



Presented at the DLSU Research Congress 2017
De La Salle University, Manila, Philippines
June 20 to 22, 2017

iWrite: Exploring Applications on an iPad to Support Children's Writing Readiness Skills

Andrea Mae Canlas¹, Mayumi Kojima¹ and Jasper Vincent Alontaga^{1,*}

¹ De La Salle University

*Corresponding Author: jasper.alontaga@dlsu.edu.ph

Abstract: Writing delays are one of the most common problems among preschool children. This delay is an indication that the writing readiness skills weren't developed with mastery. The purpose of this action research was to improve the writing readiness skills among preschool children aged three to four years old through the use of two concurrent educational iPad applications. The study was conducted at a daycare center with a sample size of three (3) participants for duration of six (6) days. They were selected based on the researcher's observation and upon the recommendation of the cooperating teachers in the center. Built-in progress reports from the iPad applications, observations and worksheets scored by a rubric and a checklist were used to measure the children's writing skills. The results showed that although there were no significant improvements made on quality of the participants writing based on the rubric, there were observable improvements and increase on the writing readiness skills of the participants based on their checklist scores especially on hand & eye coordination. Moreover, the students showed positive attitudes towards the iPad applications and did more writing tasks. The study attests the role and opportunity of technology-mediated instruction to capture the attention of preschool students especially those situated in traditional classroom settings.

Key Words: iPad applications; writing readiness skills; early childhood education; preschool children; educational technology

1. INTRODUCTION

The increasing use of touchscreen tablets like iPads in homes and even in the early childhood setting has been an ongoing trend. According to National Association for the Education of Young Children (NAEYC), in a joint position statement with the Fred Rogers Center for Early Learning, they stated that technology, when used wisely, has the potential to support learning and relationships for young children (Radich, 2013). The various tools of technology with the appropriate means of guidance can harness learning and development. This encourages teachers to reevaluate the materials they

use in class and how they use them to address the role of technology in the classroom.

Writing is a fundamental skill and an integral part of every child's experience in school. A majority of the time a child spends in class is usually occupied by writing or other fine motor activities. Early Childhood Education holds the philosophy that very young children develop skills and learn best by engaging in play in an environment that supports their learning (Edmonds, 1991). However, it is also important to remember that there is still a need to advance and master these skills through explicit instruction alongside developmentally appropriate practices like play.



Children with age 3 to 5 years old are at stage of prewriting skills (Moyer, 2014). Fine motor skills are the skills that control small muscles of fingers, hands, and wrists. The development of fine motor skills is important for completing tasks such as writing, drawing, and buttoning. The fine-motor skills that is necessary for writing is called writing readiness, these are fundamental skills that a child must develop before actual writing. This is the skills to hold a pencil, make strokes, copy shapes, drawings and advancing to letters (Kid Sense Child Development, 2013).

Fine motor skill delays particularly the writing readiness skills like correct pencil grasp, hand and finger strength, hand and eye coordination, hand dominance, and hand division have a multitude of effects in the development of other fine motor skills.

Pencil grasp (type of grasping and correct way of grasping) is the ability to grasp a pencil age appropriately. For age 3, your child will hold crayon or pencil with fingers pointing towards the paper which is called pronated pencil grasp. By age of 4-5 years old, child may able to master tripod pencil grasp which is same manner of grip as many adults hold a pen, this grip is done using thumb, index finger, and resting on their middle finger.

Hand and finger strength is the strength of hands and fingers against force resistance. Hand eye coordination is a combination of small-motor and perceptual-motor development that enables children to use their sight to guide hand and finger movements as in writing. In order for the young children to write first, children must have finger strength to hold a pencil and fine-motor skill to precise movements of pencil, and process information from vision to coordinate hand movements to make the pencil do what they want. This skill is developed through maturity of fine motor muscles and experiential practices (Beaty & Pratt, 2007).

Hand Dominance is the consistent use of one hand over the other for task performance. This allows dominant hand to be more developed and refined in tasks. Hand Division is when the thumb, index, and middle finger are the three main fingers used in manipulation leaving the other two in tucked into the palm and not used.

A delay in these prior to writing skills can cause delays in other skills as well, developing these fine motor skills prior to writing is an important foundation for the attainment of other important skills in all areas of development. A progressive but

very common intervention to delays with fine motor skills often includes sensory touching. In this regard, the researchers would like to explore the possible benefits of touch technology, specifically iPad applications, in developing children's sense of touch to support their writing readiness skills.

Figure 1 illustrates the conceptual framework of the study. This action research contest that touch technology, specifically iPad apps, is an effective instructional tool to improve children's fine motor skills. It examined the current level of writing readiness skills of the children in terms of the five sub-skills: pencil grasp, hand and finger control, hand eye coordination, hand dominance and hand division. It then looked into improvements that were evident in their writing readiness skills as supported by the iPad applications.

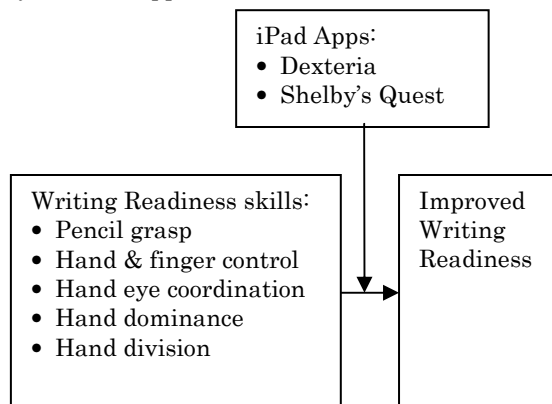


Fig1. Conceptual framework for using iPad apps to improve writing readiness skills

The study is significant since these writing readiness skills determine the ability to hold pencils and copy or draw certain shapes which will eventually help in writing actual letters. A delay in these foundation skills can cause delays in children's formal writing skills.

2. METHODOLOGY

This study followed a single group pretest-posttest design utilizing a mixed method approach where in which the researchers used both quantitative and qualitative measures of data to collect and analyze. The quantitative data was collected from the results of the pre-test and the post-test worksheets, checklist, as well as the progress report provided by the iPad apps used during the



Presented at the DLSU Research Congress 2017
De La Salle University, Manila, Philippines
June 20 to 22, 2017

study. The qualitative data was collected during the observations conducted by the researchers.

The participants of the study were three (3) students aged 3-4 years old of the pre-kindergarten class in a day care center. The students were selected based on the recommendation of the head teacher. These students were the only ones who still do not write with as much fluency as compared to their classmates.

Student A is a 4 year old male. The teachers describe the participant to be progressing when it comes to his writing ability, however still lacked hand/finger control and strength. Student A was the most advanced among 3 participants, he was able to read words shown by teacher however became easily frustrated with writing tasks. He was right handed and still using pencil with whole hand grasp. He was often described as needing constant guidance and repetition during writing activities to perform well.

Student B is a 3 year old male. According to the teacher's reports and records, this participant knew how to write numbers but did not know their numerical equivalence. He would be able to count objects but failed to right the correct number. Student B seemed to be having a hard time reading vocabularies given he was usually very quiet during class and often made mistakes in the writing booklet. He was left handed but some teachers were not aware of the fact that sometimes teacher removes his pencil from left to right hand, he is also whole hand grasp. The participant prior to the intervention wrote using a whole hand motion with little to none wrist action.

Student C is a 4 year old female. Prior to the iPad intervention, this participant has been recognized as one of the least participative during classroom activities. She is often distracted by the objects around her, rarely sings along, workbook and worksheets activities don't get done, and is often seen with her head resting on the table. According to the teachers, Student C doesn't participate as well and as often as the others because her writing ability is delayed as compared to her classmates whom have reached a progressing level of fluency in writing. Her lack of enthusiasm with regards to participating in the activities of the class may be a result of how restricting the activities are in the school because almost 90% of their classroom activities rely on pen and paper. She had fewer words during class time and often refuses to complete tracing tasks. Her writing tasks were always assisted by teacher holding her hand from behind, that she did not

initiate any mark makings. Her pencil pressure was also very weak that without a help there were barely a mark made however she was able to manifest the correct pencil grip. Student C needed the intervention more than the other 2, she was mostly doing scribbles, and often never understood what she was writing during their class activities; according to the records of the lead teacher, student C never wrote with purpose.

Two instruments were used for the study. The first is the writing worksheet and writing quality rubric adapted from Catungal & Monasterio (2016) which covered tracing and copying of horizontal, vertical, diagonal, curved lines and shapes. Another instrument was the writing readiness skills checklist adapted from the Screening Prewriting skills Occupational Therapy (SPOT) checklist by van Hartingsveldt, Cup & Corsten-Mignot (2006) which covered Pencil Grip, Hand and Finger Strength/Control, Hand and Eye coordination, Hand Dominance and Hand division. The checklist was used every time the participants had a writing task to take note of changes or information that was directly observed.

The intervention involved the use of two iPad apps namely *Dexteria* and *Shelby's Quest*. *Dexteria* includes three hand exercises that develop the writing readiness of children, namely: *Tap It* which exercise in the app, this exercise enhance the hand and finger control, hand eye coordination, and hand dominance among others; *Pinch It* which helps improves thumb and pointer finger manipulation and control. It fosters several of the prewriting skills necessary for formal writing; and *Write It* which provides prewriting practice for finger control, stroke sequencing, hand dominance, hand eye coordination, perceptual abilities for writing and other prewriting skills being measured by the study. A stylus was used for this exercise since the target writing readiness skills are all skills that require children to grasp and manipulate a pen/pencil. Similarly, *Shelby's Quest* also has three hand exercises or quests all with three different levels. The app also uses a narrative to explain each exercise and makes use of a character that the children need to help for each quest. The three quests on the app are the following: *Quest 1: Help Skip the Salmon find his Family* which improves tapping and dragging skills; *Quest 2: Save Samantha the Squirrel's Acorns* which improves pinching skills; and *Quest 3: Help Maurice the Moose find his Trail Home* which improves tracing skills. All the iPad apps exercises are



recorded and saved on the apps. Every time the student uses the app his or her scores and progress on the app is under the student's report.

The study was conducted for 6 days. The study started with a pre-test where each student was video recorded while doing a set of writing worksheets to measure their writing readiness. During the next four days of intervention, two students at a time were pulled out to class complete the daily iPad tasks. A post-test was conducted after the intervention.

Pre-test and post-test scores based on the rubric and checklist were compared and analyzed. The observation notes gathered from the progression seen on writing tasks and the students' progress report on the iPad apps were used to support the findings of the study.

3. RESULTS AND DISCUSSION

As a group, the students got an average pre-test score of 18.67 points for writing readiness skills (Table 1). After implementing the iPad Apps Dexteria and Shelby's Quest together with the writing tasks, all three children's scores improved and the average post-test score increased to 34 points.

Table 1. Pre-test and Post-test Scores on Writing Readiness Skills

	Student A		Student B		Student C	
	Pre	Post	Pre	Post	Pre	Post
Pencil grasp (out of 12)	3	7	1	5	4	6
Hand & finger control (out of 15)	9	8	4	9	3	4
Hand eye coordination (out of 24)	9	18	5	9	6	11
Hand dominance (out of 6)	3	3	2	4	0	1
Hand division (out of 12)	4	7	0	4	3	6
Total (out of 69)	28	43	12	31	16	28

Among the writing readiness skills, the children's hand eye coordination had the highest increase. This particular skill is developed through

maturity of fine motor muscles and experiential practices (Beaty & Pratt, 2011). This result is also supported in the scores found on the iPad app report, wherein over the course of the intervention the children had developed more control and was able to decrease the amount of time that it would take to complete the iPad app task. These results support Picard and Tsao's (2014) claim that using iPad applications improve many fine motor skills, one of which is the writing readiness skills.

Similarly, the children's quality of writing also improved, from an average pre-test score of 22.33 points to an average post-test score of 26 points (Table 2). Observation notes for student A and B also shows their pencil grasp developed into tripod grasp from whole hand grasp. Student C also exhibited decreased refusal to do the writing drills. For all three students there were observable improvements on their writing names practices.

Table 2. Pretest and Posttest Scores on Writing Quality

	Student A		Student B		Student C	
	Pre	Post	Pre	Post	Pre	Post
Page 1 (out of 12)	7	7	5	5	4	5
Page 2 (out of 12)	6	6	6	7	4	5
Page 3 (out of 16)	7	6	5	9	7	8
Page 4 (out of 12)	6	6	7	9	3	5
Total (out of 52)	26	25	23	30	18	23

Using iPad applications also served as a great opportunity to capture the attention of the students especially those situated in traditional classroom settings. During the intervention, students were more motivated to complete iPad tasks that children actually wanting to do more app intervention especially at first. However, after few days at the end of the intervention around day 5, students seemed less interested in apps that some of them got distracted by other students during the exercise or some refused to do certain game. Although, once they start, they still wanted to complete all the levels of each exercise given. The most beneficial application was Dexteria's "Write it" and Shelby's Quest 1: Help Skip the Salmon find his



Presented at the DLSU Research Congress 2017
De La Salle University, Manila, Philippines
June 20 to 22, 2017

Family and Quest 2: Save Samantha the Squirrel's Acorns.

For Dexterity, the first stage "Tap it" was difficult for participants to complete that researchers did not include it on the exercise. This is because students were not able to move their other fingers while thumb touching the screen, it also seemed like none of the students understood the instruction of Tap it. Therefore researchers utilized other 2 stages "pinch it" and "write it" from Dexterity. Pinch it was most popular game in Dexterity. Student A and B were motivated to complete more than difficulty level 5, but student C differed that she refused to do pinch it sometimes. For write it, all participants were asked to trace their own first name letters in caps. There was confusion among children due to different strokes on letters than their own to complete. Therefore some letters that students find difficult was assisted with researchers behind. For student A letter "M" and "R", for student B letter "B" and for student C most of the time required assistance in every letters. However, as the days pass by students got more accustomed to the app especially Student A and B, that they started to accomplish each letter consuming less time or alone, some even initiating to start the stage by themselves.

For Shelby's Quest, the 1st stage Quest 1: Help Skip the Salmon find his Family, was children's favorite, that all children were motivated to accomplish the quest however, due to the program did not require precision as long as the ending placement of the fish the students were dragging end at a certain point, children tend to finish the task without much preciseness in tracing the route of river. Students knowing this fact, even though researchers and teachers remind them to follow the river pass the students did not take much consideration on that. The second stage Quest 2: Save Samantha the Squirrel's Acorns gave a hard time to all the students at first. The action of pinch and drag acorn to basket frustrated students, it was also not so clear if the acorn was successfully inside basket or not since the hand students are using block the view of acorn being disappearing to basket. The quest needed some practice before participants were able to complete stage 3. At first children were not so careful to drag the acorn but in the end of the day 4 learning the function of the game, students were more careful not to drop the acorn. Student A slowed down the pace of dragging for him to be able to successfully drop in proper place. This app also offers three stages however, with difficulty to understand

the difference in strokes direction and orders that researchers did not encourage using Quest 3: Help Maurice the Moose find his Trail Home, researchers observed children frustrated and unsatisfied with the strokeorders, that even researchers found it difficult to figure the order of stroke out without failures.

Overall, the participants of the study were able to use the iPads purposefully as an alternative to the traditional writing activities. This supports Dluhosh & Burns (2014) on the importance of integrating iPads and other forms of mainstream technology into the classroom in order to facilitate children in learning.

4. CONCLUSIONS

While a direct relationship cannot be established between improvements of the hand writings with the iPad applications, the researchers found out that the use of the iPad apps resulted to both numerical and observable improvements on writing readiness skills. It can be concluded therefore that using educational iPad applications integrated in traditional classroom of pen and paper style can contribute to the further improvement on writing readiness skills.

For future researchers, it is recommended to allot a longer period of implementation to make the result more comprehensive. An extensive reproduction of the study would provide a seamless transition from the development of writing readiness skills to further development in academic writing. It is also recommended to integrate the iPad intervention always with the traditional pen and paper or crayon worksheets of other types of sensory activities. This is because after continuously practicing on iPad, the children get used to the applications and the motivation level tends to go down. Integrating pen and paper or crayon activity allows children to see more connection and improvements, adding more variation to the activities.

5. REFERENCES

Beaty, J. J., & Pratt, L. (2007). *Early literacy in preschool and kindergarten: A multicultural perspective*. Pearson Merrill/Prentice Hall.



Presented at the DLSU Research Congress 2017
De La Salle University, Manila, Philippines
June 20 to 22, 2017

Catungal, S. & Monasterio, K. (2016). Improving children's writing skills through manipulatives-enhanced learning classroom (Unpublished thesis). De La Salle University – Manila

Dluhosh, B. K., & Burns, A. Y. (2014). Tablet Use by Occupational Therapists for Preliteracy Learning with Preschool Children.

Edmonds, R. (1991). Effective schools for children at risk [Videotape]. Alexandria, VA: Association for Supervision and Curriculum Development.

Kid Sense Child Development (2013). Writing Readiness (Pre-Writing) Skills. Retrieved from <http://www.childdevelopment.com.au/visual-processing/113>

Moyer, L. (2014). Developmental Milestones for PreWriting and Writing Skills. North Shore Pediatric Therapy

Picard, D., Martin, P., & Tsao, R. (2014). iPads at school? A quantitative comparison of elementary schoolchildren's pen-on-paper versus finger-on-screen drawing skills. *Journal of Educational Computing Research*, 50(2), 203-212.

Radich, J. (2013). Technology and interactive media as tools in early childhood programs serving children from birth through age 8. *Every Child*, 19(4), 18.

van Hartingsveldt, M.J., Cup, E.H.C, & Corsten-Mignot, M. (2006). Screening Prewriting Skills Occupational Therapy (SPOT). Retrieved from <http://www.ergoboek.nl>