoided.

A movement has been building to restore handwriting to its former prominence (Berninger, 2012; Bounds, 2010, Datchuk, 2015; Grapes et al., 2014; Kelly, 2006; Universal Publishing, 2012; Willis, 2011). Several states that adopted the Common Core State Standards either have passed legislation to add standards related to handwriting or have given local school districts the authority to add handwriting standards themselves (Universal Publishing, 2012). The cognitive benefits of handwriting continue to be empirically validated, and today's classroom teachers are again recognizing the integral value of traditional modes of transcription in the learning process (Berninger, 2012, Duran & Frederick, 2013, Mueller & Oppenheimer, 2014).

### **The Use of Technology in Teaching and Learning**

The use of technology in most classrooms is commonplace (An et al., 2015; Black, 2015; Fuentes, An, & Alon, 2015; Herold, 2016). "Technology" itself is a relative term since there was a time when ballpoint pens and typewriters were considered technological advancements. Typewriters became popular during the 1920s and continued through the 1980s when they were replaced by early versions of computers. During that time, the typewriter became a reason not to teach handwriting (Eaton, 1985; Thornton, 1996). The process of learning how to compose text using the typewriter requires essentially the same skills as writing using a keyboard, although keyboarding skills learned under the guidance of a teacher are significantly better than such skills learned independently (Shorter, 2001).

Today, SMART Boards, computers, tablets, and a myriad of apps are available to enhance teaching and learning (An et al., 2015; Fuentes et al., 2015; Mentor, 2015). The technology revolution has transformed teaching and learning (Ciampa & Gallagher, 2013; Connelly et al., 2007; Myers, 2013). With the implementation of Common Core State Standards,

elementary students in 45 states are to be taught keyboarding skills (“Keeping cursive in the classroom,” 2013). Teaching keyboarding skills prepares students for a variety of career fields and allows them to learn through a variety of engaging presentation styles. Proponents of the use of technology in the classroom highlight the teaching of critical thinking and problem-solving skills; the increased use of collaboration, interaction, and participation; and an overall greater technology proficiency in the modern world (Carruthers, Martinovic, & Pearce, 2015; Edwards-Groves, 2012).

Giving students practice with multitasking and further developing hand-eye coordination and visual-spatial skills are also seen as tangible benefits for the use of technology (Sardone & Devlin-Scherer, 2010). Another use of technology, specifically video games, has been found to be a highly effective way to promote collaboration within the classroom. Students enjoy multi-player games over single-player games as a way to promote collaboration and competition. It was found that this approach fostered greater social interaction within the learning setting (An et al., 2015; Kumi-Yehoah & Campbell, 2015; Trespalacios, Chamberlin, & Gallagher, 2011). For young adolescents, keyboarding may have an advantage in the speed of composition because efficient cross-hand coordination is developed (Berninger, 2013).

Through the use of technology, today’s students have access to an unlimited amount of information. Teachers and parents alike are concerned that having instant access to information hampers students’ critical thinking skills and the development of adequate writing skills (Ciampa & Gallagher, 2013; Mattern, et al., 2006). The proliferation of apps covering a significant range of children’s stories and games is changing the way children learn to read. Fewer parents are reading paper books to their children; electronic devices are changing the cultural context of reading (Merchant, 2015). Many parents understand that technology has its place, but recognize

that boundaries must be set to encourage active exploration of the natural world (Plowman & McPake, 2013).

Student engagement is greatly enhanced by the use of mobile devices in the classroom. This is due in part to the novelty of the technology and the immediate feedback derived from it. Teachers who regularly utilize technology in the classroom note that students' perseverance on difficult tasks is greater than what would have occurred on handwritten tasks (Ciampa & Gallagher, 2013). Several studies have analyzed student engagement, understanding of vocabulary, and comprehension of stories between paper books and e-books using an iPad or tablet. The animations provided by the e-book format provide rich visual and auditory cues that enhance learning vocabulary and overall story comprehension. Students using paper books and e-books are equally distracted during reading activities, but the level of student engagement and motivation is significantly higher for students utilizing the digital text (Estevez-Menendez, An, & Strasser, 2015; Hong et al., 2015).

Students need to master the organization of their thoughts in a handwritten fashion prior to the introduction of new technology (Peterson & McClay, 2012). Digital storytelling is growing in popularity as a means of encouraging written composition through a mixed format. This method is described as creative writing that is first done in a traditional fashion with paper/pencil and then transferred to keyboarding. The student's work may include pictures, audio files, video, music, etc., with its final form as a movie. This emerging approach facilitates creativity and critical thinking, fosters confidence, and promotes student engagement. Digital storytelling appears to benefit students who struggle with reading as well (Morgan, 2014). Because the creation of an iMovie, as one example, involves a tremendous amount of

collaboration and dialogue, the struggling reader is better able to understand the sequence of the story in this fashion as opposed to traditional dialogue and discussion.

Changing approaches from paper to keyboarding is also used in Canadian schools (Kocsis, 2016; Peterson & McClay, 2012). Teachers direct students to compose by hand when writing in notebooks and then to use computers as the final stage for completion, which includes a “clean” copy, often with clip art illustrations. Classroom teachers deliver explicit instruction to students on how to write drafts by hand. Students then receive and provide feedback among their peers and with the teacher before ever using a computer to retype the drafts into the final format (Peterson & McClay, 2012). The primary assumption in this approach is that students find it easier to organize and plan when writing by hand (Peterson & McClay, 2012). It is thought that writing by hand is more natural and forces the student to do more independent thinking without the assistance of spell checks and grammar checks (Kocsis, 2016).

One of the challenges of technology integration is that the students are ahead of the teachers in understanding and intuitively using technology. The age of the teacher may significantly affect the level of technology integration in the classroom. Ciampa and Gallagher (2013) found that younger teachers more quickly adapt to new technology than do older teachers. In addition, more professional development for teachers on the integration of technology in the classroom is needed (Bledsoe & Pilgrim 2015; Young, 2016). Because of the lack of professional development and the resistance that older teachers manifest in embracing change, today’s digital natives, who are adept with technology, often reverse the typical classroom roles. Teachers largely become the students, and students enjoy demonstrating what technology can do (Ciampa & Gallagher, 2013). Through the use of reciprocal teaching and Vygotsky’s Zone of

Proximal Development (Vygotsky & Kozulin, 1986), students and teachers readily learn from one another.

### **The Future of Cursive**

In 2001, the U.S. Congress approved the No Child Left Behind Act (NCLB) to strengthen the nation's public schools. Among other landmark changes, this comprehensive educational reform included the development and implementation of national education standards designed to provide continuity and consistency in all public schools across the land (Great Schools, 2016; U.S. Department of Education, 2017). The Common Core State Standards originated in 2010 and were eventually approved by 45 states. At their height, these comprehensive standards governed the educational benchmarks of nearly 80% of the nation's students (Universal Publishing, 2012; U.S. Department of Education, 2016). These comprehensive standards largely eliminated handwriting instruction in favor of a significant focus on the development of math and reading skills.

As the pressure increased for students to perform well on annual assessments tied to the Common Core Standards, individual states sought ways to replace the national standards with their own benchmarks for learning (Breiner, 2015; Dianis et al., 2015). In December 2015, the Every Student Succeeds Act (ESSA) replaced the longstanding No Child Left Behind Act of 2001. This law gave states even more flexibility in developing their own benchmarks (U.S. Department of Education, 2017). As a result of this freedom and due to the encouragement of neuroscientists and educators alike, lawmakers in several states have already passed legislation adding handwriting standards back into the mandated curriculum (American Handwriting Analysis Foundation, 2016; Armstrong, 2014; Berninger, 2013, Gentry, 2016; Hopkins, 2016; Klemm, 2016; Saperstein Associates, 2012; Trond, 2011).

The two primary modes of transcription, keyboarding and paper/pencil, are competing for dominance and significance in today's classroom (Armstrong, 2014; Berninger, 2013; Bounds, 2010; Herold, 2016; Karavanidou, 2017; Mueller & Oppenheimer, 2014). A growing number of studies provide validation that there are benefits for both modes (An et al., 2015; Berninger et al., 2009; Grapes et al., 2014; Moge & Hartley, 2013). Cursive has been shown to enhance the ability to write words, to synthesize thought, and to better recall what has been learned (Karavanidou, 2017). This skill improves fluency and the quality of student writing. Without being taught handwriting skills, students are being negatively affected in spelling, memory of content instruction, and summarizing skills (Karavanidou, 2017; Saperstein Associates, 2012). The slower pace of handwriting allows the inner voice more time for rehearsing and greater retention (Alonso, 2015). The cognitive benefits of handwritten work over typed work have been validated empirically, and cursive writing instruction in America's classrooms should be reinstated and regularly utilized (Berninger et al. 2002; Bounds, 2010; Connelly et al., 2007; Grapes et al., 2014; Karavanidou, 2017; Mattern et al., 2006; Moge & Hartley, 2013; Willis, 2011).

## **Conclusion**

The process of handwriting and written expression is highly complex and involves fine-motor movement, visual-motor coordination, and other cognitive skills (Berninger et al., 2009; Datchuk & Kubina, 2013; Flower & Hayes, 1981). The theoretical framework emphasizing the efficacy of traditional modes of transcription begins with Vygotsky's construct of thought and language as the foundation (Emig, 1977; Presseisen & Kozulin, 1992; Vygotsky & Kozulin, 1986). Building upon Vygotsky's construct is the cognitive process of writing theory developed by Flower and Hayes (1981). This theory highlights the cognitive processes that the

learner uses in composing whereby the writer orchestrates and monitors his own thinking in a hierarchical fashion (Berninger et al., 1997; Flower & Hayes, 1981). A third construct that supports the cognitive aspects of writing is Virginia Berninger's simple view of writing.

Berninger postulates that writing's three components – transcription, executive functions, and text generation – are all heavily dependent upon working memory (Berninger et al., 2002; Berninger et al., 2006; Berninger et al., 2009). These three constructs form a cohesive framework for understanding written expression and the importance of traditional modes of transcription (Bounds, 2010; Hotz, 2016; Mueller & Oppenheimer, 2014).

Handwriting instruction has always had an important place in America's classrooms (Dougherty, 1917; Heavens, 2015; Myers, 2013; Thornton, 1996). Introduced in the colonial period, cursive writing was primarily taught to boys, but handwriting was laborious (Hopkins, 2016; Thornton, 1996). The complex and artistic approach of Spencerian handwriting was introduced in the 1800s. By the 1880s, the fountain pen replaced the quill pen, and the practical and efficient Palmer method became ubiquitous in America's classrooms. Early in the 20<sup>th</sup> century, manuscript handwriting was introduced; eventually, the Zaner-Bloser method of cursive writing replaced the Palmer method as the most utilitarian approach of teaching handwriting skills (Eaton, 1985; Goodness, 1958; Hopkins, 2016; Thornton, 1996).

As the use of technology expanded, the role of traditional handwriting has steadily decreased (An et al., 2015; Berninger, 2013; Dinehart, 2014; Supon, 2009). Manuscript writing is still taught in the early primary grades, but curriculum standards no longer include cursive handwriting as a required skill (Karavanidou, 2017; Myers, 2013; Zaner-Bloser, 2015a). While student engagement is greatly enhanced by the use of technology, the benefits and importance of traditional handwriting skills is regaining significance. As a result, the two primary modes of

transcription, keyboarding and paper/pencil, are competing for dominance (Armstrong, 2014; Berninger 2013; Karavanidou. 2017; Mueller & Oppenheimer, 2014). It is vital that today's educators understand the importance of cursive writing and its benefits.

Technology has captured the spotlight in today's classrooms, but the cognitive benefits of teaching cursive are well documented (Berninger et al., 2009; Bounds, 2010; Willis, 2011). Finding ways to enjoy the benefits of both modes could provide the best opportunities for today's digital natives and could inform the educational community regarding the roles that traditional and digital modes of transcription should play in the greater educational landscape (An et al., 2015, Menard, 2010; Moge & Hartley, 2013).

## **Chapter III**

### **Design and Methodology**

#### **Introduction**

Technology is advancing rapidly, and it permeates every aspect of society. These advancements are found in today's classrooms as well (Ciampa & Gallagher, 2013; Fuentes et al., 2015; Heavens, 2015; Herold, 2016; Myers, 2013). Classroom teachers now have both traditional and technological ways to engage students in learning, particularly in the area of written expression. Tasks that have traditionally been done with paper/pencil can be done through keyboarding, and schools across America are moving rapidly to this approach to learning (An et al., 2015; Mentor, 2015; Reichert & Mouza, 2015). While there are perceived benefits of each writing mode, additional research is needed to specifically understand the cognitive benefits of cursive writing, which would then provide a clear rationale for retaining it in today's curriculum.

Chapter 3 provides further detail and explanation of the theoretical framework, the research design, and the approach used for data collection and analysis. It is important to provide a solid theoretical basis for the researcher's study and to connect it to existing empirical data on the topic (Creswell, 2015; Ravitch & Riggan, 2017). A mixed-methods design was selected to provide the researcher with multiple sources of data.

#### **Research Questions**

It is important to discern if there are benefits for the use of cursive over digitally produced work and if there is an empirical rationale for retaining handwritten work in today's classrooms. To accomplish this, the researcher sought to answer the following three questions:

1. Do student-generated stories demonstrate a greater fluency and compositional quality in cursive than what is produced by keyboard?
2. What are teachers' attitudes and beliefs regarding the value and usage of cursive compared to the value and usage of keyboarding?
3. What are students' attitudes and beliefs regarding the value and usage of cursive compared to the value and usage of keyboarding?

### **Theoretical Framework**

The primary theoretical approaches supporting the framework for this study are Lev Vygotsky's social constructivism theory (Vygotsky & Kozulin, 1986), the "cognitive process of writing" theory developed by Flower and Hayes (1981), and Virginia Berninger's "simple view of writing" theory (Berninger et al, 2002). Vygotsky's construct is based on the premise that language development is highly social and that through the rich interactive nature of communication, the young learner first becomes proficient in oral language (Plowman & McPake, 2013). Verbal language is the foundation for building written language and the cognitive structures of learning (Brandon & All, 2010). As the learner matures, oral language becomes inner language. Inner language is an abbreviated form of oral language that silently and more efficiently directs the child's cognitive actions (Dunn, 2005, Vygotsky & Koszulin, 1986).

The development of inner language provides the framework for written language, and the learner translates inner language into written language through the intentionality of the teacher or mediator (Dunn, 2005; Presseisen & Kozulin, 1992; Vygotsky & Koszulin, 1986). At the heart of Vygotsky's social constructivism theory is the premise that children learn from the social interactions they observe, and that through the skill of the mediator (teacher), the student is able to achieve higher levels of thinking and productivity than on their own (Vygotsky &

Kozulin, 1986). It is this type of learning that encourages cognitive development; the learner's brain begins to understand concepts developmentally. This supposition is in opposition to the developmental constructivism approach of Jean Piaget, which asserts that the child has to go through developmental steps to achieve new learning (Karpov & Bransford, 1995).

Social constructivism in the new millennium has evolved into a new theoretical perspective known as connectivism. Just as the brain utilizes many cognitive skills in accomplishing the complex task of writing (Flower & Hayes, 1981; Gentry, 2016; James & Englehart, 2012; Ortiz & Wright, 2010; Wolf, 2001), connectivism asserts that the learner is now able to utilize the virtual world of knowledge available through non-human networks, such as the Internet (Bates, 2015; Gallagher et al., 2015). Within connectivism, the virtual world provides the rich, social interaction that face-to-face conversation provides. Digital writing modes fit within the connectivist model, just as traditional writing modes fit within the constructivist model (Koochand, Riley, & Smith, 2009).

The cognitive-process theory of writing directly supports the proposed research questions. Developed by Flower and Hayes (1981), the cognitive-process theory of writing asserts that the writing process is highly complex and is directed by the learner's own thinking in a hierarchical fashion. Throughout the writing process, the brain acts as its own monitor in planning, getting thoughts on paper, reviewing, and goal setting (Berninger et al., 1997; Flower & Hayes 1981). In contrast to other writing theories that see the writing process as stages of completion in a linear fashion, Flower and Hays (1981) assert that the writing process involves many different "sub-processes" occurring simultaneously. The connecting of the writing process with cognition is highly reciprocal as the brain organizes, generates, evaluates, and revises continuously under the direction of another area of the brain that is monitoring and guiding the

process. The writer's long-term memory facilitates the knowledge of the topic, the intended audience, and the writing plans.

One key aspect of the cognitive theory of writing is translating. Translating is defined as getting thoughts on paper. Using the student's knowledge and experience in moving thought to paper, the act of translating is highly dependent on the student's working memory (Flower & Hayes, 1981; McCutchen, 1996). In the student's working memory, the writer's knowledge of the topic and of the intended audience is merged with writing plans and ideas, which are then constructed in a meaningful way on the page (Hefferman, 2014). McCutchen (1996) asserted that there was a direct correlation or relationship between the student's low-level transcription skills (i.e. spelling, letter formation, etc.) and the working memory's capacity to generate high-level composing skills, such as generating fluent text.

The social constructivism theory, the cognitive process of writing theory, and the "simple view of writing" theory work together as they collectively focus on the interdependent relationship between thinking and writing. Vygotsky's construct provides the temporal view, tracing the progression of verbal language to inner language (Dunn, 2005; Vygotsky & Koszulin, 1986). Inner language is the catalyst allowing the student to communicate in writing to an absent person – the blank piece of paper. As the pencil takes to the paper, the cognitive process of writing theory provides the depth and detail to discern what is happening cognitively during the writing process (Flower & Hayes, 1981). Berninger's "simple view of writing" with its three components of transcription all focused on working memory fits well with social constructivism and the cognitive model and provides a cohesive framework for the development of written expression.

## Research Design

There are a number of effective research designs that can be utilized to answer research questions (Creswell, 2015, Hoepfl, 1997; Marshall & Rossman, 2016; Plano Clark & Ivankova, 2016). The methodology selected for this study was a convergent mixed-methods approach. The goal of a mixed-methods design is to benefit from the strengths of both quantitative and qualitative approaches (Johnson & Onwuegbuzie, 2004; Neuman, 2006; Plano Clark & Ivankoa, 2016). This process provides the most informative and useful research results (Johnson, Onwuegbuzie, & Turner, 2007). The use of a mixed-methods design provided the greatest flexibility in understanding the use of cursive and the growing influence of written work produced by keyboard.

To address Research Question 1 related to writing fluency and compositional quality of written work using both modes of transcription, each student participant wrote two stories using the *Test of Written Language-4* (TOWL-4). One story was written in cursive, and one story was written by keyboarding. The TOWL-4 is a nationally normed test that provides age and grade-based norms. The TOWL-4 manual furnishes composite (standard) scores and percentile ranks using seven different subtests. The seven subtests are grouped to measure two main aspects of written language: contrived writing and spontaneous writing. The results of the first five subtests (Vocabulary, Spelling, Punctuation, Logical Sentences, and Sentence Combining) are combined to determine the student's contrived writing. The results of the final two subtests (Contextual Conventions and Story Composition) are combined to determine the student's spontaneous writing ability. The researcher used the final two subtests of the TOWL-4 for this study (See Appendix K).

Scoring for the final two subtests is based on a single, spontaneously written story. The student is directed to write a story in response to a stimulus picture. Points are earned on Contextual Conventions (Subtest 6) for meeting requirements related to orthographic (e.g. punctuation, spelling, capitalization) and grammatic (e.g. sentence structure and complexity, word choice and length, paragraph formation) elements. The same student-generated story is then used to earn points on Story Composition (Subtest 7); it measures “the ability to write in a logical, organized fashion; to generate a specified theme or plot; to develop a character’s personality; to employ an interesting and engaging prose; and to use mature and appropriate vocabulary” (Hammill & Larsen, 2009, p. 50).

The Spontaneous Writing composite score is represented by a standard score and a percentile rank that correspond with other norm-referenced diagnostic tests such as the *Wechsler Intelligence Scale for Children-5* (WISC-V) and the *Woodcock-Johnson IV Tests of Cognitive Skills* (WJ-IV COG). There are two versions of the TOWL-4; Form A of the test was used for the cursive story, and Form B of the test was used for the keyboard story (See Figure 5).

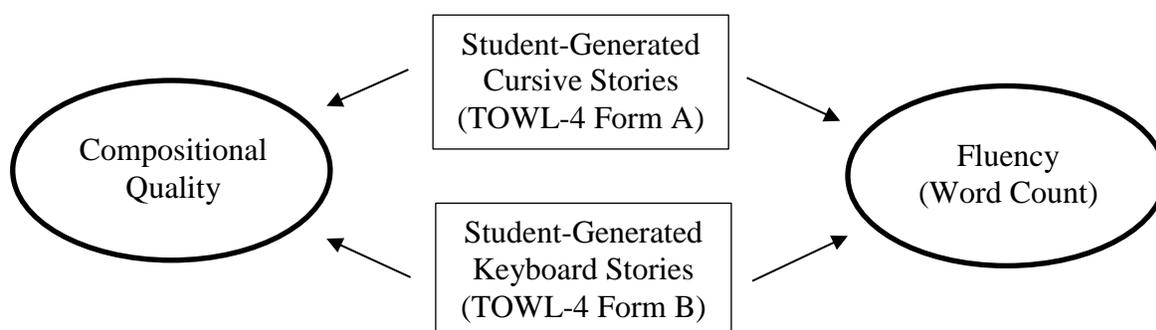


Figure 5. Use of the TOWL-4 for Answering Research Question 1

One of the primary goals of the study was to compare the differences in fluency and compositional quality between two modes of transcription (cursive and keyboard) among fifth- and eighth-grade students. The standardization of the TOWL-4 includes a 5-minute time

limit for planning the respective story and a 15-minute time limit for writing the respective story. In accordance with the standardization of the testing instrument, the participating teachers were provided a verbatim script to administer the student-generated stories. The script also included instructions on administering the student and teacher surveys.

To address Research Question 1 regarding fluency of writing, the word count of each student's stories was recorded by mode of transcription and by grade level. For the second half of Research Question 1, the researcher determined the compositional quality by mode of transcription and by grade level using the Spontaneous Writing composite index score (See Figure 5). The TOWL-4 results from this study are included in chapter 4.

In addition to writing two stories using the TOWL-4, student participants completed a 23-question survey developed and validated by the researcher that included 18 Likert-scale questions using a five-point scale rating from one to five (strongly agree to strongly disagree). The results from the Likert-scale survey questions were analyzed to understand student beliefs about: 1) perceived benefits of using cursive for taking notes and writing compositions, 2) their writing habits (taking notes, etc.) when a choice of handwritten or typed modalities for writing are both available, and 3) their attitudes and beliefs about the use of cursive and keyboarding. The student survey also included two open-ended questions to provide additional insights on student opinions regarding modes of transcription used in day-to-day schoolwork. The final three questions were related to demographics.

The researcher also included classroom teachers in the study. The six fifth-grade general classroom teachers and the three eighth-grade language arts teachers of the student participants were asked to complete a 30-question survey. The teacher survey was used by permission from a previous study (Heavens, 2015). The survey included 18 Likert-scale questions using a

five-point rating from one to five (strongly agree to strongly disagree), 7 open-ended questions, and 5 questions related to demographics. The comprehensive results of the teacher surveys were analyzed to understand teacher beliefs and practices regarding: 1) the use of cursive versus keyboarding in their classroom, 2) the amount of instruction dedicated to cursive and keyboarding, and 3) the rationale for/against the use of both cursive and keyboarding into the future.

Additionally, qualitative data from a purposeful sample of teacher participants was collected using follow-up phone interviews. This data provided a more in-depth understanding of individual teacher beliefs and attitudes about cursive and any perceived benefits for using it as an integral approach to written expression in the classroom. As classroom teachers evaluate students' writing fluency and compositional quality, they are in the unique position to provide their opinions and observations from both traditional and digital means of communication.

The students' perceptions and the teachers' professional judgments provided valuable qualitative information. Open-ended survey questions were included on both the student and teacher surveys. Collecting both quantitative and qualitative data provided a robust approach to answering the research questions. Validating and presenting evidence through triangulation was critical. Using methodological triangulation enabled the researcher to substantiate the phenomenon from multiple sources of data and to provide cohesive conclusions to guide future practice (Newman, 2006; Plano Clark & Ivankova, 2016).

## **Participants**

The study was designed to collect empirical data on the modes of transcription from student-generated written work and insights on the attitudes and beliefs of classroom teachers and students about the benefits and practices of using cursive and keyboarding. Classroom

teachers have unique and identifiable attitudes and beliefs on educational topics. They are keenly aware of the advancement of technology in the classroom and are able to address the impact these changes have on students' learning (Kagan, 1992; Heavens, 2015; Sharp & Titus, 2016).

It is also beneficial to gain students' perspectives on the value of cursive and keyboarding (Chemin, 2014). Today's students are adept with technology in the classroom and still have exposure to, and experience with, traditional modes of writing. As the primary method of writing moves from handwriting to keyboard, it is important to understand the best practices in education based on empirical data. Fifth-grade students and eighth-grade students were intentionally selected for this study due to their experience in using both cursive and keyboarding. Because students of these ages have had sufficient direct instruction and practice in using cursive and in keyboarding, their opinions were highly valued. The students provided pertinent information on the ease of compositional writing using both modes of transcription.

Research data was solicited from three private K-12 Christian schools in the midwestern United States. The three schools have approximate student populations of 200, 400, and 800 students respectively. The schools are affiliated through their membership in and accreditation by the Association of Christian Schools International (ACSI). ACSI is the largest Christian school organization in the world with 25,000 member schools in 100 countries serving 5.5 million students. In the United States, there are approximately 1,600 ACSI accredited schools. The two larger participating schools are located in the suburbs of a large metropolitan area, and the third school is located in a rural area.

The teacher group of nine participants included six fifth-grade general classroom teachers and three eighth-grade language arts teachers from the three schools. The student group of

participants included 74 fifth-grade students and 90 eighth-grade students (see Table 1). Two of the three participating schools had multiple sections of fifth- and eighth-grade students. The parent/guardian of each student participant granted consent for participation in the study.

Table 1

*Participants by School and Grade*

	Number of Fifth-Grade Student Participants	Number of Eighth-Grade Student Participants	Number of Fifth-Grade Teacher Participants	Number of Eighth-Grade Teacher Participants
School A 200 Students	9	8	1	1
School B 400 Students	19	17	2	1
School C 800 Students	46	65	3	1
TOTALS	74	90	6	3

**Piloting and Validation**

The efficacy of any research study is predicated upon sound research methodology and validation (Creswell 2015; Plano Clark & Ivankova, 2016). Because of the subjective nature of the student-generated writing samples, a standardized diagnostic test, the *Test of Written Language-4* (TOWL-4), was selected for use in this study. The TOWL-4 was normed in 2007 using 2,205 students from 17 states (Hammill & Larson, 2009). Its reliability on the individual subtests was calculated using Cronbach's alpha. An alpha score of  $\alpha \geq .70$  is considered a minimum standard of reliability for a diagnostic test of this nature. The alpha scores for the composite score for spontaneous writing (the combined score of the two subtests that were administered as part of this study) for both Form A and Form B are shown in Table 2. The

authors of the test used the averaged coefficients of all grade levels ( $\alpha \geq .70$ ) as the measure of internal consistency and reliability (Grande, 2014).

Table 2

*Reliability of the TOWL-4 Instrument by Form and Grade*

TOWL-4 Alpha Values			
Composite	Fifth Grade	Eighth Grade	Average of All Grades (4 <sup>th</sup> – 11 <sup>th</sup> )
Spontaneous Writing Form A – Cursive Story	.80	.82	.82
Spontaneous Writing Form B – Keyboard Story	.78	.84	.82

The student-generated stories, student surveys, teacher surveys, and semi-structured phone interviews were piloted for reliability and validity. The pilot study was conducted at the researcher's own school, another ACSI accredited school with 500 students (K-12). The pilot included 100% participation with 21 fifth-grade students, 18 eighth-grade students, and 3 classroom teachers. Because the TOWL-4 is a standardized instrument, the teachers were provided a verbatim script to administer the student-generated stories. The script also included instructions on administering the student and teacher surveys.

The initial piloted student survey ( $N=39$ ) yielded a Cronbach's alpha score of .538. There were several individual questions that had an alpha score above .70, but the researcher chose to make adjustments in the construction and rating scale of the survey questions. The revised student surveys were then piloted 21 days later with the same sample of students. The revised piloted student surveys yielded a Cronbach's alpha score of .853. Because the number of teacher surveys in the pilot was insufficient to calculate a reliability index, and because the actual number of teacher surveys in the data gathering stage was limited ( $N=9$ ), the researcher decided

to use the data in a qualitative manner instead of a statistical manner. The Likert-scale responses to individual questions were tabulated for themes in correspondence alongside the open-ended responses.

### **Data Collection**

In this study, a triangulation convergence model was utilized where the quantitative and qualitative data were collected simultaneously and then analyzed in a parallel fashion. The results of both data sets were compared and contrasted, providing a final interpretation (Creswell, 2015; Hoepfl, 1997; Plano Clark & Ivankova, 2016, Thurmond, 2001). Upon completion of the pilot stage, the salient introductory information, forms, surveys, and other materials were mailed to the participating schools for distribution. The participating teachers were instructed to obtain parent consent for student participation, to gather data within a 10-day time frame of the receipt of the materials, and to return the raw data to the researcher within seven days. All the participating schools returned the raw data to the researcher in a timely manner.

To allow for flexibility in analysis, the student data was grouped based on the students' grade in school and then again by schools. The data from teachers was analyzed qualitatively as a single group. A second tier of qualitative data was collected from teacher participants through semi-structured telephone interviews (See Appendix I). According to Marshall and Rossman (2016), conducting interviews provides a large quantity and greater variety of data quickly, and the follow-up interview questions were designed to provide additional insights from the participating teachers. From the completed survey data, seven teachers were contacted for a follow-up interview in order to provide a purposeful sample. These semi-structured interviews were conducted by phone; participants agreed to be digitally recorded, and the informed consent

was explained to each participant. Each phone interview took approximately 15 minutes (See Appendix I). The phone interviews were transcribed and checked for accuracy.

To ensure that the study was done ethically, the researcher completed training and certification for Human Research through the National Institute of Health (See Appendix J). Permission from the superintendent/head of each school allowed the researcher to mail the research materials to the respective building principal for distribution to the fifth-grade teachers and the eighth-grade language arts teachers (See Appendix B). A follow-up, thank-you email was also sent to each superintendent expressing appreciation for allowing his/her teachers to participate in the study (See Appendix D). The researcher received approval from the Human Research Review Committee (HRRC) at Northwest Nazarene University prior to commencing the study.

### **Analytical Methods**

In order to comprehensively address the three research questions, a mixed-methods design served as the framework in analyzing the data collected during the study (Creswell, 2015; Plano Clark & Ivankova, 2016; Spratt, Walker, & Robinson, 2004). The quantitative data included the student-generated cursive stories and the student-generated typed stories. The qualitative data included the teacher surveys, the student surveys, and the semi-structured teacher interviews. The simultaneous analysis of both the quantitative and qualitative data provided validation for the study, because the researcher collected two or more sources of data in the study of the same phenomenon.

The researcher exercised a number of intentional measures to ensure the accuracy and objectivity in scoring the student-generated stories. Because the mode of transcription was the central focus of the study, the researcher carefully considered how to minimize bias based on that

factor. Each story received a unique identifier code, and an independent certified teacher converted each cursive story to a typed format prior to scoring. By implementing these steps of blinding the data, the scorers did not know which stories were originally written in cursive and which stories were composed by keyboard.

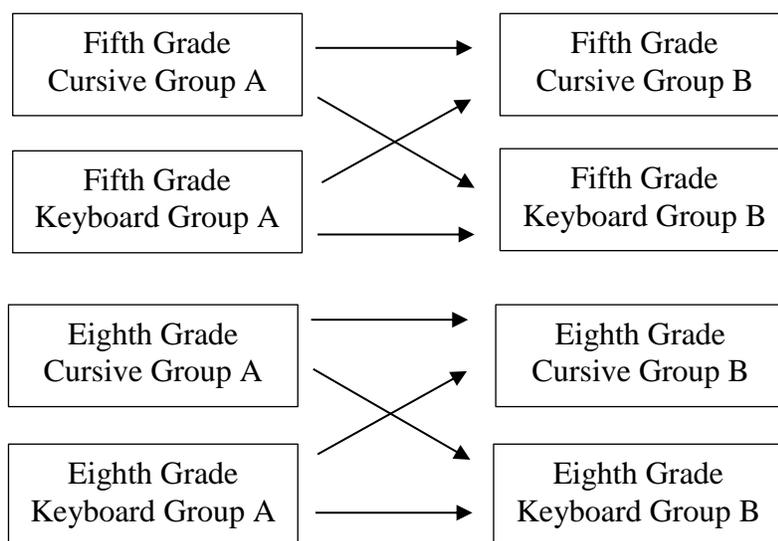
Two individuals scored each of the student-generated stories in accordance with the TOWL-4 scoring criteria. Completing the task of scoring 300 stories required a balance between feasibility and convenience. A volunteer team of 10 certified teachers (scorer 1) provided the first set of scores for each story in both modes, and the researcher served as the second scorer (scorer 2) for all the stories. Having one scorer (scorer 2) for all the stories provided the benefit of observing consistency in the scores across all the writing samples.

Using materials provided by the publishers of the TOWL-4, the researcher provided specific and standardized training on how to score the stories. The researcher used sample protocols for practice with the scoring volunteers, and the group collaboratively discussed the results to ensure scoring accuracy. For scoring the actual participants' stories, the researcher gave each of the 10 scoring volunteers a random group of between 25-30 stories each to score.

In addition to the formal training provided to obtain the greatest consistency with the scoring, the researcher used an intra-class correlation coefficient to determine inter-rater reliability between scorer one and two for both subtest 6 and subtest 7 for all participants' stories (Burke, Landis, & Burke, 2017; Creswell, 2015; Shrout & Fleiss, 1979). An intra-class correlation is a measure of homogeneity among members of a group and is often used as a measure of inter-rater reliability (Weir, 2005).

The quantitative data analysis of the student-generated stories was conducted using Version 24.1 of IBM's Statistical Package for the Social Sciences (SPSS) software (Field, 2013).

The independent variables for the student-generated stories included the students' respective grade level and the mode of transcription used. The data received from the research sites did not denote a one-to-one correspondence among the cursive and keyboard stories, so the researcher created independent samples that divided the data into groups by grades and modes of transcription (See Figure 6). In addition to placing the data in specific groups, to achieve normality, the researcher removed the outliers in the data (Field, 2013).



*Figure 6.* Group Comparisons by Grade and Mode

These steps enabled the researcher to conduct a series of parametric and non-parametric tests to determine statistical significance for fluency (word count) and compositional quality in response to Research Question 1. In addition, the researcher used an analysis of variance (ANOVA) to compare the students' composite index scores among the three participating schools. The results are reported in Tables 5-13 in chapter 4.

The student surveys included Likert-scale questions on a five-point rating from “Strongly Agree” to “Strongly Disagree,” and two open-ended questions. Descriptive data is provided in chapter 4. The qualitative data from the teacher surveys, the open-ended student survey

questions, and the follow-up phone interviews were coded and labeled to identify overarching themes (Creswell, 2015). The follow-up teacher interviews were recorded digitally and transcribed to ensure the accuracy and credibility of the participants' responses. Finally, the quantitative and qualitative data was triangulated to enhance the validity and credibility of the study (Spratt et al., 2004). The results of both data sets were compared and contrasted providing a final interpretation for both student and teacher survey responses (Marshall & Rossman, 2016; Plano Clark & Ivankova, 2016).

### **Role of the Researcher**

Researchers typically select a topic for which they have enthusiasm and passion. It is commonly known that left-handed individuals have more difficulty learning to write correctly in a predominantly right-handed world. As a left-handed individual, it may seem odd that the researcher would be interested in the topic of cursive writing. Thankfully, the researcher had excellent elementary teachers who insisted on correct pencil grip, arm position, and slant in their cursive instruction. The researcher filled Big Chief tablets with endless motifs using the Palmer Method to develop and hone fine-motor skills, and he began to love the beauty of cursive.

More importantly, the researcher has had extensive involvement across his career with the National Institute for Learning Development (NILD). This organization trains educators to work with students who have specific learning disabilities. The NILD approach uses specific techniques designed to stimulate weak processing and cognitive skills, equipping the learner to become an autonomous learner in the regular classroom setting. The primary technique within the NILD model that stimulates visual-motor integration is Rhythmic Writing. This technique utilizes chalk on a chalkboard whereby the student crosses the midline forming motifs similar to the Palmer Method discussed earlier. Over time, repeated practice with this technique enhances

visual-motor integration and develops fluidity and legibility in cursive. The schools used for this study either provide intervention for students using the NILD model or have familiarity with the approach; therefore, several participating teachers mentioned the NILD program and its efficacy during the follow-up interviews.

As a result of these experiences, the researcher is positively biased about the topic of cursive as a mode of transcription, but it goes beyond that. Handwriting skills provide the foundation for good compositional skills. It is the researcher's desire that every generation of students learns to write in a way that represents excellence. The goal is for all students to express themselves well in written composition using fluent and legible handwriting. There is also bias on the researcher's part as he serves as a K-12 school administrator and an adjunct college professor who has influence on curriculum selection and teacher methodology.

### **Delimitations**

Delimitations describe the boundaries that were set for the study, and there are several delimitations for this research. First, the scope of the study was limited to a small sampling of private Christian schools in the midwestern United States. The research methods were well-documented and included the use of a published, norm-referenced diagnostic test so that they could be replicated in other types of schools and grades of students in order to generalize the findings. Future research on the efficacy of cursive as a mode of transcription with a broader scope of participation within Christian schools and/or participation by public school districts would provide additional information for best practices in education.

The student and teacher survey instruments designed for the study included specific questions about the usage and perceived benefits of cursive, but the survey instruments were not exhaustive on the subject. Another decision was to include student participants from only two

grades in this research, although students in other grades could have provided writing samples. Both teachers and students in other grades or settings may have valuable opinions on handwriting and its impact on learning. Finally, the TOWL-4 is one of many norm-referenced instruments that can be used to assess students' writing skills.

### **Limitations**

Every research study has limitations. The study was limited to three private Christian schools in the midwestern United States. The participating schools are accredited through the Association of Christian Schools International (ACSI). ACSI has over 25,000 member schools internationally representing more than 5.5 million students worldwide. In the United States, there are approximately 1,600 ACSI accredited schools. The researcher intentionally selected three different-sized schools to participate in the study. The sample size of the study is considered a limitation (Creswell, 2015).

The keyboard stories were produced on a cloud-based word processing program. As is common with word-processing programs, misspelled words and other writing errors (e.g. fragmented sentences, missing punctuation) are often denoted on the screen. These visual cues on the screen may have prompted students to make corrections that they may not have made while writing on paper. In addition, there may be instances where an "auto-correct" feature would have corrected students' mistakes – even without them knowing it.

The same students were represented in both the cursive and keyboard samples, although there was not a one-to-one correspondence identifying which student wrote which sample. The participating teachers were directed to return the student-generated stories as a group without any identifying information on the individual students. Without the one-to-one (pairwise) correspondence among the cursive and keyboard stories, the data had to be placed into distinct

groups. Grouping the data enabled the researcher to conduct independent t-tests for statistical analysis.

Form B of the TOWL-4 was utilized for the formation of the keyboard stories. Both forms of the TOWL-4 were normed using handwritten writing samples, not digitally produced writing samples. Therefore, the mode of transcription used for the formation of the keyboard stories presents a limitation in the study.

There were two additional limitations to the study. The participants completing the written survey and/or follow-up interviews may have misunderstood the nature of the questions. In addition, while every effort was exercised to ensure accuracy in handling the data, the researcher or his volunteer scorers may have inadvertently recorded data incorrectly.

## Chapter IV

### Results

#### Introduction

This study had two primary areas of focus. First, the researcher wanted to compare the differences in fluency and compositional quality between two modes of transcription (cursive and keyboard) among fifth- and eighth-grade students. Secondly, the researcher sought to understand attitudes and beliefs of today's teachers and students regarding cursive and keyboarding, including their benefits, their usage, and their correlation to the rest of the curriculum within the digital age. The study addressed three research questions:

1. Do student-generated stories demonstrate a greater fluency and compositional quality in cursive than what is produced by keyboard?
2. What are teachers' attitudes and beliefs regarding the value and usage of cursive compared to the value and usage of keyboarding?
3. What are students' attitudes and beliefs regarding the value and usage of cursive compared to the value and usage of keyboarding?

A combination of methodologies provided an understanding of the use of cursive and keyboarding in today's schools. A mixed-methods design allowed the researcher to holistically answer each of the research questions using both quantitative and qualitative data (Creswell, 2015; Plano Clark & Ivankova, 2016). This chapter provides an explanation of the approach used to determine the reliability/validity of the quantitative data and the results of the study by research question.

## Reliability and Validity of Quantitative Data

The quantitative aspect of the study focused on the cursive and keyboard stories written by the student participants. The measures taken to limit bias and to ensure consistent scoring are described in chapter 3. The researcher conducted an intra-class correlation procedure using Cronbach's alpha to ensure the reliability of the *Test of Written Language-4* (TOWL-4) scores between the two scorers (Burke et al., 2017). The average subtest scaled scores and the inter-rater reliability alpha scores between scorer one and scorer two are provided in Table 3. The measure of inter-rater reliability for all TOWL-4 scores ranged from ( $\alpha = .756$  to  $.928$  ( $p \geq .70$ )) indicating a high level of reliability between the scorers across all the subtests.

Table 3

### *Inter-rater Reliability of TOWL-4 Scoring*

	Scorer 1 Mean Scaled Score	Scorer 2 Mean Scaled Score	Intra-class Correlation Coefficient Alpha Score
Fifth – Cursive (n = 72)			
Subtest 6	12.47	11.90	.879
Subtest 7	10.54	10.72	.756
Fifth – Keyboard (n = 65)			
Subtest 6	12.94	12.74	.928
Subtest 7	11.38	11.60	.884
Eighth – Cursive (n = 90)			
Subtest 6	10.78	10.96	.859
Subtest 7	10.96	11.40	.905
Eighth – Keyboard (n = 73)			
Subtest 6	11.42	11.78	.867
Subtest 7	13.23	13.14	.900

### Research Question 1

The composite index scores from the TOWL-4 and the mean word counts of the students' stories provided data to answer Research Question 1: Do student-generated stories demonstrate a greater fluency and compositional quality in cursive than what is produced by keyboard? To measure fluency, the researcher calculated the total word count for each student's story. The assumption of normality was achieved with the fifth-grade word count data for both Group A and Group B for both cursive stories and keyboard stories. Therefore, the researcher used a series of independent t-tests to determine the differences between the word count for cursive stories versus the word count for keyboard stories for fifth-grade students as provided in Table 4. For the fifth-grade groups, no significant difference was found between the mean word count for cursive stories and the mean word count for the keyboard stories with the scores ranging from ( $\alpha = .098$  to  $.547$  ( $p < .05$ )) as described in chapter 5.

Table 4

#### *Fifth-Grade Word Count Comparisons*

	N	Mean Word Count	Standard Deviation	Standard Error Mean
<b>Group A</b>				
Cursive	26	117	34.92	6.85
Keyboard	28	126	43.18	8.16
<b>Group B</b>				
Cursive	46	134	43.96	6.48
Keyboard	33	132	40.67	7.08

Next, the researcher analyzed the eighth-grade word count data. The eighth-grade word count data for Group A-cursive, Group A-keyboard, and Group B-keyboard met the assumption of normality, so the researcher utilized independent t-tests to determine the differences between

those groups as provided in Table 5. A significant difference existed between the mean word count for Group A-keyboard ( $M = 200$ ,  $SE = 14.49$ ) and the mean word count for Group B-keyboard ( $M = 125$ ,  $SE = 6.71$ ,  $p = .001$  ( $p < .05$ )). The results demonstrated that students in Group A-keyboard generated significantly more words within the given time limit than the students in Group B-keyboard. No significant difference existed between Group A-cursive ( $M = 139$ ,  $SE = 11.40$ ) and Group B-keyboard ( $M = 125$ ,  $SE = 6.71$ ,  $p = .280$  ( $p < .05$ )).

Table 5

*Eighth-Grade Word Count Comparisons*

	N	Mean Word Count	Standard Deviation	Standard Error Mean
<b>Group A</b>				
Cursive	25	139	57.01	11.40
Keyboard	23	200	64.51	14.49
<b>Group B</b>				
Cursive	66	95	34.78	4.28
Keyboard	37	125	40.28	6.71

The eighth-grade word count data for the Group B-cursive stories did not meet the assumption of normality, so the researcher utilized the Mann-Whitney U test to compare Group B-cursive with Group A-keyboard. The Mann-Whitney U test indicated that the median word count for Group A-keyboard ( $Mdn = 214$ ) was statistically greater ( $p < .05$ ) than the median word count for Group B-cursive ( $Mdn = 89$ ),  $U = 1461$ ,  $z = 6.10$ ,  $p = .001$ . The results demonstrated that the students in Group A generated significantly more words within the given time limit on keyboard stories than the students in Group B on stories written in cursive. The Group B-cursive stories were also compared to the Group A-cursive stories using the same non-parametric test. The results indicated that the median word count for Group A cursive

( $Mdn = 138$ ) was statistically greater ( $p < .05$ ) than the median word count for Group B cursive ( $Mdn = 89$ ),  $U = 462.50$ ,  $z = 462.50$ ,  $p = .001$ . The results demonstrated that the students in Group A-cursive generated statistically more words within the given time limit on cursive stories than the students in Group B on stories written in cursive.

The researcher then analyzed the word count data to determine differences between the word count for fifth-grade cursive stories compared to the word count for eighth-grade cursive stories as provided in Table 6. The eighth-grade word count data for cursive stories did not meet the assumption of normality, so the Mann-Whitney U test was used to compare the cursive stories by grade level. The Mann-Whitney U test indicated that the median word count for fifth-grade cursive stories ( $Mdn = 128$ ) was significantly greater ( $p < .05$ ) than the median word count eighth-grade cursive stories ( $Mdn = 93$ ),  $U = 2193.50$ ,  $z = 2193.50$ ,  $p = .001$ . The results demonstrated that the fifth-grade students generated significantly more words within the given time limit on cursive stories than the eighth-grade students on stories written in cursive.

Table 6

*Word Count Comparisons Between Grades and Mode of Transcription*

	N	Mean Word Count	Standard Deviation	Standard Error Mean
<b>Cursive</b>				
Fifth Grade	72	128	41.48	1.18
Eighth Grade	90	105	43.90	3.01
<b>Keyboard</b>				
Fifth Grade	61	129	41.62	5.33
Eighth Grade	57	148	55.57	7.36

The assumption of normality was achieved with the word count data for both fifth-grade keyboard stories and eighth-grade keyboard stories, so the researcher conducted an independent

t-test to determine the difference between the two grades. A significant difference existed between the mean word count for fifth-grade keyboard stories ( $M = 129$ ,  $SE = 5.33$ ) and the mean word count for the eighth-grade keyboard stories ( $M = 148$ ,  $SE = 7.36$ ,  $p = .040$  ( $p < .05$ )). The test results demonstrated that eighth-grade students produced significantly more words by keyboard within the given time limit than did fifth-grade students.

Next, the TOWL-4 scores were analyzed to determine the differences in compositional quality by grade and mode of transcription. After the assumption of normality was achieved, the researcher conducted a series of independent t-tests between the cursive stories and the keyboard stories at each grade level. The composite index scores on the TOWL-4 are represented by standard scores (SS).

For fifth grade, a significant difference existed between the mean standard scores for the Group A-cursive stories ( $SS = 114$ ,  $SE = 2.27$ ) as compared to the standard scores for the Group B-cursive stories ( $SS = 105$ ,  $SE = 2.36$ ,  $p = .012$  ( $p < .05$ )) as provided in Table 7. The scores indicated a higher compositional quality on Group A-cursive stories than on Group B-cursive stories. A significant difference also existed between the mean standard scores for the Group B-cursive stories ( $SS = 105$ ,  $SE = 2.36$ ) as compared to the mean standard scores for the Group A-keyboard stories ( $SS = 117$ ,  $SE = 2.81$ ,  $p = .002$  ( $p < .05$ )). The scores indicated a significantly higher compositional quality on Group A-keyboard stories than on Group B-cursive stories.

A significant difference did not exist between the mean standard scores for the fifth-grade, Group A-cursive stories ( $SS = 114$ ,  $SE = 2.27$ ) as compared to the mean standard scores for the fifth-grade, Group B-keyboard stories ( $SS = 113$ ,  $SE = 3.14$ ,  $p = .834$  ( $p < .05$ )). In addition, a significant difference did not exist between the mean standard scores for the

fifth-grade, Group A-keyboard stories ( $SS = 117$ ,  $SE = 2.81$ ) as compared to the mean standard scores for the fifth-grade, Group B-keyboard stories ( $SS = 113$ ,  $SE = 3.14$ ,  $p = .419$  ( $p < .05$ )).

Table 7

*Fifth-Grade Comparison of Cursive and Keyboard Standard Scores*

	N	Mean Standard Score	Standard Deviation	Standard Error Mean
<b>Group A</b>				
Cursive	24	114	11.12	2.27
Keyboard	28	117	14.86	2.81
<b>Group B</b>				
Cursive	45	105	15.86	2.36
Keyboard	37	113	19.08	3.14

For eighth grade, the results indicated a significant difference between the mean standard scores for Group B-cursive stories ( $SS = 110$ ,  $SE = 1.26$ ) and the mean standard scores for Group A-keyboard stories ( $SS = 118$ ,  $SE = 3.69$ ,  $p = .012$  ( $p < .05$ )) as provided in Table 8. A significant difference did not exist between the mean standard scores for Group A-cursive stories ( $SS = 114$ ,  $SE = 1.71$ ) and the mean standard scores for Group B-cursive stories ( $SS = 110$ ,  $SE = 1.26$ ,  $p = .134$  ( $p < .05$ )). In addition, a significant difference did not exist between the mean standard scores for Group A-cursive stories ( $SS = 114$ ,  $SE = 1.71$ ) and the mean standard scores for Group B-keyboard stories ( $SS = 117$ ,  $SE = 3.02$ ,  $p = .476$  ( $p < .05$ )). Finally, a significant difference did not exist between the mean standard scores for Group A-keyboard stories ( $SS = 118$ ,  $SE = 3.69$ ) and the mean standard scores for Group B-keyboard stories ( $SS = 117$ ,  $SE = 3.02$ ,  $p = .868$  ( $p < .05$ )).

Table 8

*Eighth-Grade Comparison of Cursive and Keyboard Standard Scores*

	N	Mean Standard Score	Standard Deviation	Standard Error Mean
<b>Group A</b>				
Cursive	20	114	7.63	1.71
Keyboard	24	118	18.07	3.69
<b>Group B</b>				
Cursive	58	110	9.61	1.26
Keyboard	49	117	21.16	3.02

Even though the keyboard stories scored higher than the cursive stories for both grades, it is important to acknowledge the percentile ranks that correspond with the standard scores by grade and mode of transcription. As a nationally normed diagnostic test, the average standard score representing the 50<sup>th</sup> percentile is 100. According to the TOWL-4 norms, the students in this study collectively scored above average on both cursive and keyboard stories as represented in Table 9.

Table 9

*Percentile Rank by Grade and Mode of Transcription*

	N	Mean Standard Score	Mean Percentage Scores
<b>Fifth Grade</b>			
Cursive	72	106.46	66
Keyboard	65	114.66	83
<b>Eighth Grade</b>			
Cursive	90	107.34	68
Keyboard	73	117.52	88

The researcher also determined the statistical differences when comparing the mean standard scores of the fifth- and eighth-grade cursive stories with each other and the fifth- and eighth-

grade keyboard stories with each other as provided in Tables 10 and 11. The results indicated no significant difference between the mean standard scores for fifth-grade cursive stories ( $SS = 108$ ,  $SE = 1.81$ ) and the mean standard scores for the eighth-grade cursive stories ( $SS = 111$ ,  $SE = 1.04$ ,  $p = .121$  ( $p < .05$ )). In addition, the results indicated no significant difference between the mean standard scores for fifth-grade keyboard stories ( $SS = 115$ ,  $SE = 2.15$ ) and the mean standard scores for the eighth-grade keyboard stories ( $SS = 118$ ,  $SE = 2.35$ ,  $p = .375$  ( $p < .05$ )).

Table 10

*Comparison of Both Grades – Cursive Story Standard Scores*

	N	Mean Standard Score	Standard Deviation	Standard Error Mean
Fifth Grade	69	108	15.00	1.81
Eighth Grade	78	111	9.23	1.04

Table 11

*Comparison of Both Grades – Keyboard Story Standard Scores*

	N	Mean Standard Score	Standard Deviation	Standard Error Mean
Fifth Grade	65	115	17.35	2.15
Eighth Grade	73	118	20.07	2.35

The researcher also determined the statistical differences between all the cursive stories and the keyboard stories collectively in relationship to compositional quality as provided in Table 12. The results indicated a significant difference between the mean standard scores for the cursive stories ( $SS = 110$ ,  $SE = 0.91$ ) and the mean standard scores for the keyboard stories ( $SS = 116$ ,  $SE = 1.60$ ,  $p = .002$  ( $p < .05$ )). The results indicated a higher compositional quality globally on keyboard stories as compared to cursive stories.

Table 12

*Global Comparison Between Cursive and Keyboard Standard Scores*

	N	Mean Standard Score	Standard Deviation	Standard Error Mean
Cursive	142	110	10.80	0.91
Keyboard	138	116	18.83	1.60

A series of one-way ANOVA tests were conducted to determine any statistical group differences between the three participating schools' standard scores, both by grade and mode of transcription as provided in Table 13. No significant difference existed between the fifth-grade cursive standard scores of the three schools ( $SS = 106$ ,  $SE = 1.93$ ,  $p = .085$  ( $p < .05$ )). No significant difference existed between the fifth-grade keyboard scores of the three schools ( $SS = 115$ ,  $SE = 2.15$ ,  $p = .714$  ( $p < .05$ )). No significant difference existed between the eighth-grade keyboard standard scores of the three schools ( $SS = 118$ ,  $SE = 2.35$ ,  $p = .315$  ( $p < .05$ )). However, a significant difference was found between the eighth-grade cursive standard scores of the three schools ( $SS = 107$ ,  $SE = 1.53$ ,  $p = .006$  ( $p < .05$ )). To further understand this difference, the researcher conducted post-hoc testing. A significant difference was only found between School A ( $n=8$ ) and School B ( $n=17$ ) ( $SE = 5.93$ ,  $p = .006$  ( $p < .05$ )).

Table 13

*Standard Scores - Comparison of Schools by Grade and Mode of Transcription*

	N	Mean Standard Score	Standard Deviation	Standard Error Mean
Fifth Grade Cursive	72	106	16.34	1.93
Fifth Grade Keyboard	65	115	17.35	2.15
Eighth Grade Cursive	90	107	14.50	1.53
Eighth Grade Keyboard	73	118	20.07	2.35

**Research Question 2**

Teacher surveys and follow-up phone interviews provided data to answer Research Question 2: What are teachers' attitudes and beliefs regarding the value and usage of cursive as compared to the value and usage of keyboarding? The teacher survey included 18 Likert-scale questions, 5 demographics-related questions, and 7 open-ended questions (see Appendix G). The Likert-scale survey responses supplied information on the use of cursive and keyboarding both for instruction and student work. The rating scale continuum used "5" to indicate strong agreement and "1" to indicate strong disagreement. The researcher analyzed the survey responses provided by the nine teacher participants and the follow-up phone interviews conducted with seven of the nine teachers to develop themes and patterns in understanding the role of cursive in today's classroom instruction. Additionally, the data provided information on teacher attitudes and beliefs about the role of keyboarding for classroom use. Demographic information on the teacher participants is provided in Table 14.

Table 14

*Survey Participants – Teacher Demographics*

	Number of Respondents	Percentage
<u>Gender</u>		
Male	2	22.2%
Female	7	77.8%
<u>Grade</u>		
Fifth	6	66.7%
Eighth	3	33.3%
<u>Teaching Experience</u>		
1 – 10 years	4	44.4%
11 – 20 years	3	33.3%
More than 20 years	2	22.2%
<u>Highest Level Education</u>		
Bachelor’s Degree	7	77.8%
Master’s Degree	2	22.2%

The Likert-scale survey provided salient information related to the teachers’ attitudes and beliefs about the roles of cursive writing and of keyboarding use in the teaching and learning process. The descriptive data for the teacher surveys is provided in Table 15.

Table 15

*Likert-Scale Responses from Teachers*

Survey Question	(5) Strongly Agree	(4) Agree	(3) Unsure	(4) Disagree	(5) Strongly Disagree
I expect my students to submit their written work in cursive.	33.3%	11.0%	22.3%	0%	33.3%
I enjoy teaching cursive.	11.0%	11.0%	44.0%	22.0%	12.0%
I use cursive when writing.	22.0%	56.0%	0%	22.0%	0%
I use cursive during instruction with my class.	11.3%	44.0%	11.3%	33.3%	0%
Cursive is a skill today's students need to learn.	56.0%	22.0%	11.0%	11.0%	0%
Cursive should be taught as a separate subject in school.	33.3%	44.3%	0%	22.3%	0%
It would be beneficial for me to receive additional training on how to teach cursive.	0%	17.0%	44.0%	22.0%	17.0%
My students receive keyboarding (typing) instruction at school.	22.3%	44.3%	11.0%	22.3%	0%
My students are able to complete assignments using a keyboard.	44.3%	44.3%	11.3%	0%	0%
Keyboarding is a skill that students need to learn.	89.0%	11.0%	0%	0%	0%
My school uses laptops, Chromebooks, or tablets for daily instruction.	45.0%	33.0%	0%	11.0%	11.0%
Students express themselves better in writing when using a keyboard.	0%	44.3%	33.3%	22.3%	0%
Students express themselves better in writing when using cursive.	0%	33.3%	33.3%	22.3%	11.0%
My students are able to choose their mode of transcription.	22.3%	44.0%	0%	22.3%	11.3%
In light of today's technology, cursive is no longer necessary.	0%	22.3%	22.3%	11.0%	44.3%
I give my students the choice to use cursive or printing.	11.3%	44.0%	0%	22.3%	22.3%
I plan instructional time for students to practice the formation of cursive.	0%	11.0%	11.0%	0%	78.0%
I provide a handwriting grade on my students' report card.	11.0%	11.0%	0%	0%	78.0%

Even though none of the teachers formally or regularly teach cursive due to the age/grade level of their students, 78% reported that cursive is a skill that today's students need to learn, and 56% use cursive themselves while instructing their students. In addition, 78% of the teachers reported that cursive should be taught as a separate subject in school, and the same percentage stated that they personally use cursive when writing. Only 12% reported that it would be beneficial for them to receive additional training on how to teach cursive. The primary reason given for not teaching cursive was not having enough time in the school day to fit it into the instructional day.

The teacher survey also asked a number of Likert-scale questions related to the use of technology in the classroom, particularly in writing. Sixty-seven percent of the teachers stated that their students receive formal keyboarding instruction as part of the school's curriculum at the elementary school level, and 100% stated that keyboarding is a skill that students need to learn. When asked, "My school uses laptops, Chromebooks, or tablets for daily instruction," 78% of the teachers stated "Agree" or "Strongly Agree," and 89% of the teachers reported that their students are able to complete assignments using a keyboard.

Specific survey items asked the teachers to compare the two modes of transcription. When asked, "Students express themselves better in writing when using the keyboard," 44.3% marked "Strongly Agree" or "Agree" while the remaining 55.5% marked "Unsure," "Disagree," or "Strongly Disagree." Conversely, when asked, "Students express themselves better in writing when using cursive," 33.3% marked "Strongly Agree" or "Agree" while the remaining 66.6% marked "Unsure," "Disagree," or "Strongly Disagree."

The open-ended survey questions provided valuable insights into the teachers' beliefs about the uses of cursive and keyboarding. Each of the participants provided a response to the

question, “Is it more important for students to know how to write in cursive or by keyboard? Why do you think so?” The majority of the teachers (67%) stated that cursive is more important, and the remaining 33% stated that both modes of transcription are equally important. Responses expressing this theme included the following:

FIFTH: “I think it is more important for students to know how to write in cursive!

Studies have been done that show stronger brain connections with the fluid motions of cursive and never lifting the pencil.”

FIFTH: “I think both skills are needed. In today’s age the skill of keyboarding is more important. I would say that there should be an equal amount of time spent on both.”

EIGHTH: “Both – cursive involves fine motor skills and brain connectivity (NILD program). Keyboarding is important – current practice demands ability in this skill.”

To further examine teachers’ attitudes and beliefs on the value of cursive writing and the use of digital devices for writing, the researcher conducted follow-up semi-structured phone interviews with seven of the nine teacher participants. The seven interviewees averaged 17 years of teaching experience. Each of the interviews was digitally recorded, transcribed to paper, and checked for accuracy. The researcher used a heuristic approach to organize, code, and connect the open-ended survey responses and the interview responses into distinct overarching themes. The collective responses were organized into four key themes that were voiced consistently by each of the participants: 1) the use of cursive enhances the development of cognitive skills, 2) the use of cursive promotes discipline and consistency, 3) keyboarding is an important skill for today’s learners, and 4) cursive has cultural relevance. Three of the four top themes emphasized the importance of cursive and its role in the development of the student.

***Theme #1: The use of cursive enhances the development of cognitive skills***

Each of the teacher participants indicated the importance of cursive writing in producing conscious thought. The participants were effusive in their comments about the cognitive benefits of cursive for all students, and especially for students diagnosed with dyslexia and/or dysgraphia. According to the participants, the use of cursive is valuable for memory, fluid movement, fine-motor skills, and overall “brain connectivity.” In addition, each of the teachers commented on the link between handwriting skills and literacy. While they did not articulate the physiological relationship of reading and writing, they acknowledged that in their experience, they *know* there is a relationship between the two areas. Responses expressing this theme included the following:

FIFTH: “Cursive writing allows us to be intentional about making sure that they [students] can make connections in their brains, and we are helping them to do that.”

FIFTH: “I have seen that it is easier for a student who has difficulty with fine-motor skills, because they are not picking up the pencil – it’s one fluid motion.”

EIGHTH: “Cursive is very beneficial for students with dyslexia or other type of educational limitation. It’s an easier, more fluid way to write.”

***Theme #2: The use of cursive promotes discipline and consistency***

The second most prominent theme focused on the life skills that are developed through the process of learning and using cursive. According to the participants, learning and using cursive requires conscious effort, time, and discipline. The learning process and corresponding skills are seen as valuable practices in the training of every student. The teachers underscored that even though keyboarding is quicker, the end result often lacks the careful thought and

reflection that develops when doing work in cursive. Responses expressing this theme included the following:

FIFTH: “Because technology allows us to do things quicker, I give them [students] the option of typing or writing on projects and different things. A lot of times when they are keyboarding, they rush through it faster, and as a result it often is incomplete.”

EIGHTH: “I see it [cursive] as a training mechanism developing reflective and motor skills that we tend to overlook. We’re so advanced with all our technology that we overlook the simple things that really in one sense add to the quality of life.”

***Theme #3: Keyboarding is an important skill for today’s learners***

Each of the teacher participants acknowledged that the rapidly expanding technological landscape underscores the importance of learning to type and of skillfully operating in the virtual world of the Internet. According to the participants, the ubiquitous use of keyboarding in America’s classrooms is inevitable, and intentional training in keyboarding is now a foundational life skill. Responses expressing this theme included the following:

FIFTH: “I feel like typing skills are important. Honestly, with texting these days, I don’t feel that people get a lot of experience typing, and they desperately need it.”

EIGHTH: “Everything we do is online, so they [students] have to be able to type and be able to communicate through a computer.”

***Theme #4: Cursive has cultural relevance***

The teacher participants highlighted the cognitive benefits of cursive as the most important reason for retaining it, and they also acknowledged that cursive has a place in the American culture of what are viewed as traditional day-to-day activities. These activities include being able to read information written in cursive; read, understand, and appreciate historical

documents; and being able to write and provide one's signature on official papers and checks.

Evidence of this theme from their comments included the following:

FIFTH: "You'll know how to write a check, and you can't write your signature in print, because it won't be accepted – you will have to sign it in cursive."

EIGHTH: "A lot of historical documents are written in cursive like our Declaration of Independence. I feel that if we don't know cursive in general, then we're not going to be able to read things."

In addition to the four distinct themes, the surveys and phone interviews revealed some additional areas of commonality. Several fifth-grade teachers expressed concern and frustration with the expectation to give handwriting grades in the absence of having formal handwriting instruction as part of the established curriculum. They commented that parents have also picked up on this disparity and have questioned teachers about the need to use cursive in an age of technology. Two of the teachers commented on what they've observed as students take notes in class. The teachers indicated that students who take notes in cursive tend to remember material better and longer than do other students. While this observation is consistent with current research on the topic (Duran & Frederick, 2013; Grapes et al., 2014; Mueller & Oppenheimer, 2014), when queried further, the teachers simply expressed pleasure that some students actually took notes.

The lack of continuity in formally learning how to type when using a keyboard surfaced as another concern. None of the teachers surveyed knew when the students in their schools first received formal instruction in typing. The teachers observed that most students failed to use "home row" in typing the keyboard stories for this research. The teachers also commented that texting perpetuates the "hunt and find" method of using a keyboard for writing.

### Research Question 3

Students' views on writing and modes of transcription were captured using a survey with 18 Likert-scale questions and 2 open-ended questions in order to answer Research Question 3: What are students' attitudes and beliefs regarding the value and usage of cursive as compared to the value and usage of keyboarding? A total of 158 student participants responded to the survey. Demographic data regarding the students who participated in the survey is provided in Table 16.

Table 16

#### *Survey Participants – Student Demographics*

	Number of Respondents	Percentage
<u>Gender</u>		
Male	82	52%
Female	76	48%
<u>Grade</u>		
Fifth	67	42%
Eighth	91	58%
<u>School</u>		
School A - Fifth	9	5%
School A - Eighth	7	4%
School B – Fifth	17	11%
School B – Eighth	20	13%
School C – Fifth	41	26%
School C – Eighth	64	41%

The Likert-scale survey provided a wealth of information related to students' knowledge and usage of cursive in their daily schoolwork and their beliefs about the role of cursive writing within an increasingly digital learning environment. The rating scale continuum used “5” to indicate strong agreement and “1” to indicate strong disagreement (see Appendix H). The descriptive data for the fifth-grade survey results is provided in Table 17, and the descriptive data for eighth-grade survey results is provided in Table 18.

Table 17

*Likert-Scale Responses from Fifth-Grade Students*

Survey Question	(5) Strongly Agree	(4) Agree	(3) Unsure	(4) Disagree	(5) Strongly Disagree
I am able to write the entire cursive alphabet in capital letters.	46.3%	25.4%	16.4%	10.4%	1.5%
I am able to write the entire cursive alphabet in lowercase letters.	70.1%	16.4%	6.0%	4.5%	3.0%
I enjoy writing in cursive.	17.9%	20.9%	20.9%	11.9%	28.4%
My teacher expects me to complete assignments in cursive.	49.3%	16.3%	19.4%	7.5%	7.5%
Cursive is a skill that students need to learn.	34.8%	27.3%	12.1%	9.1%	16.7%
Cursive should be taught as a separate subject in school.	13.3%	17.9%	25.4%	13.4%	29.9%
When taking notes in class, I write in cursive.	10.6%	12.1%	15.2%	22.7%	39.4%
When taking notes in class, I write in a mixture of cursive and printing.	24.2%	27.3%	6.1%	12.1%	30.3%
Keyboarding is a skill that students need to learn.	61.2%	29.8%	3.0%	3.0%	3.0%
Students express themselves better in writing when using cursive.	13.4%	14.9%	35.9%	19.4%	16.4%
There is value in learning and using cursive.	28.4%	29.9%	14.9%	16.4%	10.4%
It is easier for me to use cursive when I write.	19.4%	7.5%	16.4%	23.9%	32.8%
My teacher uses cursive when teaching or grading papers.	35.8%	17.9%	17.9%	19.4%	9.0%
Students in my school are able to complete assignments using a keyboard.	25.4%	25.4%	35.7%	6.0%	7.5%
Students express themselves better in writing when using a keyboard.	24.6%	4.6%	47.7%	10.8%	12.3%
My school uses laptops, Chromebooks, or tablets for daily instruction.	13.8%	29.3%	16.9%	9.2%	30.8%
My class receives keyboarding (typing) instruction.	42.4%	30.3%	10.6%	10.6%	6.1%
Because there is so much technology, cursive is no longer necessary.	18.2%	9.1%	24.2%	15.2%	33.3%

Table 18

*Likert-Scale Responses from Eighth-Grade Students*

Survey Questions	(5) Strongly Agree	(4) Agree	(3) Unsure	(4) Disagree	(5) Strongly Disagree
I am able to write the entire cursive alphabet in capital letters.	28.3%	18.7%	17.8%	15.4%	19.8%
I am able to write the entire cursive alphabet in lowercase letters.	35.1%	17.6%	14.3%	15.4%	17.6%
I enjoy writing in cursive.	16.7%	14.4%	15.6%	12.2%	41.1%
My teacher expects me to complete assignments in cursive.	15.4%	4.4%	17.6%	11.0%	51.6%
Cursive is a skill that students need to learn.	17.6%	13.2%	18.6%	20.9%	29.7%
Cursive should be taught as a separate subject in school.	11.1%	7.7%	16.7%	17.8%	46.7%
When taking notes in class, I write in cursive.	16.7%	4.4%	8.9%	11.1%	58.9%
When taking notes in class, I write in a mixture of cursive and printing.	30.0%	6.6%	8.9%	8.9%	45.6%
Keyboarding is a skill that students need to learn.	53.3%	25.6%	10.0%	2.2%	8.9%
Students express themselves better in writing when using cursive.	5.6%	3.4%	32.6%	18.0%	40.4%
There is value in learning and using cursive.	11.2%	29.2%	23.6%	13.5%	22.5%
It is easier for me to use cursive when I write.	14.9%	6.9%	9.2%	11.5%	57.5%
My teacher uses cursive when teaching or grading papers.	15.7%	15.7%	25.8%	16.9%	25.9%
Students in my school are able to complete assignments using a keyboard.	38.2%	28.1%	14.6%	9.0%	10.1%
Students express themselves better in writing when using a keyboard.	8.2%	20.0%	48.2%	16.5%	7.1%
My school uses laptops, Chromebooks, or tablets for daily instruction.	37.6%	14.1%	7.1%	15.3%	25.9%
My class receives keyboarding (typing) instruction.	18.8%	31.8%	23.6%	12.9%	12.9%
Because there is so much technology, cursive is no longer necessary.	19.0%	15.4%	31.0%	16.7%	17.9%

Overall, the fifth-grade students demonstrated a greater knowledge and use of cursive as compared to the eighth-grade students. Of the fifth-grade students, 87% reported the ability to write the alphabet in cursive, but only 53% of the eighth-grade students reported the ability to do so. A majority (66%) of the fifth-grade students reported that they are required to complete their assignments in cursive, but only 20% of the eighth-grade students stated that they are required to do so. For the question, “When taking notes in class, I write in cursive,” 78% of the fifth-grade students and 79% of the eighth-grade students indicated that they “Disagree” or “Strongly Disagree.” For the question, “It is easier for me to use cursive when I write,” 57% of the fifth-grade students responded with “Disagree” or “Strongly Disagree.” The percentage for eighth-grade students on the same question jumped to 70%. The same trend was true with the students’ responses when asked if cursive should be taught as a separate subject in school; 68% of the fifth-grade students and 80% of the eighth-grade students responded with “Disagree” or “Strongly Disagree.” In response to the question, “I enjoy writing in cursive,” 40% of the fifth-grade students and 53% of the eighth-grade students responded negatively.

In spite of the lower percentage of scores related to students’ use of cursive for taking notes or for enjoyment, 58% of the fifth-grade students and 40% of the eighth-grade students responded with “Strongly Agree” or “Agree” to the statement, “There is value in learning and using cursive.” In addition, 62% of the fifth-grade students responded with “Strongly Agree” or “Agree” to the statement, “Cursive is a skill that students need to learn,” but only half of that number (31%) of the eighth-grade students agreed with the same statement. According to the survey results, 49% of the fifth-grade students and 35% of the eighth-grade students indicated that cursive is still necessary, even with the growth of technology.

The survey results also provided information about the use and relevance of the keyboard in today's classrooms, and the differences between the fifth and eighth grade students were notable. When asked, "Keyboarding is a skill that students need to learn," 91% of the fifth-grade students stated, "Agree" or "Strongly Agree," but only 79% of the eighth-grade students gave the same response. Of the eighth-grade students, 66% indicated that they are able to complete assignments in school using a keyboard, but only 51% of the fifth-grade students gave the same response. When asked, "Students express themselves better in writing when using a keyboard," 48% of the responses in both grades indicated "Unsure." When asked, "My class receives keyboarding (typing) instruction," 73% of the fifth-grade students and 51% of the eighth-grade students responded with "Agree" or "Strongly Agree." The majority of the eighth-grade students (52%) and 43% of the fifth-grade students indicated that their school uses laptops, Chromebooks, or tablets for daily instruction.

In addition to the Likert-scale responses, students were given the opportunity to respond to two conditional open-ended questions. The directions stated: "Answer Question 19 if you believe that writing in cursive is valuable." Question 19 stated: "Why do you believe that writing in cursive is valuable?" The majority of fifth-grade participants (66%) and eighth-grade participants (69%) responded to this question. Four distinct themes emerged in the following order of importance regarding the value students place on cursive: 1) cursive is needed for a future job and/or as a life skill (e.g. providing one's signature), 2) cursive is neater and faster, 3) cursive encourages discipline and maturity, and 4) cursive positively impacts your brain and your thinking.

Question 20 on the student survey was also conditional: "Answer Question 20 if you believe that writing with a keyboard is valuable." Question 20 stated: "Why do you believe that

writing with a keyboard is valuable?” Fifty-one of the fifth-grade participants (76.1%) and 90 of the eighth-grade participants (98.9%) responded to this question. Four distinct themes emerged in relationship to the value of keyboarding in this order of importance: 1) keyboarding is a faster and easier way to write and is more versatile for communicating, 2) keyboarding is needed for one’s vocational future (job), 3) technology will make handwriting obsolete, and 4) keyboarding is needed for one’s academic future (high school and college).

### **Summary of the Results**

Chapter 4 discussed the results of the study in response to the three research questions. It opened by detailing the steps taken to ensure inter-rater reliability for the standard scores on the TOWL-4. The TOWL-4 standard scores provided the data for the statistical analysis by grade level and by mode of transcription. The details of chapter 4 provided the results of the student and teacher surveys, which included responses to both Likert-scale and open-ended questions. The researcher identified common themes from the students’ comments on the surveys. The results of the teacher survey data and the transcripts from the follow-up phone interviews provided additional insights and common themes. The teacher and student surveys allowed the participants to express their opinions freely about the use of cursive and keyboards for writing.

To address Research Question 1 regarding the fluency aspect of student stories using cursive and keyboard, the researcher conducted a series of parametric and non-parametric tests to determine the statistical significance of the word count in both modes of transcription. The results indicated that students in both fifth and eighth grade produced significantly longer keyboard stories than cursive stories. Additionally, a series of parametric and non-parametric tests determined the statistical significance of the compositional quality of the students’ stories in both modes of transcription using the TOWL-4 standard scores. The students in both grades

demonstrated a significantly higher compositional quality on their stories typed on a keyboard as compared to their stories written in cursive. A parametric analysis of variance (ANOVA) determined the statistical significance between the scores of the three participating schools. A statistical difference existed between the eighth-grade cursive stories for School A and School B. No other statistical difference was found among the three schools in either cursive or keyboard in relationship to the compositional quality of the students' stories.

Research Question 2 focused on the teachers' attitudes and beliefs related to the value and usage of cursive as compared to keyboarding. Surveys and follow-up phone interviews provided qualitative data to answer this question. The researcher identified four key themes from the open-ended questions and phone interviews: 1) the use of cursive enhances the development of cognitive skills, 2) the use of cursive promotes discipline and consistency, 3) keyboarding is an important skill for today's learners, and 4) cursive has cultural relevance. The participants provided a variety of comments to validate each of the stated themes.

The final research question focused on fifth- and eighth-grade students' attitudes and beliefs on the value and usage of cursive as compared to the value and usage of keyboarding. Surveys that included both Likert-scale and open-ended responses provided qualitative data to answer the research question. When compared with the eighth-grade students' responses, the fifth-grade students reported more fluency and confidence with cursive than keyboarding. Interestingly, more fifth-grade than eighth-grade students indicated that keyboarding is a skill that students need to learn.

The students' responses to the open-ended questions mirrored in large part the teachers' responses with similar corresponding themes between the two groups. Regarding the value of cursive, the predominant student themes were: 1) cursive is needed for a future job and/or as a

life skill (e.g. providing one's signature), 2) cursive is neater and faster than printing, 3) cursive encourages discipline and maturity, and 4) cursive positively impacts your brain and thinking. Four major themes emerged on the value of keyboarding: 1) keyboarding is a faster and easier way to write, more versatile for communicating, 2) keyboarding is needed for one's vocational future (job), 3) technology will make handwriting obsolete, and 4) keyboarding is needed for one's academic future (high school and college).

In chapter 5, the quantitative data from the TOWL-4 scores and the qualitative data from the student surveys, the teacher surveys, and the teacher phone interviews are triangulated and discussed. The ramifications of the study, recommendations for future research, and implications for professional practice are examined in relationship to the modes of transcription.

## Chapter V

### Discussion

#### Introduction

Using a convergent mixed-methods approach, the researcher sought to understand and substantiate the intrinsic value that cursive brings to the thinking and writing process as the primary mode of transcription. Chapter 1 provided an overview of the study and introduced the three research questions that guided the study:

1. Do student-generated stories demonstrate a greater fluency and compositional quality in cursive than what is produced by keyboard?
2. What are teachers' attitudes and beliefs regarding the value and usage of cursive compared to the value and usage of keyboarding?
3. What are students' attitudes and beliefs regarding the value and usage of cursive compared to the value and usage of keyboarding?

To provide context for the study, the narrative briefly explored the declining use of cursive in America's schools and the growing use of technology in the classroom. Finally, the opening chapter provided a brief overview of the research methods.

Based on the work of three prominent theorists in the field of psychology and education, the theoretical framework for the development of written expression provided the empirical foundation for the literature review in chapter 2. The theoretical framework described the cognitive development of written-expression skills and modes of transcription. The literature review also explored the history of handwriting in America, the use of handwriting in today's classrooms, the growing resurgence of the use of cursive, and the use of technology in teaching and learning.

Chapter 3 provided a detailed description of the study's design and methodology. A convergent mixed-methods approach allowed the researcher to analyze and compare both quantitative and qualitative data. A pilot study validated the procedures and the instruments used for the research. Then, fifth- and eighth-grade students (N=158) from three midwestern private schools participated in the actual study by composing two stories – one written in cursive and one written by keyboard. The Test of Written Language-4 (TOWL-4), a nationally normed diagnostic test, was used to obtain quantitative data on fluency and compositional quality of both the cursive and keyboard stories. The spontaneous writing composite scores on the TOWL-4 provided a standard score and percentile rank for each student's story, and those scores correspond with other norm-referenced diagnostic tests. Form A of the TOWL-4 was used as the basis for the cursive stories, and Form B of the TOWL-4 was used as the basis for the keyboard stories.

The same students also completed a survey on their attitudes and beliefs related to the use of cursive and the use of keyboard for written language. The student survey instrument contained Likert-scale and open-ended questions. The teachers (N=9) of the participating students also completed a survey on their attitudes and beliefs about cursive and keyboard use. The teacher survey contained Likert-scale and open-ended questions. The researcher also conducted follow-up, semi-structured phone interviews with the same group of teachers to glean additional insights. The phone interviews were recorded and transcribed for analysis. Chapter 3 concluded with a description of the role of the researcher and the limitations of the study.

Chapter 4 described the steps taken to ensure the reliability and validity of the quantitative data. In order to minimize bias, the researcher had an independent certified teacher transcribe each of the students' cursive stories into a typed format. This step guarded the two

scorers for each story from knowing which ones were originally composed in cursive. To provide consistency across all the writing samples, the researcher participated by scoring all of the students' stories. Using materials provided by the authors of the TOWL-4, the researcher provided formal training for a team of 10 certified teachers on the procedures for scoring the stories. Those individuals independently scored each story a second time. The researcher then conducted an intra-class correlation procedure to determine inter-rater reliability of the TOWL-4 scores between the two scorers for each of the stories.

The researcher addressed each of the research questions using the quantitative and qualitative data collected from both teacher and student participants. The quantitative data generally showed which mode of transcription demonstrated the greatest fluency and compositional quality. The descriptive results of the Likert-scale student and teacher surveys provided valuable qualitative data. In addition, the responses to the open-ended survey questions and the teacher follow-up phone interviews revealed a series of parallel themes by the participant groups. Finally, the chapter concluded with the researcher's summary of the findings.

In this final chapter, a brief summary of the results is provided. This is followed by a discussion that triangulates the quantitative and qualitative data to understand the implications of the study. Finally, the researcher examines the significance of the findings, provides recommendations for future research, and discusses the implications for professional practice.

### **Summary of the Results**

This mixed-methods study compared the differences in fluency and compositional quality between two modes of transcription (cursive and keyboard) among fifth- and eighth-grade students. The researcher also analyzed the attitudes and beliefs of teachers and students regarding cursive's value and usage as compared to the value and usage of keyboarding.

### **Research Question 1**

The first research question addressed the issue of fluency and compositional quality. A total of 158 students wrote one story in cursive and one story by keyboarding. For the fifth-grade groups, no statistical difference existed between the cursive stories and the keyboard stories in relationship to word count (fluency). The fifth-grade students composed stories of similar length in both modes of transcription. This came as a surprise, because the student survey data indicated that the fifth-grade students did the majority of their schoolwork in cursive, not by keyboard. Therefore, it was expected that they would be more fluent in cursive (See Table 19).

At the eighth-grade level, Group A-cursive stories and Group A-keyboard stories demonstrated a statistically greater fluency than the cursive stories for Group B. There was also a statistically greater fluency for Group A-keyboard stories than the keyboard stories for Group B. A statistical difference was not found between the Group A-cursive stories and the Group B-keyboard stories. The eighth-grade students in Group A demonstrated greater fluency in both modes of transcription than the eighth-grade students in Group B. One of the eighth-grade teachers in Group A has been teaching for 40 years, and during the follow-up phone interview, that teacher described a highly rigorous routine of having students do journal and essay writing. That may explain why the eighth-grade students in Group A were able to compose so much in both modes of transcription within the given time limit (See Table 19).

In addition, the researcher compared the fluency scores between the fifth-grade students and the eighth-grade students by mode of transcription. In cursive, the fifth-grade students' fluency scores were significantly higher than the fluency scores of the eighth-grade students. Conversely, the eighth-grade students' fluency scores on keyboard stories were significantly

higher than the fifth-grade students' fluency scores in the same mode of transcription. Again, the higher cursive fluency by the fifth-grade students may have been due to the fact that their schoolwork is mainly done in cursive, so they were more adept at using that mode of transcription. The eighth-grade students did not complete their daily homework in cursive, so they may have lost the skills to work quickly in that mode of transcription. The eighth-grade students have also had more experience in keyboarding than fifth-graders, so it was expected that they could compose more words within the given time limit.

Table 19

*Comparison of Fluency (Mean Word Count)*

Grade / Mode of Transcription		Grade / Mode of Transcription		Significance Level
Fifth Grade		Fifth Grade		
Group A-Cursive	117	Group B-Keyboard	132	$p = .140$
Fifth Grade		Fifth Grade		
Group B-Cursive	134	Group A-Keyboard	126	$p = .426$
Fifth Grade		Fifth Grade		
Group A-Cursive	117	Group B-Cursive	134	$p = .098$
Fifth Grade		Fifth Grade		
Group A-Keyboard	126	Group B-Keyboard	132	$p = .547$
Eighth Grade		Eighth Grade		
Group A-Cursive	139	Group B-Keyboard	125	$p = .280$
Eighth Grade		Eighth Grade		
Group B-Cursive	89**	Group A-Keyboard	200	$p = .001^*$
Eighth Grade		Eighth Grade		
Group A-Cursive	139	Group B-Cursive	89**	$p = .001^*$
Eighth Grade		Eighth Grade		
Group A-Keyboard	200	Group B-Keyboard	125	$p = .001^*$

*Note.* \*Indicates significance ( $p < .05$ ) \*\*Indicates median score (Mann-Whitney U)

In relationship to compositional quality, the researcher analyzed the composite spontaneous writing scores (standard scores) of the TOWL-4 for each grade. For the fifth-grade students, no statistical difference was found in the compositional quality between the Group A-cursive stories and the Group B-keyboard stories. In addition, no statistical difference in compositional quality was found between the keyboard stories of the two fifth-grade groups. Group A's keyboard stories scored significantly higher in compositional quality than Group B's cursive stories, and Group A's cursive stories scored significantly higher in compositional quality than Group B's cursive stories. Overall, Group B's cursive scores were significantly lower which resulted in the statistical difference between all fifth-grade groups and modes of transcription. (See Table 20).

For the eighth-grade students, there was only one independent t-test that resulted in a significant difference in compositional quality. The standard scores for keyboard stories for Group A scored significantly higher than the standard scores for Group B-cursive. Like the fifth-grade students from Group B (same school), the eighth-grade students from Group B demonstrated significantly lower standard scores related to compositional quality in cursive than the students from Group A. No reasons for the differences were presented in the data.

Table 20

*Comparison of Compositional Quality (TOWL-4 Standard Scores)*

Grade / Mode of Transcription		Grade / Mode of Transcription		Significance Level
Fifth Grade		Fifth Grade		
Group A-Cursive	114	Group B-KeyBoard	113	$p = .834$
Fifth Grade		Fifth Grade		
Group B-Cursive	105	Group A-KeyBoard	117	$p = .002^*$
Fifth Grade		Fifth Grade		
Group A-Cursive	114	Group B-Cursive	105	$p = .012^*$
Fifth Grade		Fifth Grade		
Group A-KeyBoard	117	Group B-KeyBoard	113	$p = .419$
Eighth Grade		Eighth Grade		
Group A-Cursive	114	Group B-KeyBoard	117	$p = .476$
Eighth Grade		Eighth Grade		
Group B-Cursive	110	Group A-KeyBoard	118	$p = .012^*$
Eighth Grade		Eighth Grade		
Group A-Cursive	114	Group B-Cursive	110	$p = .134$
Eighth Grade		Eighth Grade		
Group A-KeyBoard	118	Group B-KeyBoard	117	$p = .868$

Note. \*Indicates significance ( $p < .05$ )

The researcher also compared the compositional quality scores for the cursive stories between fifth- and eighth-grade students, and then conducted the same comparison with the keyboard stories between the students in the two grades. No statistical difference in the compositional quality standard scores existed between the fifth- and eighth-grade students in either mode of transcription. Lastly, the researcher compared the compositional quality of all cursive stories to the compositional quality of all keyboard stories by combining the fifth-grade and eighth-grade data. The results indicate a higher compositional quality globally on keyboard stories as compared to cursive stories.

The researcher conducted statistical tests to determine any significant differences in standard scores in both modes of transcription among the schools. No statistical difference in the standard scores existed among the fifth-grade students on either cursive or keyboard stories. No statistical difference between the standard scores existed among the eighth-grade students on the keyboard stories, but a significant difference in the standard scores was found between School A and School B on the eighth-grade cursive stories with School B scoring higher. This may be explained by the fact that the eighth-grade language arts teacher at School B placed a heavy emphasis on essay and journal writing throughout the course. That teacher's students appear to have had much more instruction and practice in writing essays than the students in School A.

The overall TOWL-4 scores earned by the students was noteworthy. Disaggregated by grade level and mode of transcription, the mean standard scores ranged from 66 – 88%. With 50% considered average based on the norms of the test, the students in this study scored above average in their abilities to compose stories having the necessary orthographic, grammatic, stylistic, and thematic elements within the allotted time limit.

### **Research Question 2**

The second research question sought to understand the attitudes and beliefs of classroom teachers regarding the value and usage of cursive and keyboarding in the teaching/learning environment. A total of nine teacher participants completed a survey that included Likert-scale questions and open-ended questions. In addition, seven of those participants agreed to participate in a follow-up phone interview. While none of the participating teachers currently teaches cursive writing in his/her classroom due to the grade level of the students and time restraints, they all indicated the importance of cursive writing in the development of cognitive skills. One teacher stated, "I think it is more important for students to know how to write in

cursive! Studies have been done that show stronger brain connections with the fluid motions of cursive and never lifting the pencil.”

The teachers rated both modes of transcription as important skills that today’s students need to learn (78% for cursive and 100% for keyboard). Four distinct themes emerged from the survey questions and phone interviews: 1) the use of cursive enhances the development of cognitive skills, 2) the use of cursive promotes discipline and consistency, 3) keyboarding is an important skill for today’s learners, and 4) cursive has cultural relevance. Three of the four top themes emphasized the importance of cursive and its role in the development of the student.

The predominant theme expressed by the teachers was that the use of cursive enhances the development of cognitive skills. One fifth-grade teacher stated, “Cursive promotes the ability to write and think deeply and to remember your thoughts.” That same teacher went on to state, “I feel cursive is better for building brain connections.” An eighth-grade teacher stated, “Cursive writing allows us to be intentional about making sure that they [students] can make connections in their brains, and we are helping them to do that.”

Closely related to the first theme, the teachers also emphasized that the use of cursive promotes discipline and consistency. One fifth-grade teacher stated, “I see it [cursive] as a training mechanism developing reflective and motor skills that we tend to overlook. We’re so advanced with all our technology that we overlook the simple things that really in one sense add to the quality of life.” Another fifth-grade teacher stated, “I believe it [cursive] helps fluid movement and strengthens coordination. It is also excellent for discipline and consistency.” An eighth-grade teacher stated, “It is a skill to be learned just like anything else, and I also think it is a good discipline.”

One of the teacher themes underscored cursive's relevance within the culture. From historical documents to writing one's name in cursive, the teachers provided insights that reinforced this theme. An eighth-grade teacher stated, "I think that both [cursive and keyboarding] are important. Mostly though, I do believe they need to know how to read cursive, because so many historical documents are in cursive." Another eighth-grade teacher stated, "There are so many things that they [students] can't read because it is in script. They're missing out on a good majority of things including important documents, and one day they will have to write their name in cursive."

The teachers also stressed the importance of keyboarding as an important skill for today's learners. An eighth-grade teacher expressed it this way: "Because technology allows us to do things quicker, I give them [students] the option of typing or writing on projects and different things." Another eighth-grade teacher stated, "Everything we do is online, so they [students] have to be able to type and be able to communicate through a computer." That teacher went on to say, "The future for my students is going to necessitate their understanding and correct use of technology."

### **Research Question 3**

The third research question was designed to explore students' attitudes and beliefs regarding the value and usage of cursive as compared to the value and usage of keyboarding. A total of 158 students completed a survey that included Likert-scale questions and open-ended questions. The students who completed the survey were the same participants who composed the cursive and keyboard stories. An analysis of the survey results and the comments from the surveys revealed four dominant themes on the value and continued use of cursive in this order of importance: 1) cursive is needed for a future job and/or as a life skill (e.g. providing one's

signature), 2) cursive is neater and faster, 3) cursive encourages discipline and maturity, and 4) cursive positively impacts your brain and your thinking.

The predominant theme expressed by the students was that cursive is necessary for employment and/or as a life skill. The students remarked that today's employers value the knowledge of cursive. The students also saw the value in being able to provide one's signature, to read historical documents, and to understand material written in cursive. An eighth-grade student stated, "A lot of historical documents are written in cursive like our Declaration of Independence. I feel that if we don't know cursive in general, then we're not going to be able to read things." A fifth-grader stated, "You'll know how to write a check, and you can't write your signature in print, because it won't be accepted – you will have to sign it in cursive."

Even though the quantitative results validated that students can write more in less time when using a keyboard, another key theme expressed by the students in favor of cursive was that it was "faster and neater." An eighth-grade student stated, "It's [cursive] an easier, more fluid way to write." A fifth-grade student stated, "When writing in cursive, the letters flow together easily to make words."

The student responses in both grades echoed the same belief as teachers: that cursive writing is important in the development of cognitive skills, discipline, and maturity. The fact that students of this age connected a school subject (cursive) as contributing to character development excited the researcher. A fifth-grade student stated, "I think it teaches students discipline." Another fifth-grade student stated, "It is hard work to write smoothly, but it is worth it." The student surveys indicated the benefits of cursive in positively impacting one's brain and thinking. One fifth-grade student stated, "Studies have shown that writing in cursive connects the two hemispheres of the brain, which is good." An eighth-grade student stated, "It [cursive]

makes a good connection between the paper and your brain.” Another eighth grader stated, “Knowing cursive makes me think better and more deeply.” The students’ comments indicate that they have been exposed to the importance of and rationale for cursive in their educational background.

The students also highlighted the importance of technology in their own lives and how using technology is natural and efficient. Even in their youth, they understand the power of technology in the marketplace. One fifth-grade student stated, “Technology is being used more, and your workplace most likely will require you to use a keyboard.” An eighth-grade student stated, “Technology is today’s society. A technological generation is rising up, and it will always be part of our lives.”

In summary, the quantitative aspect of the study yielded empirical evidence validating that keyboard stories demonstrated a greater fluency and compositional quality than did cursive stories for both fifth- and eighth-grade students. The qualitative data from teachers and students provided evidence citing: 1) the benefits of cursive and its continued use, and 2) the need for today’s students to be adept in using a keyboard.

### **Discussion and Triangulation of the Data**

To further establish the validity of the study and its findings, it was important to triangulate the data to gain a full understanding of the issues related to cursive and the use of keyboards within the same classroom. Methodological triangulation allowed the researcher to address the three research questions by analyzing the rich quantitative and qualitative data from multiple perspectives. The benefits of triangulation include, “increasing confidence in research data, creating innovative ways of understanding a phenomenon, revealing unique findings, challenging or integrating theories, and providing a clearer understanding of the problem”

(Thurmond, 2001, p. 254). Therefore, the researcher examined the quantitative and qualitative data to determine the interconnection between them.

As stated earlier, the keyboard stories at both grade levels generally demonstrated a greater fluency and a greater compositional quality than cursive stories. On the surface, these results appear to negate the value of cursive in today's classrooms. While the higher fluency results on the keyboard stories for the eighth-grade students were anticipated due to their greater exposure to keyboard instruction and practice compared to fifth-grade students, it was also true that the fifth-grade students in this study were more fluent with their cursive stories than were the eighth-grade students. The survey results also indicated that fifth-grade students held a higher belief than eighth-grade students that cursive is a skill that students should learn. Because most of the fifth-grade teachers in this study require their students' work to be done in cursive, it is logical that the fifth-grade students would more readily embrace cursive. None of the eighth-grade teachers require their students to do their work in cursive, so naturally, the eighth-grade students may not see it as necessary or even beneficial. The eighth-grade students believed that they express themselves better using a keyboard, and the composite scores validated this belief for both fluency and compositional quality.

It is the researcher's opinion that the students in this study, particularly the fifth-grade students, may have found writing a cursive story as being routine and uninteresting. The fifth-grade students' survey results indicated that 66% of the students agreed or strongly agreed that their teachers require all schoolwork to be done in cursive. Perhaps the novelty of using a keyboard to compose stories piqued their interest, resulting in the higher fluency and compositional quality. It is also important to note that collectively, the TOWL-4 scores in both modes of transcription and for both grades were above average. This indicated that the

private-school students in this study have internalized the writing process and are able to produce quality work in both cursive and by keyboarding – even when faced with a time limit.

The scope of this study did not include an analysis of the amount of instructional time and practice devoted to cursive or keyboarding. The teachers in the study stated that the students in their schools do receive instruction in both cursive and keyboarding, but none of the teachers were definitive as to which grade this instruction begins and to what extent the instruction is emphasized in any given grade level. Further research is needed to determine and understand the correlation between the formal instruction and practice for both cursive and keyboarding and the quality of students' compositional skills.

A possible explanation as to why the students demonstrated higher scores on the keyboard stories than the cursive stories is because the keyboard stories were composed on a cloud-based word processing program. As is common with word-processing programs, misspelled words and other grammatical errors (e.g. fragmented sentences, missing punctuation) are often denoted on the screen. These visual cues on the screen may have prompted students to make corrections that they may not have made while writing on paper. In addition, there may be instances where an “auto-correct” feature would have corrected students' mistakes – even without them knowing it. It is not possible to know if or to what extent these automatic features may have contributed to the achievement of higher scores on the keyboard stories, so more research is needed on how to control for this variable.

The overarching themes derived from the survey data were similar for both teachers and students. A clear connection existed among the two groups regarding the importance of cursive. Both the students and the teachers stated that cursive positively impacts the development of cognitive skills and that cursive promotes discipline, consistency, and maturity. As one

fifth-grade student stated, “I believe it [cursive] helps fluid movement and strengthens coordination. It also is excellent discipline and helps with consistency.” A fifth-grade teacher stated, “Cursive writing allows us to be intentional about making sure that they [students] can make connections in their brains, and we are helping them to do that.” Another fifth-grade teacher stated, “Cursive changes us from having to receive immediate gratification. You have to put in more thought to what you are doing when forming your letters. It helps with neatness.”

Even though the students in both grades scored higher on keyboard stories, they clearly recognized the inherent value in learning and using cursive. Furthermore, both the teachers and the students agreed that cursive has cultural relevance – from equipping them to read and understand historical documents to giving them the skills to use cursive in the workplace or in college pursuits. As one eighth grade student stated, “A lot of historical documents are written in cursive like our Declaration of Independence. I feel that if we don’t know cursive in general, then we’re not going to be able to read things.” An eighth-grade teacher stated, “They [students] should know how to sign their name and read in cursive, but they are rarely asked to write in it past elementary.”

Students with learning differences, such as dyslexia and dysgraphia, benefit from learning and using cursive (Berninger et al., 2002; Berninger et al., 2009; Roberts et al., 2014; Roberts & Samuels, 1993). The teachers in the study praised the benefits of cursive for these students in how it helps them connect ideas. As one eighth-grade teacher stated, “Cursive is very beneficial for students with dyslexia or other type of educational limitation. It’s an easier, more fluid way to write.” A fifth-grade teacher stated, “Cursive involves fine-motor skills and brain connectivity (NILD program).” Another fifth-grade teacher stated, “I have seen that it is easier

for a student who has difficulty with fine-motor skills, because they are not picking up the pencil – it’s one fluid motion.”

The fifth-grade students placed a higher value on cursive than did the eighth-grade students. This may be due to the fact that the fifth-grade teachers regularly used cursive during instruction and in grading students’ work. The fifth-grade teachers also required their students to use cursive in their schoolwork, so using cursive was commonplace for them. Conversely, none of the eighth-grade teachers required their students to use cursive, so the eighth-grade students did not see a greater value in using cursive. As one eighth-grade student stated, “I think there is value in having students read in cursive, but not write. It is close to obsolete; however, many historical texts are composed in it.”

The teachers and students shared similar views on keyboard use as well. Both groups acknowledged that becoming a digital society is inevitable and as a result, students should be trained to skillfully use keyboarding in their vocational and academic pursuits. As one eighth-grade teacher stated, “Most jobs that they’re [students] going to go into will require the ability to navigate the Internet. The future for my students is going to necessitate their understanding and correct use of technology.”

### **Significance of the Findings**

At the heart of the study was the question, “Is cursive truly beneficial in the digital age?” The two primary modes of transcription, keyboarding and paper/pencil, are competing for relevancy in America’s classrooms (Armstrong, 2014; Berninger 2013; Karavanidou. 2017; Mueller & Oppenheimer, 2014). The results of this study mirrored that same controversy. Some of the results garnered support for cursive and its benefits, whereas other aspects of the results clearly supported the students’ proficiency when using keyboards. As one fifth-grade student

stated, “I think both skills are needed. In today’s age the skill of keyboarding may be more important. I would say that there should be an equal amount of time spent on both.”

Research shows that writing by hand stimulates brain activity and memory and encourages fine motor development and eye-hand coordination (Alonzo, 2015; Berninger, 2013; Heavens, 2015; Karavanidou, 2017; Zaner-Bloser, 2015b). Additional studies validate the importance of cursive in building literacy and cognitive skills that keyboarding cannot duplicate (Gentry, 2016; Healy, 1999; Kelly, 2006; Kersey & James, 2013; McCarney et al., 2013; Pape & Ryba, 2004; Sharp & Titus, 2016; Stevenson & Just, 2012; Trond, 2011).

In spite of the overall quantitative results that showed greater fluency and compositional quality on keyboard stories over cursive stories, the teachers in this study consistently expressed their support for the benefits of cursive: “Cursive promotes the ability to write and think deeply and to remember your thoughts,” and “Cursive writing allows us to be intentional about making sure that they [students] can make connections in their brains.” The teachers’ years of experience varied widely, but across generational boundaries, the teachers expressed a cultural need for cursive to be used in school and throughout adulthood.

The students echoed these same opinions on the inherent value of learning cursive: “It makes you smarter; it is an important skill to have,” and “Studies have shown that writing in cursive connects the two hemispheres of the brain, which is good.” To a greater extent than the teachers, the students highlighted the affective reasons for retaining cursive: “If you write in cursive you can express your feelings and character,” and “Cursive is fancier and a more formal way to write.”

Conversely, both students and teachers readily acknowledged the importance that society places on keyboarding skills. Most classrooms have Chromebooks, tablets, or some other form

of technology that can be and is used in place of paper/pencil during the school day (An et al, 2015, Black, 2015; Fuentes, et al., 2015; Herold, 2016). The explosive increase of technology has transformed the teaching and learning process (Ciampa & Gallagher, 2013; Connelly et al., 2007; Myers, 2013). Through the use of technology, students have gained instant access to information and enjoyed greater student engagement. One student said, “Technology is being used more and your work most likely will require you to use a keyboard.” Many of the students and teachers in the study made similar comments. Another student said, “You need to know keyboarding, because in college and high school you type your essays instead of writing them.” As one teacher stated during the phone interview, “We are in an era of technology, and paper will soon no longer be used.”

So why is cursive advantageous? This study demonstrated that writing in cursive is definitely slower than keyboarding, but cursive encourages summarization of incoming information and active reflection. This causes the learner to remember what is written for a longer period of time over what is written by keyboard (Hotz, 2016; Mueller & Oppenheimer, 2014; Stacy & Cain, 2015). When handwriting is used, the brain receives feedback from the fingers, and that feedback is stronger than what is received from typing (Trond, 2011). The students and teachers in this study believed that cursive encourages discipline and maturity, and that it promotes brain development and critical thinking. Therefore, there are a number of benefits for the continued instruction and use of cursive: 1) it provides cognitive stimulation and strengthens memory, 2) it fosters the ability to compose thoughts and ideas, 3) it enhances the development of fine-motor skills, and 4) it encourages self-discipline in learning and developing new skills.

The teachers articulated the need to include cursive in their scope and sequence, but they were quick to say that having time to actually teach cursive within the school day has proven nearly impossible. As a result, it is not hard to understand that the Common Core curriculum currently being used in 40 states has all but eliminated handwriting instruction (Common Core State Standards Initiative, 2016; Heavens, 2015; Universal Publishing, 2012; U.S. Department of Education, 2016).

### **Limitations of the Study**

Every research study has limitations, and chapter 3 described several limitations known at the outset of the study. In order to make the study manageable, a number of decisions were made regarding the study's design. This study was limited to three private Christian schools in the midwestern United States. Within the ACSI Christian school movement alone, the research could be expanded to more than 20,000 schools worldwide. The researcher selected participants from private Christian schools because Christian schools are generally known to still value cursive writing instruction as part of the core curriculum. It is important for the study to be replicated in other school settings, both public and private, to validate the data and to provide additional discourse about the role of cursive in the 21<sup>st</sup> century.

Beyond school type, the size of school/number of students and the grade levels selected for the study also represented a limitation. Fifth-grade students were selected based on the initial belief that they were currently receiving instruction in the usage of cursive writing. That premise turned out to be false – the fifth-grade students in each of the three participating schools had received cursive instruction in earlier grades, but not in their current grade. To provide additional insights from students beyond the years of formal cursive instruction, eighth grade students were also included in the study.

Flaws in research design also become limitations. The researcher did not anticipate that the cloud-based word-processing program used for the keyboard stories could potentially enable students to see and correct spelling, grammar, or punctuation errors while they typed. More research is necessary to solve this dilemma. Another challenge was the scoring of the students' stories. It was very labor intensive to have the 300 stories each scored twice, so if the study was expanded, that challenge would need to be addressed.

The same students were represented in both the cursive and keyboard samples, although there was not a one-to-one (pairwise) correspondence identifying which student wrote which sample. The participating teachers were directed to return the student-generated stories as a group without any identifying information on the individual students. The lack of one-to-one correspondence is a limitation of the study, because the researcher did not have paired samples with which to conduct dependent t-tests by whole grades.

The participating schools were located a considerable distance from the researcher. The distance made it necessary for the building principals of the participating schools to ensure that the teachers received the research materials in a timely fashion. Even though the researcher demonstrated great care in providing detailed instructions and adequate research materials, two of the building principals contacted him seeking clarification on some specific details of the study.

### **Recommendations for Further Research**

To further validate that cursive is beneficial or to determine if it should be discontinued in America's schools, further studies are needed. It is important to replicate this particular study in a broader context, such as in public schools, to see if the same results would be achieved. In

addition, future studies need to address the following questions:

1. How much cursive instruction, practice, and usage is needed to benefit the cognitive structures of the learner?
2. What is handwriting's role in building literacy, and how can it be measured?
3. Is there an inherent difference between using manuscript or cursive?
4. Does "cursive fatigue" exist, and if so, how can it be measured and effectively addressed?
5. How is the learners' memory and comprehension impacted by the stories they write in cursive and by keyboard?
6. Over time, will students demonstrate consistent performance using keyboarding over cursive?
7. How can quality cursive instruction and practice be achieved within the existing curricular scope and time limitations?
8. Is there an appropriate age/grade level where the learner who no longer uses cursive or who uses it sparingly should not be required to do so?
9. Is there a relationship between the amount of cursive and/or keyboarding instruction students receive and the fluency and compositional quality of their writing?

### **Implications for Professional Practice**

While this study focused on the benefits of cursive writing, cursive and keyboarding are not in opposing corners. Dr. Virginia Berninger (2013) used the expression "being bilingual by hand" (pg. 1) to describe the students who have the ability to use both paper/pencil and keyboards adeptly. This should be our focus – students should not be learning typing at the expense of handwriting or vice versa. Currently in America's classrooms, there is a growing emphasis on the use of technology in the classroom, and with the transition away from traditional

modes of writing, aspects of the educational process that foster critical thinking skills may be lost. The assumption that cursive is no longer relevant in our culture and/or that we will gain something by eliminating it from the curriculum needs to be further challenged. We must not simply assume that the move to keyboarding is best for the learner in the larger scope of the educational process. Therefore, handwriting and its benefits need to be a continued topic in the discourse about teaching and learning. In addition, there may be assumptions about the efficacy of keyboarding and technology in general that also need to be critically and empirically validated.

Cursive has been taught and used in America's classrooms for over 200 years (Dougherty, 1917; Hopkins, 2016; Thornton, 1996). As new technology has developed and evolved, it has significantly impacted the educational environment. In light of curriculum mandates, cultural influences, and ever-changing technological advances, we appear to be at a cultural crossroads regarding the viability and efficacy of cursive in the future. There are strong and scholarly opinions on both sides of the issue, but there is current, empirical evidence to support cursive's continued use. Additional research needs to be done to determine the respective roles of cursive and keyboarding for the benefit of present and future generations.

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## Appendix A

### **The Use of Cursive Writing in a Digital Age: A Mixed-Methods Analysis of the Differences Between Modes of Transcription in Private Schools**

I, \_\_\_\_\_ [name of research assistant], agree to assist the primary investigator with this study by assisting in the analysis of teacher surveys and interview data. I agree to maintain full confidentiality when performing these tasks.

Specifically, I agree to:

1. keep all research information shared with me confidential by not discussing or sharing the information in any form or format (e.g., electronic, photocopies, etc.) with anyone other than the primary investigator;
2. hold in strictest confidence the identification of any individual that may be revealed during the course of performing the research tasks;
3. not make copies of any raw data in any form or format unless specifically requested to do so by the primary investigator;
4. keep all raw data that contains identifying information in any form or format (e.g., electronic, photocopies, etc.) secure while it is in my possession. This includes:
  - keeping all digitized raw data in computer password-protected files and other raw data in a locked file;
  - closing any computer programs and documents of the raw data when temporarily away from the computer;
  - permanently deleting any e-mail communication containing the data; and
  - using closed headphones if transcribing recordings;
5. give, all raw data in any form or format (e.g., electronic, photocopies) to the primary investigator when I have completed the research tasks;
6. destroy all research information in any form or format that is not returnable to the primary investigator (e.g., information stored on my computer hard drive) upon completion of the research tasks.

Provide the following contact information for research assistant:

Printed name of research assistant \_\_\_\_\_

Address: \_\_\_\_\_ Telephone number: \_\_\_\_\_

Signature of research assistant \_\_\_\_\_ Date \_\_\_\_\_

Printed name of primary investigator \_\_\_\_\_

Signature of primary investigator \_\_\_\_\_ Date \_\_\_\_\_

## Appendix B

### Email Recruitment Letter to School Superintendents

My name is Tony Ryff, and I am the Academic Dean at [REDACTED]. I am working on my PhD at Northwest Nazarene University. I am conducting a research study for my dissertation titled: **The Use of Cursive Writing in a Digital Age: A Mixed-Methods Analysis of the Differences Between Modes of Transcription in Private Schools.**

The purpose of this email is to request your support and participation in my study. This research study targets ACSI accredited schools. As the use of technology increases in the classroom, the validity and benefits of teaching cursive writing has come into question. This study is designed to understand and validate the intrinsic value that learning and using cursive writing brings to the thinking and writing process.

The means of the study is to 1) have fifth-grade classroom teachers and eighth-grade language arts teachers complete a survey with questions about teacher attitudes and beliefs about cursive writing and their students' writing abilities and 2) have fifth- and eighth-grade students compose two written stories, one in cursive handwriting and one by digital means, and to subsequently complete a survey with questions about student attitudes and beliefs about the use of cursive writing and keyboarding. The study will allow me to share knowledge about the continued use of cursive writing in today's classrooms.

The findings of the study will be shared with you upon completion of the study. The participation of your teachers and students in this research is voluntary. If you decide to have your school participate in the study, you may withdraw your consent and stop participation at any time without penalty.

The data collected from your school will remain anonymous and your teachers' and students' surveys will not connect to you to the study unless a teacher provides his/her contact information for the opportunity for a follow-up phone interview. I will be analyzing the data. There will be no direct compensation for the time used by the participants. **Your input is extremely valuable, and your participation would be greatly appreciated.**

By participating in this study, there are no known risks, as having students and teachers provide feedback on the teaching/learning process is a normal expectation in an accredited school. It is not possible to identify all potential risks in research procedures, but the researcher has taken reasonable safeguards to minimize any known and potential, but unknown, risks.

To allow your school to participate in this research, please copy and paste the attached information onto your official school letterhead, and email or mail it to me. If you would like further clarification on the nature of the study or if you have other questions, please call or email me. Thank you for your consideration.

Sincerely,

Tony D. Ryff, Ed.S

Research Supervisor: Dr. Duane Slemmer

Doctoral Student - Northwest Nazarene University Northwest Nazarene University

[Redacted]

623 S. University Blvd.

Nampa, ID 83686

Email: [Redacted]

School Phone: [Redacted]

[Redacted]

## Appendix C

### Superintendent Permission Letter

<Date>

Mr. Tony D. Ryff, Academic Dean  


Dear Mr. Ryff:

Thank you for inviting our school to voluntarily participate in your PhD dissertation: **The Use of Cursive Writing in a Digital Age: A Mixed-Methods Analysis of the Differences Between Modes of Transcription in Private Schools**

May this letter serve as permission for <Name of School> to participate in your study for ACSI accredited schools. By granting permission, we understand and agree to:

- Provide a teacher survey to each of our fifth-grade general classroom teachers and our eighth-grade language arts teachers.
- Provide the parents/guardians of each of our fifth- and eighth-grade students a hard copy Informed Consent Letter that you will provide us. This letter will be used to secure parental permission for their child(ren)'s participation in the study.
- Give permission for the teachers to have their students compose two original stories, two days apart. One story will be written in cursive writing, and one story will be written by digital means (Chromebook, desktop computer, iPad with keyboard, etc.)
- Give permission for the teachers to have their students take a 23-question survey about their experiences with cursive writing.

Upon HRRC approval of the proposed research, we will expect the research data on or around September 1. We further understand that the findings of the study will be shared with our school upon completion of the study.

Here is the contact information for your study:

Contact person / Position \_\_\_\_\_

Contact person's Email Address \_\_\_\_\_

Contact person's Phone Number \_\_\_\_\_

Sincerely,

<Signature of Head of School>

## **Appendix D**

### **Participant Follow-Up Letter (Superintendent)**

Thank you for your school's participation in my doctoral study this past semester. It was a joy to work with your teachers in collecting their attitudes and beliefs about cursive writing and its benefits. Everyone's efforts are greatly appreciated!

I wanted to provide you some of the results of my research (see below). Upon completion of my doctoral program, I will provide you a link to my completed study. If you have any questions, you are warmly welcomed to contact me.

[provide some data]

Thank you again for your help,

Tony D. Ryff

Doctoral Student Northwest Nazarene University  
[REDACTED]

### **Participant Follow-Up Letter (Classroom Teachers)**

Thank you for your participation in my doctoral study this past semester. It was a joy to work with you in collecting your attitudes and beliefs about the benefits and practices regarding the instruction and use of cursive writing and keyboarding in your school. Your efforts are greatly appreciated!

I wanted to provide you some of the results of my research (see below). Upon completion of my doctoral program, I will provide you a link to my completed study. If you have any questions, you are warmly welcomed to contact me.

[provide some data]

Thank you again for your help,

Tony D. Ryff

Doctoral Student Northwest Nazarene University  
[REDACTED]

## Appendix E

### INFORMED CONSENT FORM (Teachers)

#### A. PURPOSE AND BACKGROUND

Tony D. Ryff, a doctoral student in the Department of Graduate Education at Northwest Nazarene University is conducting a research study related to the use and benefits of cursive writing in ACSI accredited schools. Tony serves as Academic Dean at [REDACTED], an ACSI accredited school.

The purpose of this email is to solicit your support and participation in the study. This research study is targeting ACSI accredited schools. As the use of technology increases in the classroom, the validity and benefits of teaching cursive writing has come into question. This study is designed to understand and validate the intrinsic value that learning and using cursive writing brings to the thinking and writing process.

We appreciate your involvement in this project designed to benefit teachers and students as the use of technology in the classroom continues to expand.

You are being asked to participate in this study because you are a healthy volunteer, over the age of 18.

#### B. PROCEDURES

If you agree to be in the study, the following will occur:

1. You will be asked to sign this Informed Consent Form, volunteering to participate in the study.
2. You will be asked to complete a hard-copy survey with questions related to:
  - handwriting instruction in your classroom including the curriculum used,
  - written expression instruction in your classroom including the curriculum used,
  - the use of technology in your classroom, and
  - your attitudes and beliefs about your students' writing and its quality.The survey is designed to take approximately 15 minutes to complete.
3. You will be asked to distribute an informed consent form for each student in your class to his/her parent or legal guardian for permission to participate in the study.
4. You will be asked to administer Subtest 7 of *The Test of Written Language-4* to your students (Form A – story written in cursive handwriting and Form B – story written by digital means).
5. You will be given the opportunity to participate in a follow-up phone interview to answer questions about your attitudes and beliefs about the value and usage of cursive and the value and usage of keyboarding.

The teacher surveys may be completed at any time. The student surveys should be completed during a normal school day during the language arts block of instruction.

### **C. RISKS/DISCOMFORTS**

1. Some of the survey questions may not be applicable in your setting, and you are free to decline to answer any questions you do not wish to answer or to stop participation at any time.
2. Because permission to participate in the study given by the parents of your students is also voluntary and may be withdrawn at any time, the potential exists for some students in your class to *not* be subjects in the study in terms of forwarding the data to the researcher.
3. Confidentiality: Participation in research may involve a loss of privacy; however, your records will be handled as confidentially as possible. No individual identities or school names will be used in any reports or publications that may result from this study. All data from teacher and student surveys will be kept in a locked file cabinet, password protected computer or in password protected files. In compliance with the Federalwide Assurance Code, data from this study will be kept for three years, after which all data from the study will be destroyed (45 CFR 46.117).
4. Only the primary researcher and the research supervisor will be privy to data from this study. As researchers, both parties are bound to keep data as secure and confidential as possible.

### **D. BENEFITS**

There will be no direct benefit to you from participating in this study. However, the information you provide may help educators to understand the benefits of cursive writing in a digital age.

### **E. PAYMENTS**

There are no payments for participating in this study.

### **F. QUESTIONS**

If you have questions or concerns about participation in this study, you should first talk with the researcher. Tony D. Ryff can be contacted via email at [REDACTED], via telephone at [REDACTED]. If for some reason you do not wish to do this you may contact Dr. Duane Slemmer, Doctoral Committee Chair at Northwest Nazarene University, via email at [REDACTED], via telephone at [REDACTED] or by writing to him at 623 South University Blvd, Nampa, Idaho 83686.

### **G. CONSENT**

You will be given a copy of this consent form to keep.

**PARTICIPATION IN RESEARCH IS VOLUNTARY.** You are free to decline to be in this study, or to withdraw from it at any point. Your decision as to whether or not to participate in this study will have no influence on your present or future status as a student at Northwest Nazarene University.

*I give my consent to participate in this study:*

---

Signature of Study Participant

---

Date

*I give my consent for direct quotes to be used in this study:*

---

Signature of Study Participant

---

Date

**THE NORTHWEST NAZARENE UNIVERSITY HUMAN RESEARCH REVIEW COMMITTEE HAS REVIEWED THIS PROJECT FOR THE PROTECTION OF HUMAN PARTICIPANTS IN RESEARCH.**

## Appendix F

### INFORMED CONSENT FORM (Parent/Guardian)

#### A. PURPOSE AND BACKGROUND

Tony D. Ryff, a doctoral student in the Department of Graduate Education at Northwest Nazarene University is conducting a research study related to the use and benefits of cursive writing in ACSI accredited schools. We appreciate your involvement in this project designed to benefit teachers and students as the use of technology in the classroom continues to expand.

You are being asked to grant permission for your child to participate in this study through: 1) writing a 15-minute essay in cursive, 2) writing a 15-minute essay by digital means (i.e. Chromebook), and 3) the completion of a 23-question survey. These activities will be conducted during your child's normal school day during his/her language arts instruction.

#### B. PROCEDURES

If you agree to be in the study, the following will occur:

1. You will be asked to sign this Informed Consent Form, allowing your child to participate in the study.
2. Your child will be asked to complete a survey with questions related to:
  - handwriting instruction in his/her classroom,
  - the use of cursive writing in his/her schoolwork,
  - the use of technology in his/her classroom, and
  - his/her attitudes and beliefs about cursive writing.

The survey is designed to take approximately 10 minutes to complete.
3. Your child will be asked to compose two original essays:
  - A 15-minute time period will be given to write an original essay in cursive using a picture as the topic of the story
  - A 15-minute time period will be given to write an original essay using digital means (Chromebook or other digital device) using a different picture as the topic of the story.

There will be two days between the writing of the first essay and the writing of the second essay.

#### C. RISKS/DISCOMFORTS

1. Some of the survey questions may not be applicable to your child, and you and your child are free to decline to answer any questions you do not wish to answer or to stop participation at any time.
2. Because permission for your child to participate in the study is voluntary and may be withdrawn at any time, the potential exists for some students in his/her class to *not* be subjects in the study in terms of forwarding the data to the researcher.

3. Confidentiality: Participation in research may involve a loss of privacy; however, your child's answers will be handled as confidentially as possible. No individual identities or school names will be used in any reports or publications that may result from this study. All data from student surveys will be kept in a locked file cabinet, password protected computer or in password protected files. In compliance with the Federalwide Assurance Code, data from this study will be kept for three years, after which all data from the study will be destroyed (45 CFR 46.117).
4. Only the primary researcher and the research supervisor will be privy to data from this study. As researchers, both parties are bound to keep data as secure and confidential as possible.

#### **D. BENEFITS**

There will be no direct benefit to you or your child from participating in this study. However, the information your child provides may help educators to understand the benefits of cursive writing in a digital age.

#### **E. PAYMENTS**

There are no payments for participating in this study.

#### **F. QUESTIONS**

If you have questions or concerns about participation in this study, you should first talk with the researcher. Tony D. Ryff can be contacted via email at [REDACTED], via telephone at [REDACTED]. If for some reason you do not wish to do this you may contact Dr. Duane Slemmer, Doctoral Committee Chair at Northwest Nazarene University, via email at [REDACTED], via telephone at [REDACTED] or by writing to him at 623 South University Blvd, Nampa, Idaho 83686.

#### **G. CONSENT**

You will be given a copy of this consent form to keep.

**PARTICIPATION IN RESEARCH IS VOLUNTARY.** You are free to decline to be in this study, or to withdraw from it at any point. Your decision as to whether or not to participate in this study will have no influence on your or your child's present or future status as a student at Northwest Nazarene University.

*I give my consent for my child to participate in this study:*

\_\_\_\_\_  
Signature of Parent/Guardian

\_\_\_\_\_  
Date

NAME OF STUDENT \_\_\_\_\_

**THE NORTHWEST NAZARENE UNIVERSITY HUMAN RESEARCH REVIEW COMMITTEE HAS REVIEWED THIS PROJECT FOR THE PROTECTION OF HUMAN PARTICIPANTS IN RESEARCH.**

## Appendix G

### TEACHER SURVEY

Instructions: This survey asks you to provide your honest opinions about the use of cursive and about the use of digital devices in today's classrooms. Please answer each question.

**For each statement below, please circle the number in the space that best describes your answer related to the use of cursive and the use of digital devices for writing.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Strongly Agree</b>	<b>Agree</b>	<b>Unsure</b>	<b>Disagree</b>	<b>Strongly Disagree</b>

Statement	Circle Your Response (1 – 5)
1. I expect my students to submit their written work in cursive.	1   2   3   4   5
2. I enjoy teaching cursive.	1   2   3   4   5
3. I use cursive when writing (taking/writing notes, routine writing, daily tasks, grading papers, etc).	1   2   3   4   5
4. I use cursive during instruction with my class (e.g. when lecturing, demonstrating, etc.).	1   2   3   4   5
5. Cursive is a skill that today's students need to learn.	1   2   3   4   5
6. Cursive should be taught as a separate subject.	1   2   3   4   5
7. It would be beneficial for me to receive additional training on how to teach cursive.	1   2   3   4   5
8. My students receive keyboarding (typing) instruction at school.	1   2   3   4   5
9. My students are able to complete assignments using a keyboard.	1   2   3   4   5
10. Keyboarding is a skill that students need to learn.	1   2   3   4   5
11. My school uses laptops, Chromebooks, or tablets for daily instruction in the upper elementary and/or middle school.	1   2   3   4   5
12. Students express themselves better in writing when using a keyboard as the method.	1   2   3   4   5

1	2	3	4	5	
Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree	
Statement					Circle Your Response (1 – 5)
13. Students express themselves better in writing when using cursive as the method.					1   2   3   4   5
14. My students are able to choose whether to use cursive or some other form of written communication on their assignments and tests.					1   2   3   4   5
15. In light of today's available technology, cursive is no longer necessary.					1   2   3   4   5
16. I give my students the choice whether to use cursive or printing on their written work.					1   2   3   4   5
17. I plan instructional time for students to practice the formation of cursive letters in some fashion.					1   2   3   4   5
18. I provide a handwriting grade on my students' report cards.					1   2   3   4   5

Part 2 – Click on the response that most closely fits your opinion.

19. I teach cursive in my class:

- Daily                       As needed  
 Weekly                       Not at all

20. Did you receive training in your teacher preparation program on how to teach cursive?

- Yes                       No

Part 3 – Demographics: Please mark your answers.

21. Gender:

- Male                       Female

22. Grade level you currently teach:

- Fifth                       Eighth

23. How many years have you been teaching?

1 – 10 years

11 – 20 years

More than 20 years

Part 4 – Please express your opinion to the following questions:

24. Is it more important for students to know how to write in cursive or by keyboard? Why do you think so?

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25. If you teach cursive, why do you teach it?

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26. If you teach cursive, do you use a formal handwriting program/curriculum? If so, which program/curriculum?

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27. If you do not teach cursive, why do you not teach it?

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28. If you have received training to teach cursive, what kind of training did you receive?

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29. Do you know how to write in cursive? If so, where did you learn to write in cursive?

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30. Is there an inherent value of having students use cursive? Please explain.

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Thank you for your participation! If you would be interested and willing to have a follow-up phone interview regarding your views and opinions on cursive writing, please provide your contact information.

Name \_\_\_\_\_ Phone Number \_\_\_\_\_

Email Address: \_\_\_\_\_

## Appendix H

### STUDENT SURVEY

Instructions: This survey asks you to provide your honest opinions about the use of cursive handwriting and about your use of digital devices for writing. Please answer each question. Do not put your name on the survey.

**Read each statement carefully and circle the number in the space that best describes your answer related to the use of cursive handwriting and the use of digital devices for writing.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Strongly Agree</b>	<b>Agree</b>	<b>Unsure</b>	<b>Disagree</b>	<b>Strongly Disagree</b>

Statement	Circle Your Response (1 – 5)
1. I am able to write the entire cursive alphabet in capital letters.	1   2   3   4   5
2. I am able to write the entire cursive alphabet in lowercase letters.	1   2   3   4   5
3. I enjoy writing in cursive.	1   2   3   4   5
4. My teacher expects me to complete assignments in cursive.	1   2   3   4   5
5. Cursive is a skill that students need to learn.	1   2   3   4   5
6. Cursive should be taught as a separate subject in school.	1   2   3   4   5
7. When taking notes in class, I write in cursive.	1   2   3   4   5
8. When taking notes in class, I write in a mixture of cursive and printing.	1   2   3   4   5
9. Keyboarding (typing) is a skill that students need to learn.	1   2   3   4   5
10. Students express themselves better in writing when using cursive.	1   2   3   4   5
11. There is value in learning and using cursive.	1   2   3   4   5

<b>Statement</b>	<b>Circle Your Response (1 – 5)</b>
12. It is easier for me to use cursive when I write.	1 2 3 4 5
13. When my teacher is teaching, he/she uses cursive when writing on the whiteboard or when grading my papers.	1 2 3 4 5
14. Students in my school are able to complete assignments using a keyboard.	1 2 3 4 5
15. Students express themselves better in writing when using a keyboard.	1 2 3 4 5
16. My school uses laptops, Chromebooks, or tablets for daily instruction in the upper elementary and/or middle school.	1 2 3 4 5
17. My class receives keyboarding (typing) instruction.	1 2 3 4 5
18. Because there is so much available technology, cursive is no longer necessary.	1 2 3 4 5

Answer Question 19 if you believe that writing in cursive is valuable:

19. Why do you believe that writing in cursive is valuable?

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Answer Question 20 if you believe that writing with a keyboard is valuable:

20. Why do you believe that writing with a keyboard is valuable?

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About You – Please mark the response that describes you on each of these items:

21. Gender:

Male

Female

22. Grade Level:

Fifth Grade

Eighth Grade

23. If you know how to write in cursive, in what grade did you first learn this?

Kindergarten

First Grade

Second Grade

Third Grade

Fourth Grade

Fifth Grade

Sixth Grade

Seventh Grade

Eighth Grade

Thank you for your participation in this survey. Your answers will help other Christian school students as they continue learning how to be great writers!

## Appendix I

### Sample Teacher Follow-Up Phone Interview Questions

General Reminders:

- Thank the interviewee for his/her time and significant contribution to the study.
- Take care not to bias the interview by expressing own opinions on the topic of study.
- Clearly indicate that the phone interview is voluntary and that the participant may withdraw from the interview at any time.
- Ask permission to digitally record the interview.
- Have participant state his/her name, grade level, school.

The following script and questions will be used for the follow-up phone interview with selected participants who provide their contact information on the teacher survey:

1. How many years have you been teaching?
2. How many years have you been teaching at (name of participating school)?
3. Do you have teaching experience at another school(s)? Explain.

This is the bank of questions that I will draw upon based upon survey responses already provided by the individual:

1. Explain why you believe cursive should/should not be taught.
2. At what grade level is cursive writing introduced?
3. If you do not teach cursive writing, why not?
4. Do students at your school receive a formal grade for handwriting?
5. At what grade is keyboarding for essay writing and/or taking notes introduced?
6. What are the strengths/weaknesses of the current cursive writing curriculum in your school?
7. What other handwriting programs have you used and what are your opinions about them?
8. Describe your views on the quality of student compositions and how they compare to (five/ten/twenty) years ago in terms of the mode of transcription.
9. Has there been a change in the quality of student compositions as a result of the integration of technology in the classroom? Explain.

10. What language arts program is used in your school to teach writing skills (i.e. Six Traits Writing, etc.)?
11. What are the benefits (if any) of retaining cursive writing into the future?
12. Is it more important for students to know how to write in cursive or by keyboard? Why do you think so?

Thank the individual for his/her participation. Offer results of the study.

# Appendix J

## TOWL-4 Scoring Template

### Story Scoring Form

Section 5. Story Scoring (Note: The Story Composition subject should be scored according to adult standards for composition rather than age or grade standards.)

Item	Scoring Criteria	Score
1.	Sentences begin with a capital letter. 0 = 3 or more mistakes 1 = 1-2 mistakes or printed in all capital letters 2 = no mistakes	<input type="text"/>
2.	Paragraphs (clearly indicates paragraphs with indentation or space between) 0 = none 1 = 1 2 = 2-3 or more	<input type="text"/>
3.	Uses quotation marks. Must have both opening and closing quotation marks. Ex: "You saw him." It was very "heroic." 0 = no 1 = yes	<input type="text"/>
4.	Uses commas to set off a direct question. Ex: Mary said, "Hello." Mary said: "Hello." 0 = no 1 = yes	<input type="text"/>
5.	Correctly uses an apostrophe at least once. Ex: can't, the dog's, student's 0 = no 1 = yes	<input type="text"/>
6.	Uses a question mark (?) (need not be used correctly) 0 = no 1 = yes	<input type="text"/>
7.	Uses an exclamation point (!) (need not be used correctly) 0 = no 1 = yes	<input type="text"/>
8.	Capital proper nouns including those in story title. Ex: Cheryl, Mr. Jones, Elm Street 0 = no or not on proper nouns 1 = sometimes or printed in all capital letters 2 = always clearly indicates upper-case Number of nonduplicated misspelled words: 0 = 6 or more 1 = 3-5 2 = 0-2	<input type="text"/>
10.	Uses apostrophes, ellipses, hyphens, parentheses, brackets (need not be used correctly) 0 = no 1 = yes	<input type="text"/>
11.	Preparatory sentence - Usually a sentence without both a subject and a verb. Ex: When I saw the dog, looking happy and excited. 0 = yes 1 = no	<input type="text"/>

Item	Scoring Criteria	Score
12.	Run-on/Runback sentence. 0 = yes 1 = no	<input type="text"/>
13.	Compound sentences - Two complete sentences connected by a conjunction, colon, or semicolon. Both sentences must have a subject and verb. 0 = none 1 = 1 2 = 2-4 or more	<input type="text"/>
14.	Uses meaningful conjunctions other than and (and, for, yet, etc.) when forming compound sentences count each conjunction only once. Ex: I ran but he caught me. 0 = no 1 = 1 2 = 2 or more	<input type="text"/>
15.	Introductory phrases and clauses. Two or more words introducing a sentence; need not be set off by a comma. Ex: Of course, when I look back. 0 = none 1 = 1-2 2 = 3 or more	<input type="text"/>
16.	Noun-verb disagreements. Ex: They was singing. 0 = more than one error 1 = 1 error 2 = perfect, no errors	<input type="text"/>
17.	Sentences in paragraph(s). 0 = 1 paragraph, 1 sentence 1 = 1 paragraph, 2 or more sentences 2 = 2 or more paragraphs, 2 or more sentences in at least 1 paragraph 3 = 2 or more paragraphs, 2 or more sentences in at least 1 paragraph	<input type="text"/>
18.	Sentence composition. 0 = many badly constructed sentences 1 = introductory and concluding phrases 2 = a variety of well-constructed compound and complex sentences 3 = number of correctly spelled words having ones or zeros letters (count a word only once); an apostrophe counts as a letter. 0 = 0-3 1 = 4-7 2 = 8-14 3 = 15 or more	<input type="text"/>
20.	Number of words with three syllables or more that are spelled correctly (count a word only once). 0 = 0-2 1 = 3-4 2 = 5 or more	<input type="text"/>
21.	Uses on as appropriately. 0 = uses on as frequently at least once 1 = uses on as frequently at least once 2 = uses on as appropriately at least once	<input type="text"/>

Total Raw Score

### Story Code

Item	Scoring Criteria	Score
1.	Story beginning. 0 = abrupt, weak 1 = satisfactory, somewhat interesting 2 = gripping, exceptionally engaging	<input type="text"/>
2.	Definitely refers to a specific event occurring before or after the picture. 0 = no 1 = 1 2 = 2	<input type="text"/>
3.	Story sequence. 0 = a series of random, disjointed, or unrelated statements 1 = has some sequence 2 = moves smoothly and coherently from start to finish	<input type="text"/>
4.	Plot (storyline). 0 = uninteresting, dull flat 1 = interesting, logical, acceptable 2 = intriguing, well-crafted	<input type="text"/>
5.	Characters show feelings/emotions. 0 = no 1 = some mild or subtle emotion (upset, smiling, laughing, excited, happy) 2 = strong emotion level (loud)	<input type="text"/>
6.	Story ending (strong level-lead). 0 = holding, unstable, open 1 = interesting, satisfying 2 = exciting, compelling, exceptional	<input type="text"/>
7.	Story ending. 0 = abrupt, weak 1 = logical, definite ending 2 = clever, inventive	<input type="text"/>
8.	Writing style. 0 = immature, dull, underdeveloped 1 = descriptive, matter-of-fact 2 = artistic, stylish, exceptional	<input type="text"/>
9.	Story 1. 0 = no 1 = single focused, coherent, interesting 2 = engaging, unique, gripping	<input type="text"/>
10.	Story vocabulary - one point for each of the 10 choices. 0 = 0-3 1 = 4-7 2 = 8 or more items	<input type="text"/>
11.	Overall vocabulary used in story. 0 = sparse, immature 1 = satisfactory, adequate, competent 2 = rich, mature, vigorous	<input type="text"/>

Total Raw Score

Story:  
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## Appendix K

### TOWL-4 Scoring Form

Form: A  B

Age-based Norms

Grade-based Norms

Spring (January–June)

Fall (July–December)

Test of Written Language—Fourth Edition

# TOWL-4

Record/Story Scoring Form

Donald D. Hammill Stephen C. Larsen



---

#### Section 1. Identifying Information

Name \_\_\_\_\_ Female  Male  Grade \_\_\_\_\_

Year      Month      Day

Date Tested \_\_\_\_\_ School \_\_\_\_\_

Date of Birth \_\_\_\_\_ Examiner's Name \_\_\_\_\_

Age \_\_\_\_\_ Examiner's Title \_\_\_\_\_

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#### Section 2. Subtest Performance

Subtest	Raw Score	%ile Rank	Scaled Score	SEM	Descriptive Term
1. Vocabulary (VO)	_____	_____	<input type="text"/>	1	_____
2. Spelling (SP)	_____	_____	<input type="text"/>	1	_____
3. Punctuation (PU)	_____	_____	<input type="text"/>	1	_____
4. Logical Sentences (LS)	_____	_____	<input type="text"/>	1	_____
5. Sentence Combining (SC)	_____	_____	<input type="text"/>	1	_____
6. Contextual Conventions (CC)	_____	_____	<input type="text"/>	1	_____
7. Story Composition (SCo)	_____	_____	<input type="text"/>	1	_____

---

#### Section 3. Composite Performance

Composite	Subtest Scaled Score							Sum of Scaled Scores	%ile Rank	Descriptive Term	Composite Index	Difference Score
	VO	SP	PU	LS	SC	CC	SCo					
Contrived Writing _____								<input type="text"/>	_____	_____	<input type="text"/>	<input type="text"/>
Spontaneous Writing _____								<input type="text"/>	_____	_____	<input type="text"/>	<input type="radio"/> Not important
Overall Writing _____								<input type="text"/>	_____	_____	<input type="text"/>	<input type="radio"/> Statistical 6 or above
											<input type="text"/>	<input type="radio"/> Clinical 25 or above (Form A) 20 or above (Form B)

---

#### Section 4. Descriptive Terms

Subtest Scaled Score	1–3	4–5	6–7	8–12	13–14	15–16	17–20
Descriptive Term	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior
Composite Index Score	<70	70–79	80–89	90–110	111–120	121–130	>130

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### Appendix L

### TOWL-4 Stimulus Picture – Form A



A

Appendix M

TOWL-4 Stimulus Picture – Form B



## Appendix N

### NIH Certificate

