A Comparison of the Efficacy of Phonics Instruction With and Without Technology

By Kathleen Keck Sprague

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Abstract

This study, a quasi-experimental pretest-posttest design, was conducted by a first grade classroom teacher to determine if providing opportunities for first grade students to practice phonics using an iPad and computer games would increase their phonics skills more than using traditional methods of teaching phonics which did not include technology. Students from three first grade classes with relatively low DIBELS (Dynamic Indicators of Basic Early Literacy Skills) scores were randomly assigned to one of three groups. All students received the same daily phonics instruction as part of their reading curriculum. One group participated in supplemental phonics practice using the iPad and computer games. Another group received supplemental phonics practice using paper-and-pencil methods and hands-on techniques such as manipulating materials and playing word games. A third group did not receive any additional phonics practice. At the conclusion of the study, all students were tested using a parallel version of the previously given DIBELS tests and the gain scores of the three groups were compared. The results of the study demonstrated improvement in test scores for all three groups. There was not a significant difference in student gain scores for the three groups. Ratings of participants' attitudes towards their activities suggested that there were positive effects of using technology to practice phonics skills. The technology group found their activities more enjoyable and helpful than the traditional group. This finding suggests that students enjoyed practicing phonics on the iPad and computer more than they did using traditional methods. Further research should be conducted to explore how specific technologies can be used most effectively to improve the phonics skills of first grade students.

CHAPTER I

INTRODUCTION

Overview

As part of their reading instruction, children in first grade are taught phonics skills to help them sound out words when reading and spelling. Students often are placed into small homogenous groups to receive phonics practice and instruction using a variety of hands-on or paper-and-pencil methods. However, advances in technology are changing the way modern students learn. "Today's students have grown up in the digital age, where learning is not only important, but fun. Allowing kids to use social media and interactive sites in school- which they already use at home- is just common sense. It also lets teachers show kids what it means to be responsible digital citizens- an area in which many schools are failing" (Thomas & Sheninger, 2012). Due to their interaction with video games, computers, and Smart Phones, young children quickly become accustomed to rapidly changing stimuli from which they can receive instantaneous and personalized feedback. Teachers need to meet the demands of this tech-savvy generation by incorporating technology into the classroom. A current challenge is identifying how best to incorporate technology into phonics instruction. This is a concern because not all classes have technologies available to them and those that do may not use them in the ways that would increase phonics skills most effectively.

Statement of Problem

The study was designed to determine whether first grade students who were provided opportunities to practice phonics skills by playing phonics games on computer websites and iPads would exhibit greater gains in phonics skills than students who practiced phonics using more traditional methods which did not include technology or those who were not provided

supplemental practice time.

Hypothesis

The main null hypothesis (stated below) was that the mean gains in phonics scores would be equal for students in the technology, traditional practice, and control (no practice) conditions. A comparison of pretest means was done initially to establish whether the groups' pretest scores were significantly different from one another.

ho1: mean pretest score (technology condition) = mean pretest score (traditional practice condition) = mean pretest score (control (no practice)) condition

ho2: mean gain (technology condition) = mean gain (traditional practice condition) = mean gain (control (no practice)) condition

At the conclusion of the intervention, students' feelings about the extra phonics practice they received were compared and their mean perceptions of the activities' usefulness and fun were compared across the technology and traditional practice conditions.

ho_3: mean perceptions about the phonics practice (technology group) = mean perceptions about the phonics practice (traditional practice group)

Operational Definitions

The following terms are used throughout this report.

Phonics is the association of written letters with sounds and the blending of sounds together to form words.

A ***letter team*** occurs when two letters produce one sound (for example the letters "ch" make one sound).

Nonsense Word Fluency is a Dynamic Indicators of Basic Early literacy Skills (DIBELS) subtest requiring students to read as many two and three letter words as possible within one minute

(Sopris Learning, 2009). The words are not real words and test a student's ability to identify letter sounds and blend them together to form words. Some examples of these words are "baf", "op" and "cuz." Although this subtest has two portions, the Whole Words Read (WWR) score was the focus of this study.

Whole Words Read (WWR): This portion of the subtest scores students on their ability to blend letter sounds together to form a word. If the student automatically reads a three letter nonsense word correctly without sounding it out, they receive a score of one for WWR and three-for CLS. The WWR score will be the focus of this study as it reflects overall phonics ability.

Phonics Websites were used by students in an Experimental Group. These websites were used on classroom computers, and games available on these sites were played by students on an individual basis. The websites that were used were discovered through an online search by the researcher and are described below.

www.starfall.com: This website contains movies and games that teach phonics skills. Online interactive books also are featured on this website.

www.pbskids.org/lions: This website is called *Between the Lions* and features many colorful, interactive games using specific phonics skills.

http://supersimplelearning.com/abcs/games: This website provides a letter sound for which students must select the corresponding letter from a list at the bottom of the screen. Once the correct letter has been selected, a matching picture and word appear on the screen with the target letter highlighted and a voice reading the corresponding word with emphasis on the target sound.

www.kizphonics.com: This website provides leveled phonics practice. There are multiple

games including word building and matching activities.

iPad Games (Apps) were used by students in an Experimental Group. These games were used on an iPad in the classroom and played by students on an individual basis. The apps that were used are described below.

Build A Word Express (2013): This app helps students to identify sounds of letters and use them to make words. It gives a brief phonics lesson, guides the player through a practice session, and provides independent practice.

Cimo Can Spell (2013): This app provides leveled practice with spelling words. Cimo is a penguin and to help him reach his food, a word is spoken and the player must correctly spell the word using icebergs with letters on them. To check the spelling, the word is sounded out as each letter (or letter team) is highlighted. If the word is spelled correctly, the penguin hops across the icebergs to his food. If the word is spelled incorrectly, the penguin falls through the icebergs and the player must try to spell the word again.

Magic Spell (2012): This app shows the player a picture and the player must use letter tiles to build the word correctly.

Tic-Tac-Toe Phonics (2011): This app provides nine phonics questions such as "What is the missing letter in the word __?" and "Which word has the same sound as __?" The questions are read by the player and the player may select the question he/she wants to answer. If the player is correct, the space is marked with an X (for the player) or an O (for the computer). The player (or computer) who earns a "tic-tac-toe" first is the winner.

CHAPTER II

REVIEW OF THE LITERATURE

This literature review examines phonics instruction at the early reading level. Section one defines phonics and the importance of incorporating phonics into beginning reading instruction. The different types of phonics instruction that are used with young readers also are examined. Section two describes the benefits of phonics instruction and a variety of strategies that can be used with early readers that do not include technology. Section three describes ways technology can be used to enhance phonics instruction and how they can be incorporated into the classroom.

Phonics Definition

Phonics instruction is one of the many ways young children are taught to read. Phonics can be defined as "reading instruction that systematically teachers letter-sound relations and their use to read words, and to refer to the letter-sound knowledge and skills that are taught" (Handbook of Research, 2011). There are several components that are necessary for comprehensive phonics instruction. These include phonemic awareness, or hearing the sounds in spoken words, naming and recognizing letters (grapheme-phoneme correspondence), associating sounds with letters, and decoding new words (Handbook of Research). All of these components work together during phonics instruction to develop early reading skills.

The use of phonics to teach reading is a subject of much debate. Some researchers believe that the English language is too inconsistent to assign a specific sound to letters and combinations of letters. Based on this concern, it is important not to use phonics as the only strategy for reading new words. Phonics should be used in combination with other strategies and serve to "assist the reader in obtaining an approximate pronunciation for a written word that,

when checked for a match with his or her store of known spoken words and the context, gets the reader one step closer to the meaning" (Mesmer & Griffith, 2005, p. 367). Early readers can use phonics to help them recognize new words that can then be added to their sight word vocabulary as they become more skilled.

There are many different types of phonics instruction. Some teachers believe that phonics should be taught in the context of reading and writing rather than in isolation, while others believe that a more systematic approach is necessary (Morrow & Tracey, 1997). One way to teach phonics in the classroom is through explicit instruction. Explicit instruction involves the teacher directly stating the new letter and corresponding sound and having children practice it, often using a worksheet as part of the practice activities. Explicit instruction typically is used with the synthetic phonics method. In synthetic phonics, students are taught to "recognize the sounds represented by each letter (or letter cluster) in a word and then to blend those sounds to give the word" (de Graaff, Bosman, Hasselman, & Verhoeven, 2009, p. 318). Students also may be taught the analytic phonics method in a systematic manner. This approach teaches students to recognize that certain words share common sounds and spellings. Contextual instruction (or embedded phonics) takes a more whole language approach. This type of phonics instruction helps children recognize phonetic patterns while participating in typical classroom instruction. For example, the teacher or child may point out a letter and discuss the corresponding sound as it appears in the story they are reading. A combined approach to teaching phonics includes both explicit instruction as well as contextual instruction. Morrow et al., (1997) found that the type of phonics instruction varied and depended on grade levels with explicit instruction being more prevalent in the early grades. Explicitly teaching young students letters and sounds provides students with a solid foundation upon—which they can build as their phonics skills progress.

Traditional Phonics Strategies without Technology

A study conducted by the National Reading Panel (2000) involving students in Kindergarten through grade six discovered that "explicit, systematic phonics instruction is a valuable and essential part of a successful classroom reading program." In particular, first grade students who received systematic phonics instruction showed growth in their abilities to decode and spell words compared to those who were taught to read without the use of phonics. The panel cautions that phonics should be only one component of reading instruction and must be taught in tandem with phonemic awareness, fluency, and comprehension strategies to create successful readers.

There are many strategies that a teacher can use in the classroom to enhance phonics instruction. One motivating and interactive way for students to practice phonics skills is to work with a cooperative group to complete an activity that examines words embedded in their text. Examples include the teacher selecting and saying familiar words out of books the class has read. Students then can work with their group to decide on the beginning sound of a word the teacher says and write it on a dry erase board (Borgia & Owles, 2011). Another strategy that can be used in the classroom involves students looking around their classroom and in their reading materials to find words that fit a long-vowel spelling pre-selected by the teacher. The class then can make a list of these words and display it in their classroom for future reference.

A kinesthetic way for children to practice phonics is through a stepping stone game. For this activity, words are read by the teacher and students are asked to step on a paper stone that shows the written representation (letters or letter groups) of the sounds they hear. (Rule, Dockstader, & Stewart, 2006). Hands-on activities in which students can manipulate materials or letter cards to match beginning or ending sounds as well as sort objects into groups also are

effective ways for students to practice the phonics skills they have learned during systematic instruction. These researchers found that students who participated in these types of activities were able to "internalize the skills leading toward automaticity of decoding skills" (p.200) more than their peers in the control group who received phonics practice in the form of basal readers and worksheets.

Using Technology to Enhance Phonics Instruction

The continual advancement of technology has brought a new kind of phonics instruction to classrooms. Macaruso and Walker (2008) found that "computers are capable of presenting activities that are interesting and motivating to children- including the use of pictorial displays and positive feedback" (p. 268). When used to supplement systematic phonics instruction in the classroom, computers also can provide children with an opportunity to practice at their own learning pace. Macaruso, Hook, & McCabe (2006) conducted a study which found computer-assisted phonics instruction helped struggling early readers strengthen their phonics and phonemic awareness skills, enabling them to perform as well on reading assessments as non-struggling peers who did not receive computer-aided instruction. This suggests "the opportunity for extensive review through self-paced activities, tailored to the individual student with immediate feedback, allows struggling readers to progress further than children not given this opportunity" (Macaruso et al., 2006, p. 169).

There are many ways to use computers to enhance phonics instruction. Some strategies include common computer processes such as word processing. One of these techniques is eSorts. This activity is designed to support analytic phonics instruction by providing opportunities for first grade students to work one-on-one with a tutor to complete a word study. The technique was developed by Zucker & Invernizzi (2008) as a way to "use technology to

personalize learning for…students with a poor attitude towards reading…[and] for students who had already been taught spelling patterns but were having trouble mastering them" (p. 654). Over the course of five days, the first grade student dictates a story for his or her tutor to type, reviews a list of words that was sorted in a previous eSort lesson, adds words to the eSort from the student's new story and other texts, practices the eSort until it is automatic, personalizes the eSort and story with clip art and shares the story and eSort with other students. Sorting words from the student's own story makes the learning meaningful to the child, which is a motivating way to supplement a young child's phonics instruction.

Another way to use technology to enhance phonics skills is through the Internet. Many websites are available to provide children with a fun and modern way to practice their letter-sound relationships. One of these websites is Starfall.com. This website provides animated activities and pronunciations of letters and letter groups. "The activities and animations are short, engaging, and supportive of students' letter recognition and early phonics awareness" (Labbo, 2006, p.811). Mothergoose.com is another website that provides interactive games where children can push a letter on the computer's keyboard and watch a short animation that relates to the letter that was pushed. For example, the K button shows a baby holding onto a kite while flying across the screen. These Internet websites are a motivating way for young readers to practice their phonics skills.

Many computer software programs also are available to enhance phonics instruction. One of these programs is Leescircus®. It provides " 'drill-and-practice' exercises designed to give immediate corrective feedback and is intended to supplement the regular reading curriculum." (van Daal & Reitsma, 2000, p. 183). In studies involving use of this program, students who used the program to enhance phonics instruction showed "significant gains in letter knowledge but not

in concepts about reading and writing" (p. 187). Another computer program that enhances phonics skills is Simon S.I.O. (Sounds it Out) created by Mayer-Johnson. This program "enables emergent readers to develop core word skills through lessons that introduce new word families and sounds with text, voice and graphics" (Felix, 2007, p.1). Students work through the program levels and earn rewards by dragging letters into their correct positions to form words. As supported by the references cited above, using the computer is a motivating way for students to enhance their phonics skills.

Summary

The best way to teach reading continues to be a debate among experts and could vary across learners. Phonics instruction is just one of the many effective ways of teaching early literacy skills. By providing students with a knowledge base of letter-sound relationships and how to use them to read words, teachers are using phonics to build a solid foundation for reading. When used in conjunction with other reading strategies, phonics is a very effective tool for young readers to use to help them decode unfamiliar words. There are many interesting and motivating strategies that can be used to supplement phonics instruction. Some of these strategies involve technology such as computers and others provide motivation through hands-on activities. In conclusion, given that phonics instruction is a proven way to increase reading skills, it is important for students to be given opportunities to practice these skills in motivating and engaging ways so that they can build a strong reading foundation.

CHAPTER III

METHODS

The purpose of this study was to determine if providing opportunities for first grade students to practice phonics skills by playing phonics games on computer websites and iPads would result in greater gains in phonics skills than using more traditional methods that did not include technology or using no supplemental practice dedicated specifically to phonics.

Design

A quasi-experimental pretest-posttest design was used to conduct this research. This study compared the mean gains of three groups of emergent readers in their acquisition of phonics skills. One group consisted of students who had no extra phonics practice. A second group engaged in phonics practice with technology, and a third group received phonics practice without technology. In this study, the dependent variable was the gain in students' phonics skills as measured by the Dynamic Indicators of Basic Early Literacy Skills (DIBELS). The independent variable was the type of phonics practice each group received as a supplement to their daily phonics curriculum.

Participants

Participants were selected from a population of 128 first grade students enrolled at a large suburban elementary school in Pasadena, Maryland. The majority of the population is Caucasian and non-Hispanic, although African-American, Asian, and Hispanic students also attend the school. The students in the entire first grade were between the ages of six and seven years old. The population was 53% male and 47% female. The five students who scored the lowest in their class on the WWR section of the DIBELS test were selected from three different classes to participate in the study. These 15 students then were assigned randomly to one of

three groups of five students each. The groups were the Experimental Group 1: Technology; Experimental Group 2: Traditional Methods; and the Control Group. Experimental Group 1 consisted of four male and one female student. Among the group members three were Caucasian and two were minorities. Experimental Group 2 consisted of three male and two female students. Four members of the group were Caucasian and one was a minority. The Control Group consisted of three male and two female students, all of whom were Caucasian.

Instruments

The main instrument used was the WWR portion of the standardized test DIBELS (Good & Kaminski 2002). The test consisted of one page of two and three-letter nonsense words such as "rav", "tep", and "boz." The assessment was administered to each student individually and the examiner scored the student based on the number of Whole Words Read (WWR) correctly in one minute. Parallel forms of the WWR Section of DIBELS were administered to each student at the beginning of the study and again at the end.

According to the Mental Measurements Yearbook, (2003), DIBELS is a widely used assessment in schools across the country due to its progress monitoring features and the information it provides teachers that enables students to be placed into intervention groups. While other portions of the DIBELS test were not considered reliable, the Nonsense Word (WWR) portion of the test showed remarkable levels of reliability. The average concurrent reliability coefficient for this portion of the test was found to be .58 with .68 for the predictive validity when compared to other similar tests.

A survey was given to both experimental groups at the conclusion of the study. Students were asked to circle a picture to display their feelings about their involvement in the study and whether or not they thought it helped to improve their reading skills. They were also asked to

complete several short answer questions to tell about what parts of the experiment they enjoyed the most.

Procedure

The DIBELS test was administered to first grade students three times during the school year: fall, winter, and spring. School protocol requires that both portions of the test (Nonsense Word), (Whole Words Read) and Oral Reading Fluency) be administered. Only the WWR section of DIBELS was used to place the participants into groups for this study. For this portion of the test, each student was tested individually. The student was given one page of two and three letter nonsense words. After the examiner gave the directions and modeled how to read the nonsense words, a timer was set for one minute and the student was asked to read as many nonsense words as possible within that time. At the conclusion of the test, the examiner counted how many whole words the student was able to read correctly. The five lowest performing students on the WWR section of DIBELS were selected from three different classes to participate in the study. These 15 students then were assigned randomly to one of three groups as described above.

All three groups received daily phonics instruction from their homeroom teacher as prescribed by the school curriculum. The teachers provided explicit instruction on what sound a letter (or a letter team) made, focusing on a new letter (or group of letters) each week. During this explicit instruction, the teacher used visuals to help students associate a picture with the letter and its corresponding sound. Throughout the week, students were guided through reading and writing words containing the target sound using grade level texts.

Students in the Technology group received 80 minutes a week of additional phonics instruction using technology throughout the six-week study. These students took turns individually playing phonics games on the iPad for 20 minutes two days a week as well as 20

minutes playing phonics games on computer websites two days a week. All games focused on the current letter or letter team sound being studied as well as the sounds from previous phonics lessons. Students practiced identifying the letter sound, reading words that contained the letter sound, and building words using the correct letter sounds.

Students in the Traditional Methods group received 80 minutes a week of additional phonics instruction using traditional methods. These methods were employed within small group instruction, used with partners, or administered on an individual basis for 20 minutes each day four days a week. The students played phonics board games, phonics card games, and used letter tiles to build words. All games focused on the current letter sound or a letter team, being studied as well as the sounds from previous phonics lessons. As did the students in the Technology group, these students practiced identifying the letter sound, reading words that contained the letter sound, and building words using the correct letter sounds.

The Control Group did not receive any additional phonics practice. Instead, they participated in independent learning centers during the time that the experimental groups were receiving their extra phonics practice in the computer lab or an empty classroom. These students participated in activities that involved solving math problems, reading to perform a task, listening to stories on CD, completing science and social studies activities, assembling puzzles, and engaging in reading and math computer games that did not include phonics. The students in the experimental groups missed these independent activities as they occurred during their phonics practice sessions. The control group students who did not get the technology-based practice also had opportunities to use the technology for math and reading activities that were not phonics-related so that they did not feel the other students' access to such technology was "unfair".

At the end of six weeks, all students were tested using the WWR portion of the Spring DIBELS test. Although different two and three letter nonsense words were used during this administration, the directions, task, and procedure remained the same. The groups' gains in the WWR scores were compared to see if they were consistent across the groups.

Students in the two experimental groups also were given a survey (Appendix A) at the end of the experiment to assess and allow comparison of their feelings about the extra phonics practice they received. The survey had been developed and administered by the researcher.

CHAPTER IV

RESULTS

This study was conducted to determine whether first grade students who were provided opportunities to practice phonics skills by playing phonics games on iPads and computer websites would exhibit greater gains in phonics skills than students who practiced phonics using more traditional methods that did not include technology or those who were not provided supplemental practice opportunities. The study followed a quasi-experimental pretest-posttest design. Students were given a DIBELS subtest (Whole Words Read) before and after their prescribed treatment and the results were analyzed to compare the groups' gains in phonics skills.

Descriptive statistics were computed for the pre and post intervention WWR scores for each group and the total sample. These are presented below in Table 1.

Table 1 Descriptive Statistics

Pre and Post Intervention WWR scores by group

Group /Test	Mean	Range	Std. Deviation
PRETEST			
Technology	3.4	0-5	2.0736
Traditional	3.0	0-5	2.1213
Control	2.0	0-5	2.3452
POSTTEST			
Technology	7.4	1-19	7.3689
Traditional	4.8	0-16	6.9065
Control	4.0	0-9	4.0620

Comparison of Pretest Scores

Null hypothesis 1 posited that the mean pretest scores would be statistically equivalent for all three groups or conditions.

ho1: mean pretest score (technology condition) = mean pretest score (traditional practice condition) = mean pretest score (control (no practice)) condition

A one-way analysis of variance (ANOVA) was computed to test hypothesis 1. Results in Table 2 indicate the F statistic (F= .545) generated by the ANOVA was not statistically significant ($p < .593$). This indicated the groups' mean pretest WWR scores were not statistically significantly different, so null hypothesis one was retained.

Table 2 ANOVA

Comparison of Mean Pretest WWR Scores across Groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.2	2	2.600	.545	.593
Within Groups	57.2	12	4.767		
Total	62.4	14			

Comparison of Gain Scores

To test hypothesis 2, WWR gain scores were calculated by first subtracting the WWR pretest scores from the WWR posttest scores for each participant. Then the three groups' mean gains were compared via a one-way analysis of variance to determine whether or not the groups' gains differed significantly.

ho2: mean gain (technology condition) = mean gain (traditional practice condition) = mean gain (control (no practice)) condition

Descriptive statistics and results of the one-way analysis of variance comparing the groups' gains on the WWR test follow in Tables 3 and 4.

Table 3

Descriptive Statistics of Gain Scores for Each Group and the Sample

Group	N	Mean Gain	s.d.	Std. Error	95% Confidence Interval for Mean		Range
					Lower Bound	Upper Bound	
Technology	5	4.0	6.519	2.916	-4.095	12.095	-2-14
Traditional	5	1.8	5.541	2.478	-5.080	8.680	-3-11
Control	5	2.0	2.121	.949	-.6340	4.634	0-5
Total	15	2.6	4.823	1.245	-.0706	5.271	-3-14

The one-way ANOVA comparing the groups' mean gains yielded an F statistic of .286 with a probability value of $p < .756$, which indicated the mean gains did not differ significantly across the groups, although the gains were largest for the technology group, which had a mean gain of four points. As the means did not differ significantly across phonics intervention conditions, hypothesis 2 was also retained.

Table 4
ANOVA Results Comparing Groups Gains in WWR Scores

Gain Scores	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14.800	2	7.400	.286	.756
Within Groups	310.800	12	25.900		
Total	325.600	14			

Perceptions of the Interventions

Students in the Technology and non-technology groups also were surveyed about their perceptions of the extra phonics practice sessions they were provided. The survey appears in

Appendix A. Table 5 presents descriptive statistics of their responses to items one through three. Responses ranged from zero to two (with 0 = no to 1 = kind of to 2 = yes). The items asked respondents to rate how much they enjoyed the supplemental phonics lessons, whether they enjoyed missing centers, and if they felt the phonics supplementation helped them with their reading.

Table 5
Descriptive Statistics
Survey Items 1-3

Survey Item		Mean	Range	s.d.
1. Liked extra phonics	Technology AND Traditional Groups (N=10)	1.2	0-2	.9189
	Technology Group (N=5)	1.4	0-2	.8944
	Traditional Group (N=5)	1	0-2	1
2. Liked missing centers	Technology AND Traditional Groups (N=10)	1.3	0-2	.8233
	Technology Group (N=5)	1.8	1-2	.4472
	Traditional Group (N=5)	.8	0-2	.8367
3. Extra phonics helped	Technology AND Traditional Groups (N=10)	.9	0-2	.7379
	Technology Group (N=5)	1.2	0-2	.8367
	Traditional Group (N=5)	.6	0-1	.5477

Students were required to miss their time in learning centers to enable them to participate in this study. Centers are a popular program component for first grade students and students often

are reluctant to sacrifice this time. Table 5 shows that the Technology group's responses yielded higher means than the Traditional group's ratings for how much they enjoyed the activities, liked missing centers, and felt the intervention helped them with their reading.

Hypothesis 3 was tested to compare the mean perceptions of the phonics interventions (assessed by the three items above) for the technology and traditional phonics groups. Results of t-tests for independent samples comparing the mean responses on the items indicated that the only significant difference in mean ratings was for whether the groups liked missing centers. The Technology group rated that item one point higher on average (1.8 versus .8) than the Traditional group ($t = .2.357$, $p < .046$). Based on these results, hypothesis three was retained for how enjoyable and helpful the phonics practices sessions were perceived to be, but rejected for its impact on centers time, as students who did not have access to the Technology appeared less happy about missing centers than students in the technology group.

Table 6

T-test for Independent Samples Comparing Perceptions of the Interventions

	t	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
						Lower	**Upper**
Liked extra phonics	.667	8	.524	.4	.600	-.9836	1.7836
Liked missing centers	2.357	8	.046	1.0	.424	.0217	1.9784
Extra phonics helped	1.342	8	.217	.6	.447	-.4313	1.6313

Equal variances assumed

Finally, students in the Technology and Traditional phonics practice groups responded to open-ended items on the survey to state and describe what they found helpful, fun, boring, redundant, and confusing about the supplemental phonics practice sessions they were offered. Frequency counts for each item broken down by group are presented below in Tables 7 and 8.

Table 7

Positives

Group	Helpful Activity	N	Percent	Fun Activity	N	Percent
Tech.	Between the Lions (website)	1	20	Build a Word (App)	1	20
	Build A Word (App)	1	20	Cimo (App)	4	80
	Cimo (App)	2	40			
	Starfall (website)	1	20			
Traditional	Go Fish	1	20	File Folder Games	1	20
	Memory	1	20	Foldables	2	40
	Word Tiles	3	60	Go Fish	1	20
				Memory	1	20

Based on the responses in Table 7, students in the Technology group tended to pick unique activities that they enjoyed, whereas the majority (three of five) of the Traditional group enjoyed one activity (Word Tiles). In contrast to this, however, the data demonstrates that the majority of the Technology group found one iPad app fun while there were many different responses from the Traditional group.

Table 8

Negatives

Group	Not Helpful/ Boring Activity	N	Percent	Already knew	N	Percent	Confusing	N	Percent
Tech.	Kizphonics (website)	1	20	Kizphonics (website)	1	20	Tic-Tac-Toe (App)	5	100
	Super Simple Learning (website)	4	80	Super Simple Learning (website)	4	80			
Traditional	Bingo	1	20	Bingo	3	60	Battleship	3	60
	File Folder Games	2	40	Memory	1	20	File Folder Games	2	40
	Foldables	1	20	Word Tiles	1	20			
	Memory	1	20						

When asked what practice activities were not helpful or boring, students provided responses which are tallied above in Table 8. Overall, the majority of the Technology group did not list iPad apps on their surveys but selected websites as not helpful or boring while the traditional group selected a variety of activities. When asked what type of practice dealt with concepts the students already knew, the majority of the Technology group selected websites as being redundant while the Traditional group listed several different activities as being repetitive, with Bingo having the most responses. Finally, the participants in the two groups were asked to list any phonics practice activities they found confusing. The Technology group unanimously selected a specific iPad app, Tic-Tac-Toe, as the most confusing while the Traditional group selected two activities.

CHAPTER V

DISCUSSION

The purpose of this study was to determine if providing opportunities for first grade students to practice phonics skills by playing phonics games on computer websites and iPads would result in greater gains in phonics skills than using more traditional methods that did not include technology or using no supplemental practice dedicated specifically to phonics.

The DIBELS WWR test was used to assess phonics skills because it measures the letter sounds students are able to produce correctly in one minute in a Whole Words Read format. Hypothesis one stated that all three groups that participated in this study (technology, traditional methods, and control) would have equal mean scores on the DIBELS WWR pretest. Students' phonics knowledge was tested to ensure that the groups were comparable initially in terms of phonics scores so that the effects of the practice interventions on the posttest results could be evaluated when the gain scores were compared. The pretest results did not indicate any significant statistical differences in the mean scores between the experimental and control groups, so null hypothesis 1 was retained and changes in post test scores were presumably attributable to the interventions.

Null hypothesis 2 stated that the mean WWR gain scores would be statistically equivalent among all three groups. This hypothesis also was retained as the gains were not significantly different across groups. However, the technology group achieved slightly higher gains than the other two groups and rated the intervention as enjoyable.

Null hypothesis 3 was tested to compare the mean perception scores students gave to the phonics interventions and it was rejected as the mean ratings of perceptions about supplemental phonics practice were significantly higher for the technology group compared to the traditional group. According to their survey results, the students in the technology group were more

motivated and interested in their supplemental phonics practice that may have led to their slightly higher gains in their acquisition of phonics skills.

Implications of the Study

The survey results were very telling. Although all groups had similar gains on their posttest scores, students in the technology group found their activities more enjoyable and more helpful than the students receiving traditional instruction. Students in the technology group also reported that they did not mind missing learning centers in order to participate in their phonics practice using technology. The students from the traditional group gave less positive responses in all survey areas. These results suggest that the students enjoyed practicing phonics on the iPad and computer more than they did using traditional methods to learn phonics.

Responses to open-ended survey questions indicated that the majority of students in the Technology grouped selected more specific resources than was the case for students in the Traditional group. Survey results citing which activities were the most fun revealed a majority of the students in the Technology group selected one iPad app while four different activities were selected by the Traditional group members. Students responded in reverse when asked to name the activity that was the most helpful. The students from the Technology group listed four different activities (two websites and two apps) while the majority of the Traditional group members selected one activity. This pattern of responses suggests that students find a variety of activities using technology helpful but very few traditional activities helpful.

Students from the Technology group selected the same two websites as the most boring and redundant while the traditional group selected five different activities as the most boring and redundant. One app was unanimously chosen as the most confusing by the Technology group, while a larger number of activities was labeled as confusing by the Traditional group.

Throughout the survey, the Technology group was able to give more specific responses than the Traditional group, indicating that their phonics skills were more precisely practiced. Also of note is that the students in the Technology group primarily chose the same activity as boring and redundant, thus demonstrating their abilities to think critically about what was most and least helpful for their practice of phonics skills.

Threats to Validity

The factors affecting the validity of this study were the sample size and composition, the population, limited technology resources, and the timeframe. The study may have had different results if more than 15 students were able to participate. The majority of the three experimental groups were Caucasian males and a more varied gender and ethnic representation may have resulted in different findings. The results may also have differed if the students had been able to have access to technology on a more frequent basis

The students who participated in this study came from three different first grade classes and received daily phonics instruction from their respective teachers. Therefore, different teaching styles and classwork among the three classes may have affected the results of this study. Earlier instruction and the natural progress and development of students also may have contributed to the gains students made over the course of the study.

The pretest used in this study was important to establish a basis from which student growth could be measured. The pretest also was used to identify the lowest 15 performing students to participate in this study. It is of particular interest that 10 out of 15 of the students were male which may have had an impact on the results of this study.

Connections to Existing Literature

The results of this study support the theory postulated by Macaruso (Marcuso et al., 2008) that students are more motivated when they were able to use computers in the classroom. The participants in the Technology group of this study reported positive perceptions of their phonics practice. Research by Macaruso (Marcuso et.al., 2006) indicates that computer-assisted phonics instruction helped struggling early readers strengthen their phonics and phonemic awareness skills. While the results of this study did not reach the level of statistical significance, students in the Technology group of this study did make greater gains in phonics skills than those in the other groups, which is consistent with earlier research findings.

Implications for Future Research

Additional research in this field should include a larger variety of iPad apps, types of computer devices, and computer websites for students to use to practice phonics. Spending more time using the technology or having a longer intervention period also may yield results that are different from those found in this study. It also would be beneficial to use a larger sample size to get results that are more representative of first grade students. Including a variety of age groups in the sample might also help determine whether using technology is more beneficial at particular stages in the development of phonics skills.

Conclusion

Phonics skills are an essential component of the reading process. Students must be taught phonics skills to enable them to decode and spell words. Incorporating technology into the first grade instructional program may be an effective way to address a variety of learning outcomes and capture the interest of the modern student. Results from this study suggest that utilizing technology to practice phonics was motivating and engaging to students and resulted in

gains in their acquisition of phonics skills. Further studies should be conducted to ascertain how best to use technology to meet curricular goals such as development of phonics skills.

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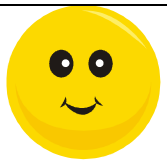
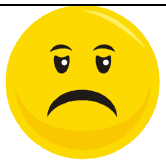
APPENDIX

Appendix A

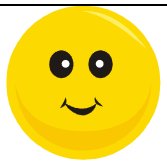
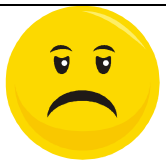
End of Study Survey for both Experimental Groups

Directions: Circle the face to show how you felt during your phonics practice time.

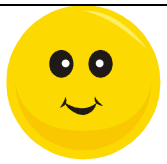
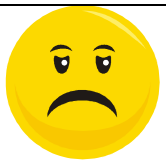
1. **I liked having extra phonics practice.**

		
Yes	**Kind Of**	**No**

2. **I liked missing centers for extra phonics practice.**

		
Yes	**Kind Of**	**No**

3. **I think that extra phonics practice helped me to be a better reader.**

		
Yes	**Kind Of**	**No**

4. **List one thing you did to practice phonics that was really helpful:**

_____

5. **List one thing you did to practice phonics that was really fun:**

_____

6. **List one thing you did to practice phonics that was really not helpful or boring:**

_____

7. **List one thing you did to practice phonics that you already knew:**

_____

8. **List one thing you did to practice phonics that was confusing:**

_____