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Best Practice for Developmentally Appropriate Kindergarten Handwriting Instruction

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### **Abstract**

Handwriting is a significant component of literacy development in young children. It is a foundational skill that will influence students' reading, writing, language use, and critical thinking. A review of the literature finds the following themes of high importance when presenting writing instruction in an early childhood classroom: automaticity of transcription skills through repeated practice, letter writing fluency before compositional fluency, writing as a critical step in overall literacy development, the role of explicit instruction as intervention for writing difficulties, and the lack of proper preservice training or professional development for teachers to integrate appropriate early writing practices into kindergarten classrooms. In this document, best teaching practices for handwriting instruction in kindergarten are offered and recommended as part of a balanced age-appropriate early childhood literacy program.

### Best Practice for Developmentally Appropriate Kindergarten Handwriting Instruction

Handwriting is the activity of expressing ideas, opinions, and views in print (Gerde, Bingham, & Wasik, 2012). It is a foundational skill crucial for literacy success (Handwriting in the 21<sup>st</sup> Century, 2014) which involves communicating, composing (Gerde, Bingham, & Wasik, 2012), and “thinking with a pencil” (National Association for the Education of Young Children [NAEYC], 1998). Handwriting is a major occupation in childhood and is essential for the child’s participation in the classroom environment (Van Hartingsveldt, De Groot, Aarts, & Nijhuis-Van Der Sanden, 2011). Handwriting is a critical skill in school and life as it helps to demonstrate, support, and deepen individuals’ knowledge and understanding of themselves, their relationships, and their world (Mo, Kopke, Hawkins, Troia, & Olinghouse, 2014). This article discusses the development of handwriting, conducts a review of the current literature of handwriting and its application to young children, recommends best practices for appropriate kindergarten handwriting instruction, and notes the implications for future research and ongoing practice in early childhood education.

The power of writing is expressing one’s own ideas in ways that can be understood by others (NAEYC & International Reading Association [IRA], 2009). The act of handwriting requires matching a motor program to the formation of a letter and then executing the program. The child needs to visualize the letter, recall the formation, and then write the letter accurately. Handwriting also requires spatial organization skills which helps children visually place the letters on lines and spaces between letters and words accurately (Olsen & Handwriting Without Tears, 2014). Educators are charged with instructing children to combine these processes and help students develop legible writing that can be produced quickly with little conscious attention (Graham, 2010).

## Literacy Development

Writing is a foundational skill firmly tied to literacy development. One of the best predictors of whether a child will function competently in school and go on to contribute actively in our increasingly literate society is the level to which the child progresses in reading and writing. Writing requires an early year fundamental insight called the alphabetic principle, which is the understanding that there is a systematic relationship between letters and sounds (NAEYC, 1998). Reading skills, such as phonemic awareness and decoding, tap similar types of phonological and orthographic knowledge required for writing (Ritchey & Coker, 2014). Children consolidate information into patterns that allow for automaticity and fluency in reading and writing (NAEYC, 1998). The skills along the developmental continuum include three primary components: (a) transcription; (b) executive functions regulating focused attention, inhibitory control, and mental shifting during planning, reviewing, and revising of text as well as strategies for self-regulation; and (c) text generation, or transformation of ideas to language representations in writing (Kent, Wanzek, Petscher, Al Otaiba, & Young-Suk, 2014).

Handwriting requires careful perception and production of the distinguishing features of each letter. There is a distinct advantage to students' acquisition of alphabet knowledge when they are able to identify letter forms through the detection of unique features. The act of forming letters through handwriting builds kinesthetic and visual memory, thus helping students (including dyslexic students) to more readily acquire alphabet knowledge (Jones & Hall, 2013). Children not only learn to read more quickly when they first learn to write by hand, but they also remain better able to generate ideas and retain information (Konnikova, 2014).

Literacy development is multidimensional and is linked to the child's reading and writing experiences in the home and at school. Emergent literacy theory proposes that listening,

speaking, reading, and writing abilities develop concurrently and interrelatedly rather than sequentially (Bazyk et al., 2009). Oral vocabulary skills play a role as young writers attempt to generate words to convey their ideas in writing. Reduced oral vocabulary or a lack of vocabulary would mean that a writer has fewer words or no words available in the translation process, possibly resulting in ideas that are less precise or simpler, or writing shorter text. A lack of adequate grammatical skills could impede sentence construction during writing. Additionally, the ability to remember and restate (imitate) sentences could reflect difficulty holding words or ideas together long enough in memory to allow conversion to paper. Skilled writers are able to generate language more efficiently than less-skilled writers which is a key predictor of writing quality (Ritchey & Coker, 2014).

### **Neural Pathways**

Through modern brain imaging techniques, researchers have found that neural activity in children who practiced printing (manuscript writing) by hand was far more advanced than in children who just looked at letters (Handwriting in the 21<sup>st</sup> Century, 2014). When writing letters and words, children need not only control the fine movements and force of the fingers and hand, but attend to the relevant stimulus, keep in working memory of the target to be copied, coordinate visual and manual movements, and integrate this perceptual and motor information with linguistic rules about orthographic structure (Maldarelli, Kahrs, Hunt, & Lockman, 2015). Skilled writing is complex, requiring extensive self-regulation of a flexible, goal-directed, problem-solving activity (Harris, Graham, Friedlander, & Laud, 2013). The neural pathways set through developing automaticity with fine motor movements offers tactile feedback that may help facilitate composing in young children as well because it activates multiple brain regions (Fitzpartick, Vander Hart, & Cortesa, 2013).

## Competency

### Preschool

The foundational skills of handwriting begin well before a child enters kindergarten. The scribbling and letter-like forms produced by preschoolers develop directionality and linearity (Handwriting in the 21<sup>st</sup> Century, 2014). Young children also acquire substantial knowledge of the alphabetic system, process letter-sound relationships, and learn to read some words from their initial literacy experiences and interactions with adults (NAEYC, 1998). Children's literacy experiences in preschool predict their growth in writing performance in kindergarten. Children in preschool spend about 37% of their day engaged in fine motor skill activities. Only about 10% of that time is spent with paper and pencil- but kindergartners spend nearly half their day engaged in fine motor activities and nearly half that time on paper and pencil tasks. Preschool teachers are encouraged to introduce more writing tasks to help their students make the leap to kindergarten successfully. Children with stronger fine motor skills do better not only in literacy tasks such as letter writing but also in kindergarten math (Handwriting in the 21<sup>st</sup> Century, 2014).

### Kindergarten

Emergent writing in kindergarten predicts later literacy skills including decoding, spelling, and reading comprehension (Gerde, Bingham, & Wasik, 2012). Per Common Core State Standards, children in kindergarten are expected to produce complete sentences in writing and to write about experiences, stories, people, objects, or events (Puranik & AlOtaiba, 2012). The contribution of handwriting readiness training programs is quite meaningful, especially among the kindergarten-age children whose achievement in handwriting readiness is especially poor. In their research Lifshitz & Har-Zvi (2015), found that half-way through 1<sup>st</sup> grade children

who demonstrated a low level of handwriting readiness in kindergarten had significantly poorer handwriting skill than the children who had moderate and high level of handwriting readiness in kindergarten.

### **Later in Life**

It is essential and urgent to teach children to read and write competently, enabling them to achieve today's high standards of literacy (NAEYC, 1998). Students who do not learn to write well are at a great disadvantage, because weaker writers are less likely to use writing to extend their learning, more likely to see their grades suffer, less likely to attend college and successfully complete a college degree, and more likely to face challenges in attaining successful employment and promotions in today's competitive job market (Mo, Kopke, Hawkins, Troia, & Olinghouse, 2014). In addition, students are required to write essays by hand on standardized tests such as the SAT or ACT (Fitzpatrick, Vander Hart, & Cortesa, 2013). Excellent instruction builds on what children already know, and can do, and provides knowledge, skills, and dispositions for lifelong learning. Children need to learn not only the technical skills of reading and writing but also how to use these tools to better their thinking and reasoning (NAEYC, 1998). Children with writing disorders have a tendency toward lower mathematics achievement, low verbal IQ, and increased attentional difficulties (Feder & Mainemer, 2007).

### **Risk Factors**

An important first step in strengthening students' writing achievement is validating procedures that can be useful for identifying which students are at risk for later writing difficulties, whether it is specific writing disabilities or more general writing difficulty (Ritchey & Coker, 2014). No other school task requires as much synchronization as handwriting (Feder &



Mainemer, 2007). Early intervention can optimize writing development for young and at-risk writers, minimizing the number of students who would subsequently develop more severe writing difficulties (Parker, Burns, McMaster, & Shapiro, 2012). Handwriting may constrain beginning writers in at least four ways: these children's written text may be less accessible to others because the legibility of their handwriting is still developing, what they say in their writing may be devalued to some degree as legibility of text can influence the evaluation of writing content, young children's handwriting may impede their writing efforts by interfering with other writing processes as a result of switching attention during composing to think about how to form a particular letter, and difficulties with handwriting may constrain young children's development as writers (Graham et al., 2008). In addition, fine motor skills are the strongest predictor of special education referral and the second strongest predictor of kindergarten retention (Handwriting in the 21<sup>st</sup> Century, 2014).

### **Fluency**

If children cannot form letters with reasonable legibility and speed, they cannot translate the language in their minds into written text (Graham, 2010). Legibility includes proper formation, directionality, size, tilt of letters, good line quality, and proper organization on the page (Lifshitz & Har-Zvi, 2015). Handwriting fluency (speed and legibility) is the single best predictor of quality and length of elementary students' written compositions (Jones & Hall, 2013). Just as young readers must learn to decode fluently so they can focus on comprehension, young writers must develop fluent, legible handwriting (and must master other transcription skills like spelling) so they can focus on generating and organizing ideas (Graham, 2010). Fast, legible handwriting is critical to the production of creative and well-written text (Olsen & Handwriting Without Tears, 2016). Kindergartners are at the early stages of developing

automaticity. This implies the significance of providing handwriting instructions at an early age as they begin to develop automaticity and fluency in handwriting (Fitzpatrick, Vander Hart, & Cortesa, 2013).

### **Automaticity**

Intrinsic factors, such as attentional resources, play an important role in the development of handwriting. When an individual is first learning to write all the attentional resources of working memory must be allocated for handwriting production (Fitzpatrick, Vander Hart, & Cortesa, 2013). Letter writing automaticity is defined as the rate at which children can access, retrieve from memory, and write alphabet letters accurately (Kim, Otaiba, Puranik, Folsom, & Gruelich, 2013). Once the transcription skills have been mastered and become automatic, more resources are freed for the higher-level writing skills (Fitzpatrick, Vander Hart, & Cortesa, 2013). A lack of adequate foundational skills in either text generation or transcription are thought to constrain higher-order skills such as planning and revising; both of which are essential components of writing (Puranik & AlOtaiba, 2012). With consistent handwriting practice, the processes involved become less demanding and more automatic, enabling students to devote a higher amount of neurological resources to critical thinking and thought organization (Handwriting in the 21<sup>st</sup> Century, 2014). Once automaticity has been achieved, handwriting is not influenced by task complexity or cognitive load (Fitzpatrick, Vander Hart, & Cortesa, 2013).

### **Content Demands**

When students are taught letter formations in a natural context—that is, when they are needed to complete a language arts activity—the functional difficulty of the task is increased. The child now has to attend to the cognitive components of content and language in addition to

the motor task of actual letter formation. For a novice writer, these requirements may exceed the optimal challenge point and the information would exceed the capacity of the individual to process the information and use it to improve skill (Asher, 2006). Working memory is specifically linked to literacy scores for younger children. As students progress in school, slow handwriting fluency can tax the capacity limitations of students taking notes while engaged in a lecture and decay the information in the working memory (Jones & Hall, 2013).

### **Explicit Instruction**

Explicit handwriting instruction is vital to prevent writing difficulties (Jones & Hall, 2013). Explicit instruction with handwriting should take place with incidental methods, such as providing time for practice and modeling proper techniques, on a frequent basis in order to foster students' development with handwriting (Sharp & Brown, 2015). If handwriting – a skill best taught through explicit instruction—is only emphasized when the students have failed to ‘catch’ the skill, students are likely to fall behind early and develop poor habits that require remediation (Dinehart, 2015).

### **Professional Development**

Few teachers feel adequately prepared to teach handwriting. Only 12% of teachers indicated that the education courses taken in college adequately prepared them to teach handwriting. Despite this lack of preparation, teachers use a variety of recommended practices for teaching handwriting. The application of practices, though, was applied unevenly, raising concerns about the quality of handwriting instruction for all children (Graham, et al., 2008). Educating teachers about fine motor difficulties and how to implement occupational therapy intervention strategies may be critical in enhancing fine motor function in children (Bazyk et al.,

2009). Learning could be assisted, fostered, and improved through interactions with more skillful experts.

## **Conflicts to Instruction**

### **Differing Viewpoints of Development**

Contrasting views of child development lead to differing practices of handwriting instruction among kindergarten teachers. Among many early childhood teachers, a maturationist view of young children's writing development persists despite much evidence to the contrary (NAEYC, 1998). Such educators feel requiring a young child to form letters properly may cause a child to perceive writing as a difficult exercise rather than an interesting activity. Such teachers emphasized the need to develop children's social, emotional, play, and broadly conceived cognitive skills but not foundational literacy skills. Some educators question whether handwriting problems in children don't simply normalize over time without the need for intervention although studies have shown that over time handwriting issues left unresolved lead to frustration, less written output, and lower grades (Lifshitz & Har-Zvi, 2015).

### **Varying Emergent Skills**

It is common to find within a kindergarten classroom a five-year range on children's literacy-related skills and functioning (NAEYC, 1998). Proponents of emergent literacy theory encourage children to "write" for the purpose of relating thoughts and experiences and developing a self-image of a writer. At kindergarten, most children are still using emergent forms of writing such as scribble, drawing, non-phonetic strings of letters, or phonetic ('invented' or 'creative') spelling, and few have made the transition to conventional writing as their preferred writing form. Early childhood educators who embrace emergent literacy theory believe that

children can compose even if they have not mastered all of the mechanics of handwriting. The focus is on purposeful writing to communicate versus writing drills to learn printing skills (Bazyk et al., 2009).

### **Academic Underachievement**

Those who recommend intervention at kindergarten age rely on accumulating evidence that attempts at quality writing in kindergarten result in improved academic achievements, most often in literacy skills, especially among students who are at risk of academic underachievement. From these studies it is possible to conclude that an intervention program for kindergarten children that will advance literacy abilities, such as writing, can lead to improved academic achievements at school age. Moreover, it can prevent atypical writing habits from becoming ingrained and difficult to change at a later age (Lifshitz & Har-Zvi, 2015). Extra handwriting and spelling instruction for young children who were at-risk for writing difficulties made greater gains in spelling, handwriting legibility and fluency, sentence writing, and vocabulary diversity in their composition when compared with those who received extra phonological training (Vander Hart, Fitzpatrick, & Cortesa, 2010).

### **Motor Delays**

The motor and perceptual components related to poor handwriting performance may include fine motor control, visual motor integration, kinesthesia, and sensory modalities. Studies have found that children with handwriting problems show a deficit in fine motor control. Visual motor integration was also found to contribute significantly to poor handwriting (Van Hartingsveldt, De Groot, Aarts, & Nijhuis-Van Der Sanden, 2011). Common handwriting problems identified by teachers include: problems with overall neatness, spacing, letter size,

letter formation, alignment of letters, reversals, grip, uniformity of slant, posture, placement of paper, and physical positioning in chair (Graham et al., 2008). These findings suggest that performance depends not only on being able to form the letters correctly but also to control the hand in a steady fashion as one moves the hand across the page in writing a sequence of letters. Excessive pen movement between letters may be an indication of problems with initiating a new movement sequence when starting a new letter (Fitzpatrick, Vander Hart, & Cortesa, 2013).

### **Common Core State Standards**

Teachers have very little formal education in teaching handwriting. It is a concern that teachers are not aware of quality research-based strategies in handwriting instruction and are not trained in how to implement these strategies in the classroom. Therefore, there is a great need for training, especially in teacher preparation programs and/or through district-wide professional development programs (Vander Hart, Fitzpatrick, & Cortesa, 2010). The Common Core State Standards call for teaching legible writing, but only in kindergarten and 1<sup>st</sup> grade. After that, the emphasis quickly shifts to proficiency on the keyboard (Konnikova, 2014; Sharp & Brown, 2015). Early childhood educators are left to sort out what is needed in the area of handwriting to meet the standards for written language. Explicit, evidence-based guidelines for teaching handwriting skills are absent from the Common Core State Standards. Developed with a “focus on the results rather than the means”, the standards empower educators to integrate any additional topics that will achieve the objectives set out in the Common Core State Standards (Handwriting in the 21<sup>st</sup> Century, 2014). The Common Core State Standards provided flexibility for states to add material to the Standards as approved by their governing boards. Thus handwriting standards have become a hot topic for state boards of education. To date several states have included additional handwriting standards as part of their State Core Standards,

including Alabama, California, Georgia, Kansas, Idaho, Indiana, Massachusetts, North Carolina, and Utah (Jones & Hall, 2013). Although the Common Core State Standards for Written Language do not ensure positive change, they do create a window of opportunity for such change to occur if they lead educators, administrators, and policymakers to reevaluate current practices, abandoning less effective methods in favor of more constructive ways of teaching writing (Mo, Kopke, Hawkins, Troia, & Olinghouse, 2014). Individual district mandates as well as the International Reading Association and National Association for the Education of Young Children's belief that "goals and expectations for young children's achievement in reading and writing should be developmentally appropriate, that is, challenging but achievable, with sufficient adult support" (NAEYC & IRA, 2009) communicate a clear need for developmentally appropriate handwriting practices that will provide all students with equal access to foundational skills.

### **Recommendations for Instruction**

This review of the literature highlights the need for educators of young children to establish solid classroom practices as they implement a developmentally appropriate handwriting program with their students. With the added emphasis on writing through the Common Core State Standards and increased importance evident through the literature, the following recommendations are made for handwriting instruction in the kindergarten classroom.

#### **Daily Lessons**

Provide daily time for students to write (Gerde, Bingham, & Wasik, 2012). Short lessons demonstrating certain letter formations tied to the publication of writing provide an ideal time for instruction (NAEYC, 1998). End of kindergarten recommendations include daily writing

time of 60 minutes daily, 30 minutes for teaching and 30 minutes of practice (National Center for Education Evaluation and Regional Assistance [NCEERA], 2012). Handwriting is a motor skill and like most motor skills it is best learned through spaced practice (Graham et al., 2008).

### **Teach Strokes of Letters**

Introduce letters when students are developmentally ready. Students should be developmentally ready to form the basic lines (vertical, horizontal, circular, and oblique) that constitute manuscript letters by the time they enter school at age 5. If students have had adequate experiences using paper and pencil and have developed age-appropriate visual-motor integration skills, then the order of introduction of letters should not have an impact on success with handwriting (Asher, 2006).

### **Develop Automaticity**

Teach students to form letters fluently and efficiently (NCEERA, 2012). It is essential that handwriting curricula be structured so that children have opportunities to develop automaticity. If, however, the curriculum overemphasizes neatness of the writing product, it may negatively impact the development of automaticity (Fitzpatrick, Vander Hart, & Cortesa, 2013).

### **Attend to Pencil Grip**

Teach very young writers to hold a pencil correctly (NCEERA, 2012). It is essential students be encouraged to use a reasonably comfortable grip, such as the tripod method (in which the pencil is held between the thumb and index finger, resting on the distal phalanx of the middle finger, about an inch from the point) as soon as they start school (Graham, 2010). By the end of kindergarten, a child's pencil grip is reinforced and kinesthetically locked in (Van Hartingsveldt, De Groot, Aarts, & Nijhuis-Van Der Sanden, 2011).



**Use Common Language**

Adhere to a common language when guiding students in the strokes necessary to form specific letters. It is recommended that district-wide initiatives might be needed to ensure that consistent instruction begins early and be carried through to higher grades. Consistency in handwriting instruction within the school district would also make it easier for special educators and occupational therapists to provide interventions consistent with classroom practices (Vander Hart, Fitzpatrick, & Cortesa, 2010).

**Practice**

Practice is considered to be a key component of motor learning. Children require blocked and constant practice to master letter formation without the pressure of worrying about content and grammar. Blocked practice provides children with the opportunity to work on emerging skills during a task that follows a predictable sequence. Blocked practice can take the form of writing different letters until the formation is consistent or even writing common sight words. Blocked handwriting practice may lead to automaticity and increased writing speed. Automatic handwriting allows students to spend all of their energy on writing content instead of having to divide their attention between content and text production (Cahill, 2009).

**Use Appropriate Paper**

Practice various styles of lined paper until 1<sup>st</sup> grade. Kindergartners perform better or equally well on blank versus wide-lined paper. They may be compromised with narrow-lined paper. In terms of size, educators and therapists should consider providing papers that at minimum include guides for the top and baseline of letters and to use discretion when assigning midline guides for young writers as these lines appear to have an uncertain effect on accuracy and carry the

potential for confusion amongst writers (Reidlinger, Candler, & Neville, 2012). It is also recommended that a limited number of different types of paper are introduced to young children as they develop some control of letter formation in the initial phase of handwriting instruction in order to keep task demands consistent. Once motor patterns are developed, variable practice using different kinds of paper is appropriate. It will increase the challenge level of the task, facilitating retention of performance and line generalization (Asher, 2006; [hwtears], 2009).

### **Offer Authentic Experiences**

Create an engaged community of writers. Teachers should participate as members of a community by writing and sharing their writing. Students should be encouraged to collaborate as writers and be provided opportunities to give and receive feedback throughout the writing process. Teachers should be willing to publish students' writing and extend the community beyond the classroom (NCEERA, 2012). Reading and writing workshops, in which teachers provide small group and individual instruction, may help children develop the skills they need for communicating with others (NAEYC, 1998). Practices that build on prior knowledge naturally encourage growth as students view themselves as writers (Snyders, 2014). Group intervention allows the children with disabilities to be educated with peers without disabilities and provides early intervention for children without identified disabilities who may be demonstrating delays (Bazyk et al., 2009). A positive school culture can affect teachers' instructional practices and students' academic performance.

### **Addressing Difficulties**

#### **Early Identification**

Early identification could prevent long-term negative consequences of writing failure for many students (Ritchey & Coker, 2014). Since handwriting is a fine motor skill, teachers must employ effective instructional techniques for students to consolidate the acquisition of handwriting skills through significant practice (Sharp & Brown, 2015). The importance of developing motor memory is clear from a review of the literature. Students whose handwriting difficulties stem from poor motor memory do not retain a kinesthetic pattern for forming letters. Their writing may appear legible, but observation reveals that one particular letter may be formed in different ways (from top, clockwise, counter-clockwise, baseline up, fragments) and these students then must compare visually to determine the correctness of the letter, which slows down writing. Close adult supervision is needed to ensure that students are practicing correctly and using a consistent letter formation to strengthen the kinesthetic memory of that letter formation (Asher, 2006). Mastery of the motor skills involved in writing can then be used for effective communication.

### **Consistency of Curriculum**

Poor motor memory difficulties require adequate practice with consistent repetition of efficient letter formations within a structured handwriting program. Research supporting the superiority of a particular program over another is limited. Using one consistent program within a school district would ensure that the staff uses uniform instructions and terminology, helping students master writing more easily (Asher, 2006). Although handwriting was studied extensively from the 1970s through the early 1990s, research has not established the superiority of a particular method of instruction, or specific tools that facilitate handwriting production (Asher, 2006). Several supplemental handwriting programs are available such as Callirobics, Handwriting Without Tears, Big Strokes for Little Folks, Sensible Pencil, and Loops and Other

Groups (Cahill, 2009). Handwriting programs which offer opportunities for young children to engage in activities that lay the foundation for good handwriting are most appropriate.

Consistency of instruction together with adequate practice during acquisition of handwriting would help to establish the motor skills used for communication.

### **Occupational Therapy**

Good assessment is essential to help teachers tailor appropriate instruction to young children and to know when and how much intensive instruction on any particular skill or strategy might be needed (NAEYC, 1998). Kindergarten children are often referred to occupational or physical therapists for evaluation and/or treatment for poor fine motor performance, including difficulty with pre-writing skills. Therapy referrals made early in a child's academic career are considered to be beneficial to the child so that a deficit can be addressed- and hopefully corrected- before the student's academic performance is affected (Van Hartingsveldt, De Groot, Aarts, & Nijhuis-Van Der Sanden, 2011). Attention to individual needs at this emergent level may free cognitive resources to assist not only in efficient text production by allowing students to remain engaged, abstain from competing demands, and transfer ideas and thoughts to the written word, but also engage in self-regulatory strategies during writing that promote higher quality compositions (Kent, Wanzek, Petscher, Al Otaiba, & Young-Suk, 2014). It is essential that teachers are willing to adapt instructional strategies or offer more individualized instruction if the child fails to make expected progress or diverse learning strengths or needs.

### **Areas of Future Research**

Although there is much literature regarding the benefits of handwriting instruction, the literature also describes a decline in attention to handwriting instruction due to increased use of

technology (NAEYC, 1998). Advancements with digital technologies and attention to students' development with 21<sup>st</sup> century literacies has greatly altered perceptions regarding manuscript and cursive handwriting instruction (Sharp & Brown, 2015). When students struggle with handwriting people usually think, just put them on a computer. It turns out that many of the problems relating to why they have trouble learning handwriting might also affect how they use a keyboard. In fact, there is a high correlation between handwriting speed and typing speed; students who do not demonstrate automatic writing often struggle with automatic typing (Jones & Hall, 2013). Areas of future research include an exploration of the link between handwriting and technology. Educational technology has exploded and offers a wealth of support to educators as they realign writing instruction to better address the Common Core State Standards (Mo, Kopke, Hawkins, Troia, & Olinghouse, 2014). A further investigation of digital tools available to expand students' understanding and provide scaffolding for beginning writers as they engage in all of their environments is needed as it relates to the acquisition of 21<sup>st</sup> century literacy skills.

### **Conclusion**

It is clear though the literature that proper handwriting instruction and writing skills practice is essential for the literacy development of kindergarten students. The inclusion of structured handwriting readiness programs should be considered as part of the regular kindergarten curriculum designed to assist in children's readiness and transition to school (Lifshitz & Har-Zvi, 2015). Teaching handwriting has a large, positive effect on the amount of texts students generate (Olsen & Handwriting Without Tears, 2016). A best practice, developmentally appropriate kindergarten writing program creates students who see themselves as capable writers, having mastered the complex set of attitudes, expectations, behaviors, and skills related to written language.

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