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The Effects of Using Computer and iPad Story-Writing Applications for Creative Writing with Kinder Year Students in a Montessori Early Childhood Program

An Action Research Report
By Ruth Ann Christensen
The Effects of Using Computer and iPad Story-Writing Applications for Creative Writing with Kinder Year Students in a Montessori Early Childhood Program

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in fulfillment of final requirements for the MAED degree

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Abstract

This study investigated the viability and implications of technology-assisted story writing with kinder year students. Seven kinder year students at a private Montessori school participated in the study. Pre- and post-study conferences and Likert scales determined story writing skills and attitudes. These were followed by one-on-one story-writing sessions using a variety of story-writing tools. Students were given the choice of story-writing method at each session. Individual sessions were evaluated and completed stories compared to a rubric of fundamental story-writing elements. Stories written by the students improved with the use of computer and iPad programs, but independent story writing was not achieved. Individual phonetic abilities proved pivotal to any success with technology-assisted story writing. The results of the study suggest introducing technology-assisted story writing when a child can successfully build words phonetically.

*Keywords*: kinder year, kindergarten, story writing, technology, Montessori
Young children, being instinctively imaginative, are inherently capable of concocting fantastical stories. These stories, as well as non-fiction anecdotes describing genuine events in a child’s life, are worthy of preservation. In addition to recognizing the pure delight value of a child’s story, early childhood educators understand how story writing plays a significant role as literacy emerges. In a Montessori primary classroom, children ages three through six years explore story writing by dictating to an adult, building with a moveable alphabet, and handwriting. Many young students encounter difficulties with story writing because of the inadequacies of these methods. Although dictation to an adult is typically well received by the student, it fails to provide the autonomy required of Montessori pedagogy. Building words and short phrases using a moveable alphabet is an especially beneficial endeavor; however, extending the process to story length can be laborious, resulting in perhaps a few sentences at most. The handwriting alternative requires fine-motor skills and hand strength—both of which are still developing at this age. Young children often become frustrated with the difficulties they encounter as they attempt to record their ideas on paper. The result of these challenges for young writers is mediocre enthusiasm for writing and rarely chosen story writing exercises.

Although technological literacy is considered an authentic preparation for life and a necessitous component of early childhood education today, many educators have been averse to integrating technology into their classrooms. Montessori philosophy’s belief in the significance of hands-on learning during early childhood embodies the foremost reason for minimal technology for young students. My extended experience teaching in a Montessori early childhood classroom compellingly confirms the advantages of hands-
on-learning. However, I have also identified a gap in story writing participation the use of technology could feasibly address. Computer and iPad programs offer young children appealing story writing applications and multiple supports such as spell check, frequently used word promptings, and options to draw digitally or choose from a variety of interesting graphics. Writers can manipulate text and illustrations, changing colors and presentation. The attraction of technology itself provides powerful motivation for young story writers who desire to participate in the adult world and contemporary culture. In addition to increased incentive for story writing, computer and iPad keyboards function like a moveable alphabet, eliminating the fine-motor demands of handwriting.

This study was conducted at a private Montessori school with seven kinder year students (ages five and six). The kinder year students share their classroom with twenty younger children, representing an age range from three to six and enrollment totaling twenty-eight. I previously trained and taught with the teacher of the class, but recently retired from working in the classroom. After a traditional Montessori morning work period, kinder year students spend an hour before lunch and after lunch focusing on academic and project-based learning. The younger children are not in the classroom at this time. Story writing sessions occurred during these kinder year times and were conducted one on one to accommodate the varied phonemic skills and reading levels of individual students. The implications of this study inform Montessori teachers in the potential of technology to enhance story writing in early childhood. The findings contribute to the research described below, giving Montessori early childhood educators substantive examples for determining whether this area of literacy, story writing, calls for integrating computer and iPad technology into classroom literacy practices.
Literature Review

Introduction

Technology in our culture. Early childhood educators have realized the imperative to integrate technology into instruction as their young students come to preschool from family and cultural backgrounds increasingly filled with digital technology. Zevenbergen (2007) wrote that young children were “digital natives” and needed a pedagogical framework to support their experience and exploration with technology. Similarly, Shuker and Terreni (2013) proposed a common conceptual framework for integrating technology in education to help educators better understand the acquisition of digital literacy skills. The process of acquiring 21st-century literacy skills is understandably more diverse and less clearly defined than conventional literacy skill development. M. M. Neumann and D. L. Neumann (2014) suggested that a pedagogical framework incorporating the acquisition of conventional literacy skills alongside emerging digital literacies was needed. Wohlwend (2009) concurred, emphasizing that understanding technology has become an important preparation for life. Wohlwend also called for the development of relevant technology curricula for young students.

Digital literacy. The National Association for the Education of Young Children (NAEYC) 2012 position statement described technology as a new tool for learning that could be used responsibly in the early childhood classroom. Technology-rich homes and communities, as well as a plethora of interactive digital devices, have significantly transformed modern culture. Because technology will continue to pervade and influence our daily lives, it seems clear that educators should provide opportunities for young children to develop media and digital literacies. The need for integrated technology in
early childhood education applies to Montessori environments as well. In the 2016 *North American Montessori Teachers Association Journal*, MacDonald suggested that integrating technology in Montessori instruction was “a 21st-century expression of Montessori’s belief that education should be *preparation for life*” (p. 106). Montessori’s instructional philosophy capitalized on the child’s motivation to engage in the real-world activities that imitate adult life. Accordingly, young children today are eager to embrace the new learning tools and technology they observe permeating the adult world. Hertzog and Klein (2005) noted that the child’s motivation to become technologically literate and proficient with new learning skills also represented an appropriate desire for acclimating to their own time and place.

Couse and Chen (2010) wrote that today’s ever-changing, innovative forms of technology offered different language tools and subsequently posed new literacy learning needs for young students. Beschorner and Hutchison (2013), reflecting that literacy learning began at birth and developed through the child’s interactions with the environment, suggested that the roots of literacy in today’s culture included digital forms of reading and writing in addition to classic print media. According to M. M. Neumann and D. L. Neumann (2014), literacy knowledge, skills, and understanding could be developed through interactions with new, innovative digital tools as well as with traditional, non-digital tools. However, new literacies and technologies have not always received adequate attention in early childhood education (Wohlwend, 2009).

**Technology use at home vs. school.** Hill (2010) identified a disparity between the literacy methods and practices currently used in education and the young child’s use of multi-modal technology at home. This disparity indicated the need for expedient
efforts to redefine conceptions of literacy to include more than just traditional print-based methods of instruction. Wohlwend (2009) described young children as “developing learners of new literacies and technologies and curious explorers who willingly play with new media” (p. 117). This observation of young children’s explorations with new technologies further illuminated the generational divide between students of traditional print-based literacy and those who embraced the new, non-linear, multi-modal literacies. The NAEYC (2012) recommended that children have opportunities to develop digital literacies that are akin to the opportunities they have with traditional literacy emergence. Nevertheless, a reluctance of educators to embrace technology in the early childhood classroom has often impeded the implementation of digital learning tools. Some educators and parents have considered the use of technology in early childhood as inappropriate and unimportant (Zevenbergen, 2007). Quesenberry, Mustian, and Clark Bischke (2016) asserted that many classrooms underutilized their technology resources due to skepticism about the benefits and developmental appropriateness for young children. Funding for educational technology also restricted the inclusion of computers and other digital devices in the classroom.

**Learning Gains**

Compelling the move toward integrating technology in early childhood instruction are the learning gains realized with the meaningful use of digital, interactive devices in the classroom. Quesenberry et al. (2016) noted that technology could be employed in early childhood to encourage the development of social skills such as cooperation, collaboration, and communication. A case study of Head Start students ages three through five using iPads found that a well-designed digital media curriculum could
have positive effects on communication and collaboration, as well as enhancing interest, motivation, and learning in general (Lee, 2015). Another case study conducted in four Dutch kindergartens (95 students), found that language gains occurred when technology was used meaningfully in early childhood education (Cviko, McKenney, & Voogt, 2005). Similarly, a description of the use of technology in a gifted early childhood program for children ages three through six at the University Primary school noted improved literacy instruction, student creativity, and critical thinking (Hertzog & Klein, 2005). Hertzog and Klein’s experience at the University Primary School suggested that technology could be a tool for meaningful and challenging learning experiences. Colbert’s (2006) research, funded by New Zealand’s Ministry of Education, focused on storytelling technology with four-year-olds. She found that young children learned the function of text and purpose of words when involved with technology-assisted writing.

**Sharing students’ work.** Colbert also noted that children were encouraged by the opportunity technology provided for sharing their work and seeing it valued by others. When children could share their work at home, the result was an increased connection between child, family, and community. The NAEYC (2012) agreed that technology tools gave educators an opportunity to make and strengthen home and school connections. Shuker and Terreni (2013) concluded that the ability for children to share and distribute their stories was one of the most useful features of technology-assisted writing. Case studies reported by Bratitsis, Kotopoulos, and Mandila (2012) concluded that the opportunity to print out and share finished stories provided added value to the child’s work.
Concerns about Technology in Early Childhood Education

Despite the advantages offered by the use of technology in early childhood, educators have continued to be concerned about the developmental appropriateness of exposure to digital media in preschool and kindergarten. MacDonald (2016) acknowledged the benefits of incorporating technology in early childhood education but recommended that educators understand the inherent risks as well. He encouraged a foundation of sensorial experiences before children were introduced to the abstraction of digital learning. Cordes and Miller (2000) agreed, and suggested a focus on experiential learning in early childhood. They called for a complete moratorium on computers in the classroom until the benefits and hazards were clearly understood. Harms to physical health and vision as hazards of computers in the classroom, as well as emotional risks in the areas of social skills, imagination, concentration, and patience were suggested. Herman (2012) stressed the need for balancing the use of technology with children and advised that too much can hinder healthy inter-personal interactions. He shared indications that digital natives lacked the ability to concentrate for extended periods of time, demonstrate empathy, and recognize social cues. The NAEYC (2012) recommended constant monitoring of any new research findings related to “vision and eye health, exposure to electromagnetic fields and radiation from cellular phones, toxins from lead paint or batteries, choking hazards involving small parts, child obesity, screen time, or any other potentially harmful, physiological, or developmental effects or side effects related to the use of technology.” They further cautioned that developmentally appropriate use of technology in early childhood required active, not passive, involvement with screen work. Virtual activities should never replace the social
interactions and physical activities that are important to child development. In addition to educator training, the NAEYC recommended careful deliberation before implementing technology in the early childhood classroom.

**Technology-Assisted Writing**

**Viability and benefits.** Contemporary researchers determined that technology-assisted writing was a viable tool for young children. After observing a large group of preschool and kindergarten-age children using a stylus writing tool to draw and write on tablet screens, Couse and Chen (2010) concluded that young children could use this type of technology to express their ideas. Their students preferred a digital method to traditional handwriting. Beschorner and Hutchison (2013) found that iPads (or similar tablets) had a variety of uses in teaching emergent literacy in early childhood classrooms. Students in this case study developed a knowledge of the function and importance of print while they worked with digital media. The early childhood program at University Primary School described earlier offered further evidence that young children could compose stories using keyboards on iPads and computers. Students at University Primary School chose to type their stories, which allowed them to focus on the flow of ideas rather than the fine motor tasks of handwriting. Editing a story was also much easier in digital form—no erasing or crumpling up papers to throw in the trash. Working with young children led Hertzog and Klein (2005) to the conclusion that technology also supported students in moving from concrete experiences to abstract concepts. Colbert’s (2006) use of technology as part of the language curriculum for early childhood students resulted in longer, more complex story writing, as well as experimentation with vocabulary and content. The students in this study worked for longer periods of time on
creative writing and demonstrated more persistence to complete their stories with the use
of technology. Bratitsis et al. (2012) reported that computers attracted students’ attention
and provided strong motivation for lengthened engagement in story writing. Their data
also indicated that several quantitative aspects of story writing, including length,
sequencing, and plot development, were higher when students used computers. Students
in their study were inspired to find new ways to express their ideas and often extended
their creative thinking process.

**Story writing.** Ohlhaver (2001) found storytelling to be a formative tool for
countering literacy skills and creativity with young children. Ohlhaver emphasized that
recording young children’s stories enabled them to revisit their stories at a later time,
which increased the personal meaning of the writing experience. As mentioned earlier,
researchers established that the use of technology for story writing in early childhood
enhanced creativity, collaboration, communication, critical thinking, and motivation
(Cviko et al., 2005; Colbert, 2006; Lee, 2015). Bratitsis et al. (2012) and Shuker and
Terreni (2013) successfully facilitated technology-assisted story writing with groups of
preschool and kindergarten children. Bratitsis et al., using a story writing computer
program with eight kindergarten students, concluded that the effect of technology use in
story creation was “significant and positive” (p. 16). Shuker and Terreni (2013) found
that young children’s digital stories produced with computers in e-book form were both
personal and interactive. This finding correlated with Wohlwend’s (2009) determination
that young children’s interaction with technology was explorative and playful.

**Keyboarding.** The skill of keyboarding presented challenges that limited
successful digital story writing participation for young children. This difficulty is most
likely the reason for scarcity in specific research on keyboarding with young children. A case study conducted by Colbert (2006) described kindergarten children using computer keyboards to type self-created stories. The study explained that computer-assisted creative writing allowed creative expression without the fine motor demands of letter formation. A keyboard or digital equivalent allowed the young writers to focus on story creation instead of handwriting. Beschorner and Hutchison (2013) used iPads to create e-stories with five-year-old students and noted that all could use online keyboards to build words. Elkind (2016) noted similar experiences with young children and suggested that onscreen keyboards as well as point and click software could bypass keyboarding and facilitate story writing successfully with young children. However, occupational therapists (Stevenson & Just, 2014) recommended maximizing motor competency with the development of handwriting before introducing the specialized skill of typing. The benefits of motor competency included letter shape memorization, complex motor planning development, and the integration of visual-perceptual skills with motor skills. Stevenson and Just also suggested that the skills developed while learning to handwrite would contribute to success with story composition and keyboarding.

**Independence.** The level of independence demonstrated with technology-assisted writing varied, though adult assistance was a necessary component of the research. Shuker and Terreni (2013) determined that young children using the PowerPoint program were likely to need assistance with certain aspects of e-book creation. Beschorner and Hutchison (2013) described methods used by teachers in their study to guide students through story writing with iPads. Assistance was available but intentionally limited to encourage independence with the students’ use of the iPads. Similarly, Stevenson and
Just (2014) found that help from an adult was required when young children created e-stories with computers. Another group of kindergarten children studied by Cviko et al. (2012) used 6th-grade helpers to assist the students’ work with technology. Bratitsis et al. (2012) reported that every child in their study needed teacher support at some point in the digital story writing process.

Conclusion

The literature clearly demonstrated an imperative to integrate technology into early childhood instruction, with the requirement of developmentally appropriate materials and methods. I agree with Zevenbergen (2007) that educators need pedagogical methods that reflect best practices for including technology in early childhood education. Research and academic articles also substantiated the viability and benefits of technology-assisted writing. As established in the literature, young children can successfully create digital stories using a variety of applications on tablets and word processing computer programs. The NAEYC (2012) and others (Beschernor & Hutchison, 2013; M. M. Neumann & D. L. Neumann, 2014; Hertzog & Klein, 2005; Cordes & Miller, 2000; Couse & Chen, 2010; Cviko et al., 2005) suggested more study and research into the use of technology with young children, including appropriate uses and long-term effects. My study will continue to explore the potential to enhance creative story writing with iPads and computers, using Our Story and Storybird programs. Because these programs require keyboarding, the abilities of students to use a keyboard will become an integral part of my study. In addition to determining the level of independence possible with technology-assisted story writing, I hope to appraise the
findings in the literature of increased interest and abilities in creative story writing with the use of technology.

**Methodology**

My study took place over the time span of six weeks at the beginning of the school year. Activities related to the study occurred after lunch for 90 minutes each day, during a kinder year work period. At this time of the day, seven kinder year students remained in the classroom while the younger children napped in another location. The afternoon kinder year work period is typically reserved for advanced academic, cultural, and project-based activities. Occasionally, story writing sessions were held before lunch, during a 45-minute kinder year work period. During the first week, I collected baseline data in the form of teacher questionnaires (Appendix A) and student conferences (Appendix B). Work samples were obtained, using dictation, the moveable alphabet, and handwriting methods of story writing. During weeks two through six, I conducted numerous one-on-one story writing sessions with the children. Each session was followed by the completion of an observation document (Appendix C), intended to measure story writing elements and to record informal notes describing the session. Stories written by the children were compared to a story writing rubric (Appendix D) and given a numerical score. At the end of the study, the questionnaires and conferences were repeated to determine changes in story writing attitudes and abilities.

Before story writing began, the students’ teacher completed Likert-style scale questionnaires for each child. This scale indicated the students’ general attitudes toward writing stories and identified their current story-writing skill levels. The teacher employed previous experience with her students as well as simple skill assessments to
complete the questionnaires. I then conferenced with each student to ascertain how they perceived their own story-writing abilities and to determine their feelings about story writing. My conferences were informal and elicited answers casually.

The first story writing samples were dictated to me as I wrote and then illustrated by the children. A set of separate lower-case letters, known as the moveable alphabet, was used for the second story completed by each child. The letters of the moveable alphabet are found in a large box, divided and color-coded by consonant and vowel, but in no particular order. The procedure used with the moveable alphabet involves using letters to build words on a large rug. Writing a complete story with the moveable alphabet represents a significantly advanced extension of the activity. After building a story with the moveable alphabet, students were given the option to draw a picture relating to their story. The last of the initial stories collected were handwritten and illustrated by the students in a similar manner as the dictated stories. Both the dictated and handwritten stories were written on paper prepared with horizontal lines spaced one inch apart covering the bottom half of the page, with the top being left blank for illustrations. The story writers were given a variety of choices for drawing tools, including markers, colored pencils, and crayons.

Story-writing sessions during weeks two through six incorporated the use of computer and iPad programs. The computer application used was *Storybird*, and *My Story* was used with the iPad. During the kinder year work period, a child who was not engaged in work was invited to write stories in the school library, which is adjacent to the classroom. Story writing sessions were held outside of the classroom to eliminate distractions for the story writer and other students. The children were seated on a child-
sized chair at a small table, and I sat beside them on a small stool. Often upon entering
the classroom, students approached me, asking to join me for a story-writing session. I
instituted a system of taking turns to guarantee that equal opportunities were provided.

I completed an observation form at the conclusion of each story writing session.
The observation form focused on particular facets of the session and included detailed
notes about the child’s performance during the session. Notes included the child’s use of
the device and phonic abilities as well as any difficulties observed or unusual
circumstances encountered.

Students writing stories on an iPad or computer used the keyboard similar to the
moveable alphabet, finding the sounds needed to build desired words. The computer
keyboard included upper case letters only, while the digital iPad keyboard incorporated
capital letters at the beginning of a sentence and lower case for the remainder of the
sentence. The students were given varying levels of support, depending on their needs.
Examples of support included phonemic sound identification and word segmentation, the
location of letters on the keyboard, punctuation (a period at the end of a sentence), and
spaces between words. Care was given to allow independence where and when possible.
Story prompts were only given when needed, such as “What happened next?” or “How
does your story end?” I consistently demonstrated an interest in the child’s story and
expressed mild, natural reactions to their work. I pointed out useful features of the story
writing program when appropriate, and the option of using either digital graphics or
drawing the illustrations was offered. Other options at students’ disposal included color,
font, and placement of text, a variety of drawing tools, erasures and deletes, frequently-
used word lists, and spell check. The length of each different session depended on the
interest of the child. Story-writing sessions, in general, followed the child’s interests and abilities.

All stories were preserved as work samples and assessed with a story writing rubric. Stories that were initiated and completed independent of my sessions were also gathered and evaluated with the rubric. The rubric addressed essential story writing elements such as connected phrases or sentences, a complete story with beginning, middle, and end, and evidence of a developed story. Story-writing work samples also provided word count data. Stories were systematically printed after each session and distributed to the authors, with the understanding that they would share their stories with others.

During the third week of the study, a story-writing lesson was given during the typical daily group time at 1:30 p.m. The lesson reinforced the importance of a beginning, middle, and end of a good story. A discussion with familiar story examples as well as sequencing activities were presented. The students were given sequencing activities to choose and complete during their work period. From that point on, the students were encouraged to plan their stories before beginning the writing process. They were also given a choice to work on an old story or start a new one each session. The children enjoyed reading the stories written previously and stored on the device. During the third week, the children were also given a choice of device for their writing, selecting either the computer or iPad.

At the end of the six-week study, both the teacher-generated forms and student conferences were repeated, using identical questions and procedures. These were then compared with the first set to determine changes both in attitude, abilities, and
perceptions of students. Data from the story rubric and observation forms were compiled and compared as well. Qualitative information from the observation form was coded for perceptible themes to be quantified for analysis.

**Analysis of Data**

My study was instigated after approval from an Institutional Review Board and coordination with the classroom teacher. The first data collection tool (Appendix A) entailed a Likert-style scale completed by the teacher. This survey focused on students’ story-writing attitudes and abilities. Each student’s scores were tallied and an average for all kinder year students was formulated. An identical form was completed by the teacher at the conclusion of this study to reveal any differentiation. Variances in several areas are illustrated in Figure 1 below. The teacher did not notice a change in her students’ abilities to write stories, but reported increased desire to write and share stories and a better understanding of the story elements of beginning, middle, and end (b/m/e). Students’ autonomously choosing to write stories in the classroom also ranked higher at the end of this study. Average scores for independence during the writing process were lower at the end of the study. In addition to areas addressed in Figure 1, the teacher conveyed anecdotal improvements in reading as well as writing skills for all kinder year students.
During the first week of the study, I conferenced with each child individually to ascertain their perceived attitudes and abilities regarding story writing (Appendix B). Initially, three out of seven students conveyed positive opinions about their story-writing capabilities. One commented, “It’s easy if you have a parent or teacher helping you.” Another said, “It’s not really good for me—it’s a little bit hard.” When asked the same question at the culmination of the study, all seven students described themselves as good story writers (see Figure 2). Some of their statements were, “I’m the greatest story writer in the world,” “I like it so much,” “I’m so much better than I was before,” and “I’m the best now.” All students indicated a desire to write and share their stories, both before and

*Figure 1.* Five-point Likert scale averages for student story-writing ability before and after study. Scores were generated by the teacher.
after the study. “Proud,” “happy,” and “good” were words the students used to describe how it felt to show their stories to a friend or family member. When asked if they felt differently about their writing at the end of the study, every child answered affirmatively. One attributed the improvement to practicing with me, and another added that they were a better writer because they could write more pages than before. When asked at the first conference what they remembered or thought about while writing stories, several students commented on the picture for the story. At a final conference, students reported that letter sounds symbols (alphabet), story topic, and planning their story and picture were important things to remember when writing a story.

![Figure 2. Responses to the before and after study conference question, “Are you a good story writer?”](image)

Actual story writing with the students also began the first week, with an opportunity for each child to dictate a story to me. I recorded their words on simple lined paper as they narrated their stories. The children were invited to draw an illustration for their story if they wished. (Appendix E). Only one child chose not to include a picture in
the story. As mentioned earlier, students were given copies of their stories after each session and encouraged to take them home to share with family and friends. Appendices F through I include work samples of one story written with the moveable alphabet, one handwritten story, and two tech-assisted stories (computer and iPad). Copies of all stories were preserved, compared to a story-writing rubric, and measured for word count totals.

Average word count scores for each story are denoted in the graph below (see Figure 3). Averages for dictated stories, stories written with the moveable alphabet (MA), and handwritten stories are designated. Figure 3 conveys a higher word count average for technology-assisted story writing as compared to both handwritten and moveable alphabet compositions.

![Figure 3. Average word counts of stories dictated to me, written with a moveable alphabet (MA), handwritten, and using technology.](image)

During each story-writing session with a student, I completed an observation form (Appendix C) that assigned a numerical value from zero to three for key story-writing
elements. Values were totaled to determine a score from zero to fifteen for each session. I included on this form my informal observations of the child’s degree of independence, where and when adult assistance was required, unique aspects of their story writing, use of different device features, and ability to focus. I also noted a child’s choice of writing tool. After experience with each of the five different writing methods, the children consistently chose to write on the iPad. However, when asked at the final conference which method was preferred, two children expressed computer as their answer.

Writing session scores are charted in Figure 4, with each child’s scores represented by a different color. This data includes all story-writing sessions, including the first three, not incorporating technology. The graph indicates that most students’ scores trended upward, though two remained high throughout the study. Two aspects of a writing session form are characterized by the next two graphs (see Figures 5 and 6). The first measures a student’s eagerness to participate in a story-writing session. Average scores for this trait are higher with technology-assisted writing. An upward trend over time might also reflect the benefit of story writing practice in general. The duration of different story-writing sessions is pictured in Figure 6. This data suggests that story-writing efforts are maintained for a longer period when a student uses a device.
Figure 4. Observation scores for writing sessions. Each child is represented by a different color.

Figure 5. Averages for students’ eagerness to participate in different methods of story writing, rated from zero to three on the observation form.
Observation notes from story-writing sessions suggest all students in this study except one needed support with phonemic awareness. My assistance was needed to identify phonetic sounds, recognize corresponding letter of the alphabet, and word segmentation. The children also needed reminders to place spaces between words and a period at the end of a sentence. None of the students in this study could write a complete story with complete independence. During the six-week study, two students worked on self-chosen handwritten stories during regular classroom time. Rubric scores and word counts for these two stories were very low and not included in data analysis.

I noted on the observation forms that several children learned to use a one click “suggested word” feature and incorporated optional emoji graphics to match their text.
Both drawing and picture-click functions were utilized by the children. The students demonstrated the ability to edit their text using the backspace key, as well as manipulate the size, color, and placement of their text. When drawing illustrations, children chose the color and thickness of their drawing tool and often changed their tool within the same session. Eraser mode was also employed when drawings were not satisfactory to the child. All students in this study experimented with various functions within a device. Spell-check was engaged with mixed ends; the students’ phonetic spelling sometimes resulted in inaccurate and confusing spell-check outcomes. This negatively impacted the possibility for independent story writing using a device. Only three children had sufficient phonetic abilities to complete a story with a high degree of independence.

As previously mentioned, each story written by a student was compared to a story-writing rubric (Appendix D). The rubric measures the complexity and completeness of a story, assigning numerical values from zero to five, five being the most developed. Average rubric scores for each story are demonstrated in the chart below (Figure 7). Results are analogous to word count comparisons (see Figure 3) with high scores for dictated stories. Average technology-assisted story scores again exceeded that of the other two modes of writing.
Results of this study suggest that using technology to assist story writing in kinder year is a viable strategy. Story writing with computer and iPad programs proved both enjoyable and successful for students in this study. However, independence, which is quintessential in Montessori education, was not achieved. The level of independent story writing with a computer or iPad was contingent on individual student’s phonetic abilities. With this understanding, I would suggest beginning technology-assisted story writing sessions later in the school year when these skills are more developed. Another option would be to introduce technology-assisted story writing when a student has mastered most of the phonetic sounds and can build words successfully with the moveable alphabet. Word segmentation, or identifying each sound in a word in order, is also an important skill and should accompany phonetic training in early childhood classrooms.
Several notable details were discovered during the story writing sessions using the computer and iPad. Alphabet letters on a computer keyboard are upper case, while Montessori early childhood language programs focus on lower-case letters. This variance confused the students and made it more difficult for them to find the desired letter key. An iPad digital keyboard displays upper case at the beginning of a sentence, but converts to lower case immediately after the first letter is typed. This type of keyboard seemed more suitable for kinder year writers. Children in this study quickly understood how to manipulate the computer and iPad programs. They began to autonomously open and view previous stories and stories their friends had written, start and end stories, and choose illustrations. Students also immediately identified the drawing features of the iPad program, often “playing” with the size and color of their drawing line and erasing where and when desired. Students were also able to manipulate their text on an iPad, changing the size, position, and color.

Another disadvantage of the computer program *My Story*, in addition to the upper-case computer keyboard, is the artwork. Drawing your own story pictures is not possible with this program; the author chooses illustrations from different artist files. Topics can be searched, but after deciding on a picture, story writers are limited to the work of that same artist. Consequently, the illustrations for *My Story* tended to guide instead of supplementing the story. Because the spell-check function of the iPad proved problematic for phonetic spellers, I would recommend determining if it can be turned off or investigating other programs that do not include that option. *Storybird* also offered word choices on the digital keyboard as text was being written. Some students learned to use the word choices independently. Word choices were sight words or word suggestions.
based on the letters the student was typing. The student writers also clicked on emojis
that appeared on the keyboard when a word was spelled correctly. Emojis supplemented
text but did not replace it and were extremely popular with the children.

Early scores may have been influenced by the fact that some of the children knew
me from my previous time in the classroom as their afternoon teacher two years ago.
Initially, I felt that the children who remembered me scored better in eagerness, length of
story-writing session, and word count portions of the study. That factor quickly vanished
as the students became familiar with me and the writing session procedures. Another
aspect that may influence the study results is the natural improvement in story writing
that is realized with practice. Student are expected to become a better writer with
experience.

A device and even another person in the classroom can be distracting to other
children, which is why my story-writing sessions were conducted in the library, adjacent
to the classroom. One-on-one work was also deemed necessary to prevent distraction.
The classroom teacher may wish to use adult volunteers, usually parents, to continue
writing stories with an iPad or computer. Adult volunteers are traditionally employed for
dictated stories in the classroom, and this could be expanded to include technology-
assisted story writing. However, because of potential disruption, this type of activity may
work better in another room in the school. Another intriguing idea is to use older student
mentors from upper elementary or middle school to work with younger writers. I would
also like to investigate iPad programs that transcribe the spoken word into print as a
method for preserving children’s stories.
Technology has increasingly become an integral part of our lives and culture, creating a need to consider its place in early childhood education. This study established the viability and possibilities of using technology to assist story writing in kinder year. Further research with slightly older students could further identify the optimal age and stage of development for introducing technology into the story writing process. A lengthier study could also generate more data on the possibility of independence with technology-assisted story writing. Another strategy to explore is working on only one story with each child, expanding the storyline with each writing session. Many questions about the use of technology in early childhood exist, but this study offers perspective on what can be done and where to start. I would encourage other early childhood educators to continue to consider appropriate use of technology in the classroom to reflect the child’s world and prepare them for their future.
References


Hill, S. (2010). The millennium generation: Teacher-researchers exploring new forms of


### Appendix A

**Teacher Survey**

**5 Point Likert Scale Survey**

<table>
<thead>
<tr>
<th>Student</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1 Student can create a story (using any tool—dictating to an adult, moveable alphabet, writing, digitally)</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2 Student enjoys creating stories</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3 Student understands the elements and sequencing of a story (beginning, middle, end)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4 Student independently chooses story writing activities</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5 Student exhibits independence during story writing process</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6 Student stays on task to complete story writing process</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7 Student enjoys sharing completed stories with others</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix B

Conference Questions

1. How do you feel about writing stories? Why do you think you feel that way?

2. What is your favorite way to write stories? Do you have a favorite classroom material to use for writing stories?

3. Do you think you are a good story writer? Why do you think that?

4. Do you think writing a story is easy or hard?

5. What do you think about when you write a story? What do you try to remember to do?

6. How do you feel when you finish writing a story? Do you like to share your story with others? If so, who do you like to share then with?

Post-interview questions include all the above plus one additional question: 7. Think about the way you wrote stories when you first started kinder year. Do you think your story writing has changed since then? How?
Appendix C

Story-Writing Session Observation Form

<table>
<thead>
<tr>
<th>Child</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attitude</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>The child approaches writing with eagerness.</td>
<td>The child approaches writing with some eagerness.</td>
<td>The child is somewhat indifferent toward writing.</td>
<td>The child displays a dislike towards writing.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Confidence</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>The child displays confidence in writing.</td>
<td>The child displays some confidence in writing.</td>
<td>The child shows a little confidence.</td>
<td>The child is not confident in his/her writing ability.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planning</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>The child generates ideas for writing without resistance or difficulty.</td>
<td>The child generates ideas without great difficulty, but may gravitate towards the same subjects.</td>
<td>The child has limited ideas for writing.</td>
<td>The child has great difficulty generating ideas for writing.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Independence</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>The child works with initiative for at least 15 minutes.</td>
<td>The child works with initiative for at least 8 minutes.</td>
<td>The child displays limited initiative for at least 4 minutes.</td>
<td>The child displays limited initiative.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Productivity</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>The child works productively during each session, completing a story in 1 or 2 sessions.</td>
<td>The child works productively during each session, but may not finish stories in 1 or 2 sessions.</td>
<td>The child works very slowly, and may get side-tracked on occasion. The child may not finish stories in 1 or 2 sessions.</td>
<td>The child works at a slow pace, and does not complete stories. The child is easily side-tracked and distracted.</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
## Appendix D
Kinder year Story-Writing Rubric

<table>
<thead>
<tr>
<th>Level</th>
<th>Story Complexity</th>
</tr>
</thead>
</table>
| **5** Evidence: “Advanced Story” | • Text presents connected sentences  
• 6 or more sentences are present  
• A logical sequence of sentences is present  
• Beginning, middle, and end of the story are enhanced  
• Each sentence contains more than 3 words |
| **4** Evidence: “Developed Story:” | • Text presents connected sentences  
• More than 3 sentences are present  
• A logical sequence of sentences is present  
• A beginning, middle, and end of the story are evident  
• Each sentence contains at least 3 words |
| **3** Evidence: “Complete Story” | • Text presents an attempt at producing connected sentences  
• At least 3 sentences are present  
• A logical sequence of sentences is present  
• A beginning, middle, and end of the story are evident  
• Each sentence contains at least 2 words |
| **2** Evidence: “Story” | • Text presents an attempt at producing 2 connected phrases and/or sentences |
| **1** Evidence: “Phrase or Sentence” | • Text presents an attempt at producing a phrase or short sentence  
• The phrase or short sentence contains at least 3 words |
| **0** Evidence: “Developing Writing” | • Text presents unconnected words |
Appendix E

Story Sample – Dictated

There was a dog and it was a girl. The dog’s name is...

The dog was lost in the forest.

A little boy found the dog and brung him home. The mom
Appendix F

Story Sample Written with Moveable Alphabet
Appendix G

Story Sample – Handwritten

[Hand-drawn image of a group of animals with a story written below in phonetic spelling]
Appendix H

Story Sample - Written with Computer (My Story)

ther was a letl grl and she had a ltl pupe.
and et wus sowen.

and hr nam wus
Appendix I

Story Sample – Written with iPad (My Story)

and annabella was peying en the snow and theew wus a letl bryr wocheg them. and the dog wus lao peyen en the sow.
the ed

There was a letl grl and et wus holuwen and the letl grrls nem
Then et was tim to gow trekrtren and I got a lot of kade.

I had fun gowen tekrtret and naw I’m gowen hom. The end