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# Assistive Technology: A Study of the Benefits of iPad Applications in the Classroom

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ASSISTIVE TECHNOLOGY:  
A STUDY OF THE BENEFIT OF IPAD APPLICATIONS IN THE CLASSROOM

Thesis submitted in partial fulfillment  
of the requirements of the degree  
Masters of Education

By

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2012  
Cedarville University

CEDARVILLE UNIVERSITY  
SCHOOL OF GRADUATE STUDIES

July 30, 2012

I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY Rachel Nicole Janssen ENTITLED Assistive Technology: A Study On The Benefit Of iPad Apps In The Classroom BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF Master of Education.



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## ABSTRACT

Janssen, Rachel N. M. Ed., Education Department, Cedarville University, 2012.  
Assistive Technology: A Study of the Benefit Of iPad Applications in the Classroom

Based on research in the educational divisions of language arts and technology, the purpose of this project was to examine the effects of technology, namely iPad applications, on the instruction of language arts with an emphasis in spelling. In a 3<sup>rd</sup> classroom of 22 students, 8 students were an experimental group receiving additional iPad app instruction on top of the traditional methods of teaching used in the classroom. The remaining 14 students served as a control group only receiving traditional teaching methods. Pre-tests and post-tests in an A-B-A design form compared the scores of the students before and after the quarter of learning. The study did not show a statistical significant advantage to the additional use of the iPad app.

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## CHAPTER I: INTRODUCTION AND PURPOSE

### Introduction

Learning to read and write are two basic elements of education. Students read to receive information. Students write to communicate information. While this basic principle has stood true over time, the methods of accomplishing these feats are varied. Looking back over the history of education, one can see movements and fads in education, particularly in regards to language arts. Melanie and Jeffrey Brooks (2005) acknowledge a heavily debated argument in relation to the teaching of language arts. They note, “Educators remain divided as to the effectiveness of both whole language and phonic instruction for the teaching of reading comprehension. Neither technique has proven truly effective and fail safe.” (Brooks, 2005, p. 273) Popularity aside, what is the best way to teach language arts to students, particularly to the students in today’s classrooms?

While a pendulum balance swings in the debate between phonics and whole language, rote phonics and phonemic awareness have long been championed the most productive way to reach success in the teaching of reading and writing, based in part to the humble beginnings of reading education. Zimmerman and Brown (2003) point out the

heavy emphasis, even federally, placed upon phonics as call for a more balanced approach.

Many educators and researchers fear, that like the government nutrition guidelines, a defacto 'reading guide pyramid' is being promoted by the government policy makers- with phonics claiming the prime real estate at the base of the pyramid and crowding out other important reading nutrients. Unlike the food pyramid, the Administration's reading guidelines have the power of the law behind them. (p. 604)

In an interview of Grace Dubois, Domine (2009) paints a picture of the life of a teacher, Dubois's great-grandmother, Beulah Mae Greene, in a one room school house in the 1850's which describes the exclusive use of phonics in education. (Domine, 2009) Most schools today use this traditional method of teaching, rote phonics, in part, if not mixed with another approach. In the last 150 years, much has changed and much has stayed the same in regards to technology and literacy.

Hempenstall (1997) notes "...literacy, and the role of schools in promoting it, has had a fiery history in the educational community for almost 200 years." (Para. 2) The article focuses mainly on the debate that has permeated reading instruction between phonics and whole language. Melanie and Jeffrey Brooks define both phonics and whole language approaches to language arts as they explain, "Whole language operates from the premise that youngsters acquire knowledge rather than learn it through direct teaching... In the whole language approach, classroom activities focus on students, who are asked to interact with the text in various ways." (Brooks, 2005, pgs. 271-272) Brooks further explains in the following:

[Phonics] operates from the premise that children learn best in a sequential and ordered process of acquiring linguistic components and then rearranging them appropriately. Instruction begins with students gaining phonemic awareness, or the ability to understand that the ‘sounds of spoken language work together to make whole words.’(2005, p. 272)

Explored later are the connections and ramifications of these two approaches to language arts education.

A myriad of other approaches to literacy have come to light in the history of education as well. For the purpose of this study, we will focus on the following two approaches, as they are used in combination in the Sound Literacy iPad application to be studied. The two approaches are Orton-Gillingham (O-G) and morphological spelling.

Kathy Penn, the creator of the Sound Literacy App, explained that while primarily and initially used with students with learning disabilities, namely dyslexia, Orton-Gillingham techniques have broadened to general classroom use while students are learning basic, elementary reading skills (Personal communication, October 15, 2011). “Dr. Samuel Orton and educator Anne Gillingham developed the basic philosophy of Orton-Gillingham throughout the 1930’s and 1940’s believing that students with severe dyslexia needed a multisensory approach...” (Rose, 2007, p. 172) Taking the basic principals of phonics, O-G expands a bit farther with a multisensory approach. On their website, Orton-Gillingham explains their approach.

The Orton-Gillingham methodology utilizes phonetics and emphasizes visual, auditory and kinesthetic learning styles. Instruction begins by focusing on the structure of language and gradually moves towards reading. The program



provides students with immediate feedback and a predictable sequence that integrates reading, writing, and spelling. (Orton-Gillingham, n.d.)

Where O-G focuses on a multisensory structure, a morphological approach focuses on the meaning of a word. Deacon, Whalen and Kirby (2011) introduce the subject well in their article, “Do children see the danger in dangerous? Grade 4, 6, and 8 children’s reading of morphologically complex words.”

Derivational morphology has an important place in children’s oral and written language development across the upper elementary years. Derived words are those for which the addition of an affix typically signals a change in word type (e.g., from the noun *magic* to the adjective *magical*) and brings with it a degree of change in meaning. (p. 467)

It is argued that the ability to determine meaning based off of root words will increase the reader’s likelihood for comprehension. (Deacon, 2011, p. 468) Yet how often in schools, aside from a spelling lesson on prefixes or suffixes, are we teaching students to analyze and break down a new word for meaning? Shouldn’t word meaning play a role in instruction?

Add into the mix technology. The research in regards to the impact of technology on literacy education is still in an infancy stage. The authors of “Technology and At-Risk Young Readers and Their Classrooms,” (Blachowicz, 2009, p. 387) draw from the Report of the National Reading Panel in regards to the prevalence of available research in the realm of technological education for reading.

The Report of the National Reading Panel (National Institute of Child Health and Human Development, 2000), a review of scientifically based research on reading,

discussed the potential of computer-aided learning technology in the classroom and noted that though there is intense interest in computer technology, there has been relatively little systematic research on computers with respect to literacy issues. (Blachowicz, 2009, p. 387)

While findings may presently be in smaller numbers, can we dismiss the tools of society?

“Today, information and communication technologies such as word processors, email, CD-ROMs, digital video and the Internet have resulted in another profound way in which we learn, play and work.” (Taffe, 2007) The researcher can remember when cassette tapes touting multiplication facts and computers allowing for a journey down ‘The Oregon Trail’ were the height of educational technology. Today’s students have netbooks which allow classrooms to Skype in real time with students on the other side of the world. Technology in education has changed just as technology in society has changed. School marketing campaigns would have us to believe that utilizing the latest technology in schools and classrooms is a marked selling point for a successful district. Even the state of Ohio provides content standards which schools are required to meet in the area of technology.

The way students learn has changed throughout the history of American education. As society changes and technology advances, the students within our classroom grow and change as well, as Mitchell Weisberg (2011) explains:

Students in today’s classroom are becoming much more technologically savvy every year. This comfort with technology comes from growing up in an environment where they have encountered, and in fact been bombarded with new

technologies at an ever-increasing pace. Digital technology has pervaded every aspect of their lives: how they play, how they socialize, how they communicate, and how they learn. They've grown up with digital devices, and the students are on the cusp of expecting technology to be integrated seamlessly into most experiences of the personal, professional and social aspects of their life. It is a foregone conclusion that they are looking to further integrate technology into their academic life as much as possible. (p.189)

If we want to reach students in the way they are accustomed, in a way that will be meaningful to them, we have to embrace technological approaches within the classroom.

What does that mean for the classroom? More specifically, what does that mean for the study of language arts?

#### Definition of Terms

App- "highly engaging...applications" used on iPod touch, iPad and iPhone  
(Newton, 2011, p. 55)

Digital Book/ Textbook- Electronic reader, as opposed to a typical paper counterpart, for instance- Nook, "...Amazon Kindle, Sony eReader Touch, Apple iPad, entourage, eDGe, and Course Smart." (Weisberg, 2011)

IPad- "Apple's new tablet computer..." (Walters, 2010, p. 38)

ICTs- "...information and communication technologies..." (Kervin, 2010, p. 58)

ISTE- "The International Society for Technology in Education (ISTE®) is the premier membership association for educators and education leaders engaged in

improving learning and teaching by advancing the effective use of technology in PK–12 and teacher education. ISTE represents more than 100,000 education leaders and emerging leaders throughout the world and informs its members regarding educational issues of national and global scope. (International Society for Technology in Education [ISTE], 2011)

Learner Adaptive Tool- “[a tool for] tailoring educational scenarios to individual student needs. (Boden, 2007, p. 126)

Mobile learning- “Mobile learning refers to the use of mobile or wireless devices for the purpose of learning while on the move.” (Park, 2011, p. 79)

Morphological Spelling- “Spelling that involves the “understanding of the meaning relations among words” (Bourassa, 2011, p. 109)

NCATE- “The National Council for Accreditation of Teacher Education (NCATE) is the profession’s mechanism to help establish high quality teacher preparation. Through the process of professional accreditation of schools, colleges and departments of education, NCATE works to make a difference in the quality of teaching and teacher preparation today, tomorrow, and for the next century.” (National Council for Accreditation of Teacher Education [NCATE], 2010)

NMLs- “New Millennium Learners” (Kang, 2010, p. 157)

Orton-Gillingham/O-G- “Orton Gillingham (O-G) uses a systematic, multi-sensory approach to teach students basic reading, spelling and writing.” (Roses, 2007, p. 171)

Phonics- “provides students with the ‘understanding that there is a predictable relationship between phonemes and graphemes, the letters that represent those sounds in written language.” (Brooks, 2005, p. 271)

Sound Literacy App- “An interactive iPad application that combines the use of Orton-Gillingham techniques with morphological spelling, allowing the teacher and student to interact in the building of phonemic awareness, phonological processing, systematic phonetic instruction, or ‘word building’ with meaningful parts.” (Personal communication, October 15, 2011)

Touch Technology- “Mobile, touch screen devices...” (Newton, 2011, p. 55)  
“The devices have touch screens...” (Waters, 2010)

Tweet- “Our class Twitter site now has more than 350 entries (called tweets)...” (Kurtz, 2009)

Whole language- “The parts of language (pronunciation, grammar and vocabulary, etc.) have no meanings when they are isolated from each other (Freeman, Tvonnes &Freeman, 1992)...[The whole language approach differs from traditional methods in that] Traditional teaching mainly cultivates knowledge (pronunciation, grammar and vocabulary) and basic language abilities (listening, speaking, reading and writing)... The ‘whole language’ theory insists that only by putting language knowledge and language abilities into rich, real, natural language environments can the students gradually and actively master the language.” (Pan, 2012,p. 149)

#### Statement of the Problem

The purpose of this study is to analyze the benefits of technological aids on language arts instruction. When compared to the traditional methods of teaching reading and writing within the classroom, is there benefit to be gained from extensive additional study using technology, namely iPads? Many have tested and proven the validity of technological instruction within the classroom. However, given the innovative technology, limited research can be found in regards to educational studies involving iPads or iPad application. Even my contact with The Apple Company did not provide any further insight; the technology is new and the studies have not yet come to light. (Personal Communication, October 2011). I hope to branch off of further studies and explore these possibilities.

I am not exploring the benefits of technological assistance alone. The particular app, on which the study will focus, uses a combination of the traditional phonics, aspects of Orton Gillingham style learning and morphological spelling. The study will be done in conjunction with the traditional classroom learning. The study is not to extol the use of a technological device alone, but to analyze its ability to enrich what is already being taught in the classroom.

### Scope of the Study and Delimitations

The subject of this quantitative study will be 3<sup>rd</sup> grade students at Worthington Christian Elementary in Columbus, Ohio. The control group of the study will be my 3<sup>rd</sup> grade class. My 3<sup>rd</sup> grade class was chosen to allow me to have direct observation in the natural role as teacher researcher. I recognize the possibility of researcher bias as it my

own classroom. The grade was also selected because in 3rd grade, students are reading and writing to learn as opposed to learning to read; in 3<sup>rd</sup> grade the ability to read begins to impact all subjects as these language arts skills are foundational to their educational success.

For the test group, eight 3<sup>rd</sup> grade students will be chosen. The number 8 was chosen as a number high enough to see results, but low enough to each still have the ability to receive one on one tutoring with the iPad app. The subjects will be chosen to receive additional tutoring as they meet the specific criteria. The following is the selection criteria for the students.

Third grade students will be chosen based on their current performance in class in regards to language arts, particularly spelling. It was decided that in order to see the full range and effects of the tutoring, the researcher would choose 3 low students, 2 average students and 2 high students. For the purpose of our study, the previous terms will be defined accordingly: Student's abilities will be assessed on weekly spelling tests prior to the start of the study, and the grades will serve as an indicator for level of knowledge. High students would be defined as earning an average of an A on spelling tests during the 1<sup>st</sup> and 2<sup>nd</sup> quarter. An A student, or a high student, could not miss on average more than one word out of twenty on their spelling tests. Average students, for the purpose of this study, would be defined as earning an average of B on spelling tests during the 1<sup>st</sup> and 2<sup>nd</sup> quarter. A B student, or an average student, would miss on average two to three words on their spelling tests. Low students would earn on average earn a C or lower on their spelling tests during the 1<sup>st</sup> and 2<sup>nd</sup> quarter. A low student would miss four or more words on average on the weekly spelling tests. The range was selected to provide

consistency to the study. The object of the study is to see if there is a statistical advantage gained in using technology, particularly iPad apps, in conjunction with traditional methods of teaching.

Based on the standards for the state of Ohio, they should have all received a relatively similar education thus far in relation to the development and knowledge of words. Teacher variance and preference, as well as school district focus, can alternately leave holes, or offer a significant advantage; however the level of base knowledge should be relatively even. All of the students selected, save one, have attended school within the Worthington Christian School district for at least one year in an effort to control for student background variance.

The 3rd grade classroom is one of three 3rd grade classrooms in a private Christian institution, Worthington Christian Schools, located in Columbus, Ohio. The school system is made up of predominantly upper-middle class families from the Columbus area. Through Ed Choice, “the mandate allowing the department of education to annually pay scholarships [for students] to attend chartered nonpublic schools,” (Ohio Revised Code [ORC], 2005) more of a diversity can be seen within the families represented at the school.

Based on a parental survey in the classroom, 95% of the students have exposure to computers at home. Of the classroom students, 95% use the internet at home. 72% of the classroom students have exposure to an iPad/iPhone iPod and have explored with apps at home. An example of this survey can be found in Appendix D.

All of the students have exposure to technology at school, by way of the classroom or the Computer Lab. Students daily have access to three Acer netbooks and



three iPads housed in the classroom. Shared between the 3<sup>rd</sup> and 4<sup>th</sup> grade is a set of twenty-two Acer netbooks that each class uses two to three times a week. Students have access to the computer lab in computer class for an hour, once every two weeks.

Student subjects will not be competing against each other. The point of this study is to compare the students against their own work, pre-tutoring scores compared to post-tutoring scores. The level of students offers a range for interest within the study. For the purpose of this study, a single- case A-B-A research design was selected. The student test scores following the experimental study will be compared to the baseline test scores prior to the study.

### Significance of the Study

Our society is rapidly changing. The way we communicate is rapidly changing. The way students learn is rapidly changing. As research has explained, engaging students in a medium which is relevant, meaningful and enticing is a desire of educators. Our students see the use of technology in the world around them and they are drawn to these tools. Ask a student about “Angry Birds”, a popular app, and most can at least tell you they have played it and some can even offer pointers! In education, shouldn't we be taking advantage of similar tools and resources that are along similar technological design?

## Methods of Procedure

As a quantitative study, I seek to understand how beneficial and influential technology, particularly iPad apps, can be in the classroom as a learning aid. To gauge the benefits of using the aforementioned assistive technology, I will tutor a select group of 8 students, based on the specifications previously mentioned. High students would be defined as earning an average of an A on spelling tests during the 1<sup>st</sup> and 2<sup>nd</sup> quarter. An A student, or a high student, could not miss on average more than one word out of twenty on their spelling tests. Average students, for the purpose of this study, would be defined as earning an average of B on spelling tests during the 1<sup>st</sup> and 2<sup>nd</sup> quarter. A B student, or an average student, would miss on average two to three words on their spelling tests. Low students would earn on average earn a C or lower on their spelling tests during the 1<sup>st</sup> and 2<sup>nd</sup> quarter. A low student would miss four or more words on average on the weekly spelling tests. Extensive tutoring, or additional tutoring on top of the traditional classroom methods of teaching spelling, will be offered via the iPad apps to the select group of chosen students. Testing will be used as the study comparison point.

After the selecting the group to receive the additional iPad instruction (this group will remain anonymous in this study), all of the students in the 3rd grade class will be given a pre-test based on a sample of the words used through the next nine weeks. Of the 120 words studied during the course of the nine weeks, 40 will be selected to be given during the pre-test. These words will be selected based on the unique way they follow or break typical phonetic rules. These words can be found in Appendix C.

For 9 weeks, the experimental students will be tutored in pairs for 20 minutes a week, while the control students in the classroom are interacting with the material in another form of a traditional method. During the 20 minutes of tutoring time, students will use the iPad to explore with words on Sound Literacy. The Sound Literacy app was selected because of its use within the school system currently to bolster student success in literacy. Based on the literary concepts of Orton Gillingham, morphology and phonics, it will primarily be used as a tool to aid in the study of spelling. Per the Orton Gillingham style of teaching, I will use the app with the students to focus on breaking down the words phonetically, as well as interjecting morphology, which is the understanding of parts of words.

After the 9 weeks of study, all of the students in my class will be given a post test. The post test, for the sake of conformity and stability to the study, will be identical to the pre-test. The scores pre and post will be compared to see if any value was added to the knowledge. The scores of the selected experimental group which was tutored will also be compared against the scores of the students in the classroom who received only traditional instruction.

### Purpose of the Study

The study was designed initially to explore specific possibilities within my classroom. During the course of the first nine weeks of the 2011-2012 school year, I saw a need to integrate new ideas and methods into the language arts unit being taught in the

classroom. In the area of spelling, in particular, I sought to help students who were really struggling.

Enter the iPad. Originally bought for the purpose of taking reading tests or “filling time during inside recess when it was raining,” the researcher began to wonder if it could serve a more noble purpose. The kids would fight over its use and relentlessly beg for a little bit of play time. Needless to say, it was a popular item within the classroom, second only to the bathroom pass.

After research online and guidance from within my school building, the app “Sound Literacy” was brought to attention. The app incorporated the use of the iPad into an in-depth study of literacy, broken apart literally piece by piece for students; teachers could use the app to break down words for students- phonetically and morphologically (K. Penn, personal communication, October 15, 2011). I decided to use the iPad and the “Sound Literacy” app to test whether there was any benefit to be gained from supplementing traditional language arts instruction with technology, namely the iPad. The students would receive weekly instruction using the iPad application in the same group at the same time every week. Regardless of the outcome, the students in need would be receiving extra exposure and instruction in regards to their spelling words.

## CHAPTER II: REVIEW OF THE LITERATURE

### Introduction

Research and studies are growing in the area of educational technology. From the National Educational Technology Standards for students to individual school district standards, teachers face increasing mandates in regards to technological integration. How have our classrooms and schools grown and expanded with the use of technology? How does our technological society impact the students in our classrooms? Is utilizing technology within the classroom the best approach, or more specifically, is there one technological tool that works best? These are the questions that educators, myself included, ask when examining technological approaches to education.

As a result of these technological advancements, the way we approach education is constantly changing as new tools are created. Yet, the way we approach education is different now from 10 years ago, let alone 150 years ago. Vanessa Domine interviews Grace Dubois on the history of education as noted by her great-grandmother, a teacher from the 1850s. When asked about technological use, she responds.

I don't know if you'd consider prayer a technology, but the spoken word certainly remained supreme in education during the mid-nineteenth century. Children

learned to read through phonics and phonetics- sounding out letters, blending them and repeating them. By reading the Bible aloud, they would come to an understanding of the words of God. The spoken word- and especially prayer- were, at least for Beulah Mae [great-grandmother] sacred and powerful methods of teaching.... Beulah Mae was so grateful for that giant slate board on the wall, even though she regularly choked on the dust while cleaning erasers. (Domine, 2009, p. 43)

Educators are still teaching the same fundamental rights to education, such as reading, writing and arithmetic. The way we approach this learning has changed, as technology and tools have changed.

“You got the wrong TV, silly head!” claims a little girl running in a circle in an ad for Best Buy’s “Buy Back” program. Up on the screen pops, “Technology moves fast. We feel your pain.” The commercial acknowledges a sentiment felt by many- whether purchasing a TV, a phone or a computer, just as soon as you get a technological device, it is already being replaced for a more advanced model. Technological advancement has been a constant changing wheel in our society for the last 125 years. Martin Greenwald and Denis Feigler examine how this technological shift in society has impacted education:

Technology education has undergone many changes in the 125 years since Calvin Woodward introduced manual training as an educational discipline in St. Louis in the 1880s. In the following 100 years, American industry stood as the major criteria and benchmark for the selection of subject content in the industrial arts. By the 1960s, however, society was changing, fueled in large part by the

remarkable and rapid advances within industry and technology spreading through the consumer market place... (Greenwald, 2009, p. 6)

Mark Weisberg (2011) points out the conflict that exists as educators seek to find a middle ground.

These cultural forces counterbalanced meeting head-on with the traditional academic environment. The academic environment can be characterized as a dynamic tension between tradition and innovation, i.e., balancing enhancing the foundation of existing knowledge, while pushing the frontiers of new knowledge. (p. 190)

Phil Dettelis (2011) further points out the origins of educational technology and also notes confusion in the realm of educational technology:

This discipline [technology education], which is historically rooted in industrial arts, has endeavored to carve out a niche based on preparing students for careers, hands-on applications of mathematics and science, critical thinking and life skills. Unfortunately, a myriad of changes, coupled with a lack of defined content, has created an educational landscape mired in confusion and differing opinions about what this discipline should be. (p. 34)

Though we have seen that historically technology is ever changing and impacting our society, it has not always had a clear definition in the realm of education.

As there are numerous technological tools throughout these years of advancement, the opinions and integrational approaches are just as varied and abundant. In his book *Empowering Teachers with Technology* in 2003, Michael Romano wrote:

For 50 years, billions have been spent to boost learner achievement by empowering teachers with technology. However, there has not as yet emerged a clear vision regarding how to effectively integrate the costly hardware and software into what routinely happens in the classroom. The frustration level in the educational establishment and beyond has become increasingly palpable. (p. 4)

The ISTE, International Society for Technology in Education was born out of this confusion. (ISTE, 2011) “The ISTE seeks to provide universally recognized educational technological standards for students, educational technological resources for teachers, and through, NCATE, standards for teachers in training.” (NCATE, 2010) On their website, the ITSE states:

Simply being able to use technology is no longer enough. Today's students need to be able to use technology to analyze, learn, and explore. Digital age skills are vital for preparing students to work, live, and contribute to the social and civic fabric of their communities. (ISTE, 2011)

Though our society is changing, technologically speaking and educators are seeking to work through the confusion that these changes bring, it is important to examine how these changes are impacting students as learners.

Is the societal impact of technology on students, NBD (no big deal) as texting language would say? Research overwhelmingly comes to the conclusion that students are being impacted by technology, both for the good and the bad. The authors of “Developing an Educational Performance Indicator for New Millennium Learners” recognized that constant exposure to our accustomed technology could leave a gap in the development of young students. From their study they explain:



Knowledge acquisition has evolved from declarative knowledge, which is ‘knowing what,’ to procedural knowledge, which is ‘knowing how.’ That means an individual who knows how, when and where to use acquired knowledge performs better than one who just has a massive amount of knowledge....In addition to these cognitive skills, modified social skills are needed in the 21<sup>st</sup> century. Recently our world has come even more fragmented and globalized at the same time. The existing social bonds forged by geographic conditions and economic barriers have become weaker, and new ones have been built up. (Kang, 2010, p. 158)

Technology has not only changed how NMLs learn, but how they interact with the world around them. Heavily targeted by English teachers is the use of texting as a form of communication. Carrington (2005) points out how many educators fear the negative impact of constantly communicating outside of standard spelling and grammar. (pg. 170) “Texting: the end of civilization (again)?” brings this subject to light. Though not used, per se, in the classroom, implications are felt in the classroom as students bring texting language into written work. (Carrington, 2005, p. 170)

Young people require protection from addiction to a deficit form of text and from allowing its use to jeopardize their success...The clear focus here is the risk posed to the educational futures of students by the infiltration of texting into classroom activities.” (Carrington, 2005, p. 170)

The author, Victoria Carrington, goes on to note further societal implications of constant technology used by students.

Fears for young people are, of course, not limiting to texting. Hosted by the mass media, there is ongoing concern, manifested in a continuum of public debate from informed discussion to outright hysteria, with the risk of young people of unsupervised access to technology. This theme of youth at risk and at risk can also be seen running through other issues- access to internet pornography and risk of interaction with online pedophiles is a current example. (Carrington, 2005, p. 170)

Students 150 years ago did not have to face these types of risks and challenges, as they are a result of the technology we hold so dear. These affects do shape today's student, and should in turn have an impact on how we are teaching technology.

### Language Arts

As noted in previously stated research, Foorman discusses the debate in education between whole language and phonics. (Foorman, 1994) "What began as a pedagogical debate in the 1960s- whether to teach reading by phonics rules or by whole word- evolved during the 1970s and 1980s in a paradigm war of vitriolic proportions." (Foorman, 1994, p. 25) In the article "Reading the code, reading the whole," Bower (1992) also offers insight into the history of this educational debate:

Passionate disagreement over methods of reading instruction, especially the use of phonics, stretches back more than 100 years - and probably to "the beginning of pedagogy," asserts psychologist Keith E. Stanovich of the Ontario Institute for Studies in Education in Toronto. Reading research has increased dramatically in

the past three decades, with investigators arguing over whether skilled readers recognize words as whole units or effortlessly weave together words from their constituent letters and sounds. (Para. 9)

To come to a greater understanding, we analyze these methods further.

Phonics, the older of the two debated methods to teaching reading, had its origins in religious education, as Hempenstall (1997) explores the history of phonetic education is seen in the following:

The first teachers of reading in English were priests in the 7th Century. Children were taught the alphabet, syllables, and the Primer, or Prayerbook (Davis, 1973). Most reading was religious and the ability to read was restricted to relatively few. With the invention of the printing press in the 16th Century, the written word became much more prevalent, although the Bible was the only book available in most homes. Thus, reading was first promoted by religious authorities as a means to one end (salvation) and only later was considered important by governments, as a means to a quite different, secular end--an educated, democratic society. The phonic technique of teaching component skills and then combining those skills was the norm until the mid-19th Century (Adams, 1990). (Para. 23)

Phonetic “instruction begins with students gaining phonemic awareness, or the ability to understand that the ‘sounds of spoken language work together to make words.’” (Brooks, 2005, p. 272) In the 1960s, Jean Chall studied the effectiveness of several reading methods and concluded that the phonetically centered approach was best. (Hempenstall, 1997) However, British researcher Hempenstall goes on to note:

The outcome of her (Chall's) work *Learning To Read: the great debate* was published in 1967 and her conclusions were, and remain, controversial. Having analysed 20 basal level reading programmes across 300 classrooms in three countries, and having studied the literature (such as it was) on effectiveness comparisons of phonics and whole-word approaches, she concluded that systematic teaching of phonics tended to produce better word recognition, spelling, vocabulary and comprehension in all children, not only those from the at-risk groups (such as students of lesser intelligence, or those from lower socio-economic backgrounds). (1997, Para. 42)

According to research, a phonetic approach to teaching reading has hundreds of years of success. How and when did new systems branch off of this tried and true system of learning?

Focusing on the other side of the historical debate, Hempenstall describes the origins of the Whole Language movement in the following:

It was not until 1828 that Samuel Worcester produced a primer which borrowed the European idea of teaching children to recognise whole words without sounding them out....Support for this view came from James Cattell in 1885 in his assertion that whole-word reading was more economical (Davis, 1988); and, later, from the Gestaltists who considered that the overall shape of the word (rather than the summation of the sound-parts) should provide the pre-eminent clue for young readers. (Hempenstall, 1997, Para. 24)

Rather than focusing on the correlation between letter and sound in a traditional manner, the whole language approach viewed the approach to learning words holistically.

Whole language instructors value phonemic awareness, yet they support this awareness by encouraging students to engage texts through reading and writing rather than through isolated exercises; vocabulary and grammar are likewise taught through the reading and rereading of texts. (Brooks, 2005, p. 272)

Morgan further defines the concept of whole language in the article.

Whole language is a meaning-based approach to language learning that is bringing new enthusiasm and vitality into classrooms around the country. Whole language emphasizes the uniqueness of the individual child and gives more choice to students and teachers in the classroom, thus empowering them both. Using children's literature and environmental print (e.g., street signs, labels), teachers draw on students' interests to discover language activities that will motivate language growth. (Morgan, 1995, Para. 2)

Cassidy (1996) examines the strengths and benefits of a whole language approach. "The strength of the whole language approach is that it is 'whole' and the expert teacher will make use of 'real books' to develop decoding skills as well as to foster pleasurable, purposeful reading." (Para. 8) British author Cassidy goes on to explain the rationale behind the whole language movement:

Phonics exponents, like those who appeared on this program, maintain that the first step in learning to read is decoding. It is, more simply, a matter of what is recognised or acknowledged as the first step. Maybe interest, motivation and understanding come before decoding. Whole language exponents would not want

to quarrel with the fact that decoding is a vital skill for successful reading. They would almost certainly want to quarrel about the type of materials used to teach decoding skills in a pure, patterned phonics program. An intelligent teacher, with knowledge of the sounds of English and sensitivity to the texts used in the classroom can teach phonics systematically, using the language of real books. This is obviously one of the elements of Lorraine Wilson's acknowledged successful program at Moonee Ponds. It is, however, not the whole program. Her students are also working with real language in real situations and are being empowered to make decisions about the language they will employ in these situations. (1996, Para. 13)

Taking the idea of phonics farther, involves not only breaking down letters sounds, but meaning behind word. Examining the prefixes and suffixes, allows students to grasp a deeper meaning to the word and context of the word, which is the foundation of morphology. (Deacon, 2011, p. 467) Kenn Apel and Jessika Lawrence (2011) describe morphological awareness as, “the ability to consciously consider the morphological units within words, including the explicit understanding of the relation between base words (e.g., *cycle*) or roots (e.g., *-spect*) and related inflected and derived words (e.g., *recycle*, *cycling*, *inspection*, *spectacle*; Carlisle, 1995; Wolter, Wood and D’zatko, 2009).” (p. 1312) Goodwin (2010) explains the implications of this approach to literacy and explains the implications particularly related to spelling:

Knowledge of the meaning of and how units of meaning relate to grammar and spelling also improve language outcomes. With the deep orthography of English, units of meaning can have identical pronunciations, but different orthographies.

When this occurs, morphological units can support students in learning and using complex sentence patterns and exceptions. For instance, the word vineyard is pronounced *vin + yard*, but spelled *vine + yard* because of its meaning, *a yard full of vines*. In the case of the word *peeled* (two morphemes *peel + ed*) and *field* (one morpheme), which sound the same but are spelled differently, knowledge of the past tense *ed* morpheme provides students with a reason for different spellings (Nunes et al. 2006). Theoretically, improving morphological awareness may have particularly important implications for struggling readers and spellers because morphemes carry meaning while phonemes must be put together to create meaning. (p. 186)

Also expanding on the concepts of phonics, Orton Gillingham is a multisensory approach to phonetic education to aid students in the areas of language arts- reading, spelling and writing. (Rose, 2007, p. 171) Scheffel (2008) explains that “The reading program relies on directly teaching the fundamental structure of language, beginning with simple sound-symbol relationships and progressing logically to phonetic rules and word-attack strategies using multi-sensory methods.” (p. 140) Scheffel, Shaw, and Shaw studied the effect of additional aid and study with the use of an Orton Gillingham multisensory approach; while no significant difference was found between the two groups, there were in understanding alphabet principle and expected gains in phonemic awareness. (Scheffel, 2008, p. 148)

Research and time have found it necessary to maintain a mix of teaching methods in education foundationally important as reading. It is so important that educators must adhere to standards, even mandated on the federal and state level. (Buckland, 2008, p. 59)

Buckland (2008) quotes the National Inquiry into the Teaching of Literacy in the article “Phonological literacy: Preparing primary teachers for the challenge of a balanced approach to literacy education” as saying, “direct systematic instruction in phonics during the early years of school is an essential foundation for teaching children to read.” (p. 59) Utilizing just one approach in the classroom can lead to a deficit in a student’s ability and understanding. (Bower, 1992)

Phonics rarely takes center stage in reading classes - it shares the spotlight with the reading of quality children's literature, writing exercises and testing for overall reading comprehension, he says. Indeed, most code-oriented researchers express no misgivings about many whole-language techniques and concede that a fair number of youngsters figure out the alphabetic code with little or no phonics instruction. Still, the lack of such instruction creates an ever-widening gap between good and poor readers, they assert. (Bower, 1992, Para. 42)

A letter to magazine *Brown University Child & Adolescent Behavior* entitled “Phonics and whole language learning: A balanced approach to beginning reading” calls for a use of not one method of teaching reading alone, but a mix of the two. (Phonics, 1996)

Children cannot learn to read without an understanding of phonics. All children must know their ABCs and the sounds that letters make in order to communicate verbally. The question in early childhood programs is not whether to teach "phonics" or "whole language learning," but how to teach phonics in context--rather than in isolation--so that children make connections between letters, sounds and meaning. (Phonics, 1996, Para. 1)



The letter goes on to implore that, “Phonics should not be taught as a separate "subject" with emphasis on drills and rote memorization. The key is a balanced approach and attention to each child's individual needs.” (Phonics, 1996, Para. 2) Students are different and do not all learn the same. “The truth is that some children learn to read easily with phonics- and some do not. The same can be said of whole language programs.” (Carbo, 1995, p. 3)

### Technology

Technology can be used to enhance language arts and literacy specifically in a myriad of ways. Tricia A. Zucker and Marcia Invernizzi (2008) demonstrated how using the tool “My eSorts” proved beneficial in a first grade class studying spelling. The authors explained, “Overall, creating My eSorts and experience stories appeared to engage students in applying knowledge of word features while fostering a positive attitude toward literacy.” (Zucker, 2008, p. 658) Jeff Kurtz notes how the added technological exercise, not only enhanced the finer points of daily lessons, but allowed student to improve written communication and editing skills. He further stated:

When I began using Twitter with my class, I wondered if it would be worthwhile. As the year ends, I believe it was. I’m convinced that literacy is the foundation to everything else we do in school, and having literacy embedded in our days has helped to implant literacy in who the students are. (Kurtz, 2009, p. 3)

Digital textbooks (whether Kindles, Nooks, or iPad) are another avenue in the technology enhancing Language Arts and literacy. Mitchell Weisberg examined their use in “Student Attitudes Toward Digital Textbooks.” (Weisberg, 2011) Positive findings and attitudes towards digital readers were noted.

The study “Technology And At-Risk Young Readers And Their Classroom” found promising results in regards to technological assistance in literacy education. The researchers studied 18 first grade classrooms, after a 7 month implementation of a literacy-focused technology. (Blachowicz, 2009) The results offered 4 conclusions: (a) “Students were engaged, even at the end of the year...” (Blachowicz, 2009, p. 402) (b) “Secondly, the literacy technology provided a well-designed productive center that enabled differentiation.” (Blachowicz, 2009, p. 403) (c) “Thirdly, the learning technology allowed students to develop independent work habits and to build both their skills and confidence about literacy and using technology.” (Blachowicz, 2009, p. 403) (d) “And, finally, students showed significant gains in their literacy skills on standardized measures even in classrooms and schools that were not exemplary.” (Blachowicz, 2009, p. 403)

In 2006, a first grade classroom was studied in relation to the benefit of computer assisted instruction. In “An Action Research Study of Computer-Assisted Instruction Within the First-Grade Classroom,” authors Jeffs, Evmenova, Warren and Rider explain the significance found in one study.

The complexity of learning to read is indisputable. Today there are numerous computer programs available to teach reading and reading readiness skills. Yet only a few of these programs have been empirically validated. This study attempts to evaluate the effectiveness of a reading software program for young children.

(Jeffs, 2006)

All students in the class were given a pre-test, allowed time on WordMaker, and then all students were given a post-test. The study showed significance that the program helped the students with their spelling scores.

Marie and Mikael Boden researched in a similar vein- technology for spelling instruction. In “Evolving spelling exercises to suit individual student needs”, the authors conducted a research study of a particular learner adaptive tool. (Boden, 2005) A sample study of two classes totaling 47 students was used. Specifically related to spelling, the researchers sought to analyze a technological system that was individualized to student need, not a one-program-fits-all. Using their own LCT, students were able to, “learn in their own way without having to follow up tracks and pre-made levels.” (Boden, 2005, p. 127) They found a significant correlation that students success and knowledge grew when utilizing a personalized program.

In Hong Kong, a study was conducted exploring the advantages and disadvantages of tablet based learning to non-tablet based learning, as S.C. Li and J.W.C. Pow explain in “Affordance of Deep Infusion of One-to-One Tablet-PCs Into and Beyond Classroom.” Students and parents were allowed to choose a tablet-PC approach or a non-tablet-approach, the obvious difference in that students were allowed to actively interactive with the tablet during lessons and at home. (Li, 2011) The results showed that not only did the tablet –PC students spend more time technologically engaging the material, but the tablet-PC students outscored their tablet-less counterparts. (Li, 2011) As the authors note, “The results of this study indicate that deep infusion of one-to-one technology provided the necessary affordance for enhancing both formal learning at school and informal or less-structured learning at home...” (Li, 2011, p. 325)

The draw to most modern Apple technology can be found in the use of applications. Savilla Banister wrote “Integrating the iPod Touch in K-12 Education” to show how all subjects can benefit from the use of Apple’s touch technology, and as she

says, “Since this manuscript has been written, more than 600,000 Web applications have been created, with about 300 being added each day.” (Banister, 2012, p. 129) Deborah Newton also shares specific apps of interest in “APPSolutely Accommodating.” Newton explains,

Their simple interface, portability, speed and affordability, combined with the highly engaging nature of many of their applications (“apps”), present intriguing alternatives to expensive high tech tools. These hand-held devices offer individuals with and without disabilities easy access to learning opportunities, information, organizational systems, and emotional supports.” (Newton, 2011, p. 55)

In “An App for That..and That..and That,” Susan Lester compiled the 10 most popular apps from the Florida Educational Technology Conferences ranging from high-level physics to vocabulary recognition for Kindergarten. (McLester, 2011) As shown by research, applications can be used by a wide range of students in a wide field of subjects- let the creativity of the educator run wild.

The benefit of iPad use among students with autism was examined closely in the study, “Making a Difference with Smart Tablets- Are iPads really beneficial for students with Autism?” (Price, 2011, p. 31) The author and researcher, Amy Price, sought to examine, what benefit, if any, would be gained by autistic students from the use of the iPad. The iPad was sought in regards to a multi-sensory approach; the iPad has the capability for engaging more senses. Students were allowed to experiment with different applications and tools on the iPad, and teachers provided feedback. Like most studies regarding technology, the results were generally positive.

...One thing to keep in mind that no two individuals with autism are the same. The percent of increase in information acquisition when using the iPad was 0-50% in our study. While no student showed a decrease in information acquisition using the iPad and some students showed huge increases (up 50%), some students did not show significant increases. (Price, 2011, p. 34)

As with all technology, the tools used should be based on the student's learning style, need and the content being taught.

Apple has universally been a technological company used frequently within schools. Interesting enough, Steve Jobs in 1996 told Wired Magazine:

I used to think that technology could help education. I've probably spearheaded giving away more computer equipment to schools than anybody else on the planet. But I've had to come to the inevitable conclusion that the problem is not one that technology can hope to solve. What's wrong with education cannot be fixed with technology. No amount of technology will make a dent ... Lincoln did not have a Web site at the log cabin where his parents home-schooled him, and he turned out pretty interesting. Historical precedent shows that we can turn out amazing human beings without technology. Precedent also shows that we can turn out very uninteresting human beings with technology. It's not as simple as you think when you're in your 20s – that technology's going to change the world. In some ways it will, in some ways it won't. (Wolf, 1996)

In saying this, Steve Jobs knew his products were merely tools in the hands of capable educators. These tools still continue to be used in abundance in educational settings.

## CHAPTER III: METHODOLOGY

### Presentation of the Problem

Within my classroom, several students were having difficulty with language arts, spelling in particular. Teachers are always looking to find methodology that can reach out and help a struggling student. This research allowed for the examination of the effectiveness of technology, and more particularly iPad apps within a regular classroom setting.

Upon study, I discovered that little has been done in the way of examining iPad apps within the classroom for academic use. Aside from Kathy Penn, the creator of the Sound Literacy app, reaching out to app manufacturers and Apple (the creator of the iPad) proved to be a less than successful search for the researcher. The technology is so new it has not been thoroughly tested in an academic setting. Creating a study allowed me to examine the impacts, if any, from using such technology.

### Presentation of the Hypotheses

The examination will seek to show a slight correlation between the use of technology and the gain in understanding of language arts, particularly in the areas of

spelling. The use of any tool is only as powerful as the time spent in mastery. In any case, the use of a new and “hip” technology would at least provide an enticement into studying, for an otherwise struggling student.

### Participants

The students of the study will be divided into two groups. The control group and the experimental group would receive traditional teaching methods on the weekly spelling lesson typically 3 hours a week. The experimental group will receive specific spelling instruction on the iPad using the Sound Literacy app for 30 minutes, once a week for 9 weeks.

The experimental group of 8 students was selected to represent the classroom. Parental consent was requested and granted by every student in the experimental group. An example of the consent form can be found in Appendix A. Consent of the school principal was also granted for the purpose of this study; a copy of his consent can be found in Appendix B. The Cedarville University Institutional Review Board Proposal and acceptance can be found in Appendix E.

The experimental students had a range of prior skills and ability in regards to spelling- three students would be considered “high”, two students “average” and three students would be “low” performing students. High students would be defined of earning an average of an A on spelling tests. Average students, for the purpose of this study, would be defined as earning an average of B on spelling tests. Low students, after a week of study would on average earn a C or lower on their spelling tests. The range was selected to provide consistency to the study.

All of the students would continue to receive regular classroom instruction, but would receive additional instruction using the iPad application. The control group within the classroom would be the other 16 students of 22 in the classroom who were not receiving the individualized instruction on the iPad. The control group would receive spelling instruction solely in the traditional classroom manner as determined by our school curriculum.

### Instruments

The spelling lists from the year come tied together with the pre-approved and mandated language arts curriculum used throughout all of the elementary school. The elementary school uses Reading Street curriculum to teach language arts. Each weekly spelling list focuses on a different phonetic “rule” providing correct examples, as well as challenge words which break these typical rules. The students have these spelling lists a semester in advance and are working with a particular list every week. Every student, in both the control and experimental groups, has the same list of words to study. A copy of the spelling words can be found in Appendix C.

The iPads used within the classroom were purchased this year for the classroom by state auxiliary money. The state specifies that tools bought with such money will be used solely for student growth and achievement. A number of “academic” apps fill the iTunes store with high promises for a mere \$2.99. Teachers as a whole within the school have been learning how to judge the effectiveness of these apps, while learning to integrate the use of this technology into our classrooms. Every student within the experimental group has an identical iPad with an identical version of the application,



Sound Literacy. The application, Sound Literacy, as defined above, is an iPad app based on the beliefs of the company 3D Literacy, established by Kathy Penn. (Personal Communication, 2011). Based on a combination of Orton-Gillingham, phonemic awareness and morphological spell, Penn describes the app on her website in the following:

Sound Literacy is an instructional tool and resource for teaching phonemic awareness, phonological processing, the alphabetic principle, and morphemic awareness. It is the first in a unique line of apps that will encourage teachers and students to work together in an intensive work study program. With an abundance of 'sound knowledge', Sound Literacy provides a platform for teaching students to hear, see, and analyze words in ways they have never thought of before. (Penn, n.d.)

### Variables

The independent variable used within this study is the group of students receiving additional tutoring with the use of the iPad application, Sound Literacy. The experimental group will meet with the teacher for an extra 30 minutes, once a week during a “Reading center” time to have further spelling instruction using the iPad app. During this time, the control group will interact with the material in a traditional fashion, i.e.- worksheets, etc. To provide consistency and control, the same group of students meets in the same spot at the same time every week. While the words change every week, the researcher also

provides consistency in the study of words, breaking apart easier words first, and then moving on to more difficult words as the students progressed.

I chose to complete a single case A-B-A study to examine the effectiveness of the application alone, while at the same time, seeking to account for extraneous variables. Spelling tests given at the beginning of the quarter, prior to experimental instruction, serve as the baseline. This allows for comparison to spelling tests taken at the end of the quarter and provides accuracy and legitimacy. This design was selected to account for variables, as any growth and rise in score would have to be based upon the control or experimental academic approach.

#### Procedures

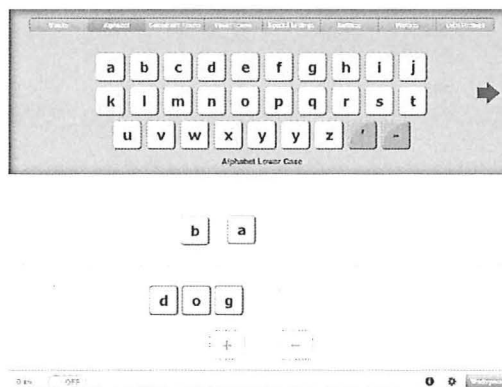
At the start of the 3<sup>rd</sup> quarter, before any spelling instruction was given, I gave a spelling pre-test to all 22 students in the classroom. The words for all students were the same and can be found in the Appendix C. The 40 spelling words selected for the pre-test were selected from the lists of words that would be used in the following 9 weeks; words were chosen as words that represent a phonetic rule, as well as words that broke a phonetic rule.

After the spelling pre-test, the classroom began the typical classroom instruction for spelling. Every week, the teacher and students would follow the Reading Street curriculum utilized for teaching reading, writing, and the focus of the study, spelling. Students would examine the phonetic rules each week and break apart the words as a class during instruction time. Typically each week we have about 3 hours of traditional spelling instruction. During a typical week, the class completes 4 worksheets/activities to

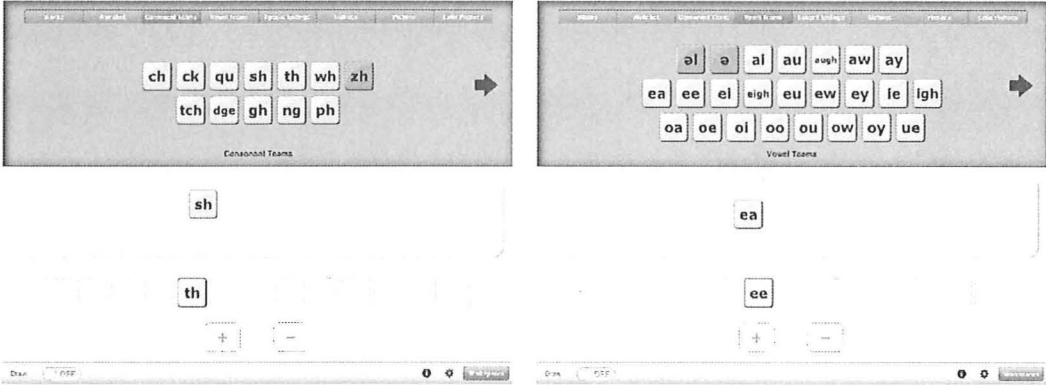
help emphasize the phonetic rules, and in turn, learn how to spell the words from our weekly spelling list.

Throughout the third quarter, when this study was put into place, the experimental group started to receive additional instruction on the iPad. During the allotted “Reading Center” time, the experimental group would meet with me as a small group of two or three, while the controlled remainder of the class was interacting with the words in a more traditional approach (worksheets, writing sentences, etc). The experimental group was still expected to complete the same traditional work. As a small group, we would pull up the app and study the spelling words. The app was designed to have teacher/student interaction as discussion as words are broken apart and analyzed.

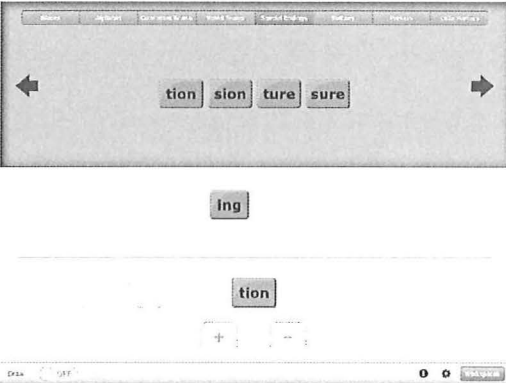
The iPad application, Sound Literacy is a multifaceted application that allows students to manipulate buttons representing letters and letter combinations. Created and based off of a combination of approaches to language arts education (phonics, Orton-Gillingham, morphology) the tool allows students to break down every word as they are learning to spell. (K. Penn, personal communication, October 15, 2011) It starts off on a main screen with the alphabet.



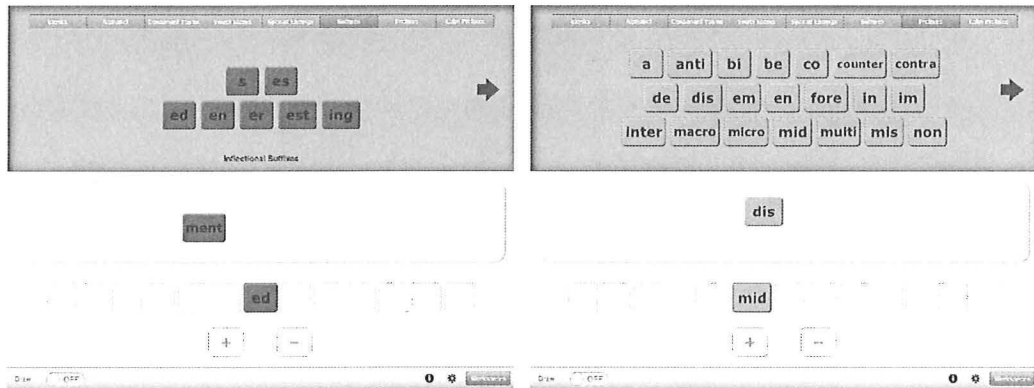
Tabs across the top allow students and teachers to customize the lessons they study. The next two tabs along the top allow students and teachers to move beyond letters and focus on consonant teams or vowel teams.



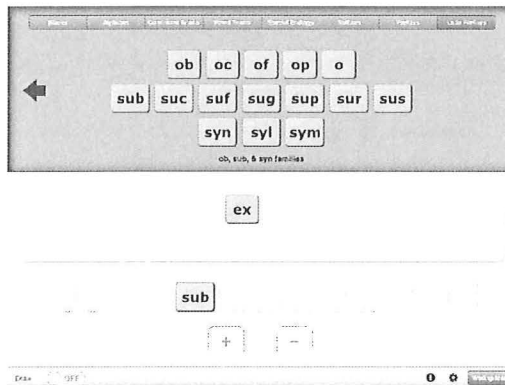
Continuing across the top, the teacher and student can select buttons to work with various special endings for words.



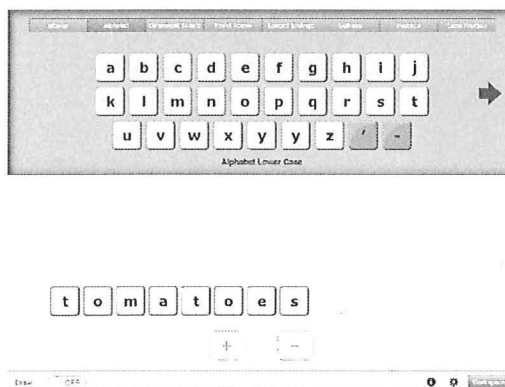
The next two tabs along the top allow for an emphasis on suffixes and prefixes.



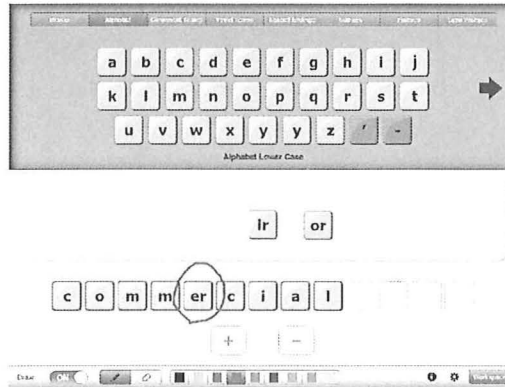
The last tab provides a little more of a challenge. As students progress in knowledge and understanding of the English language, Latin prefixes can be used to help students gain a history in the origins of words.



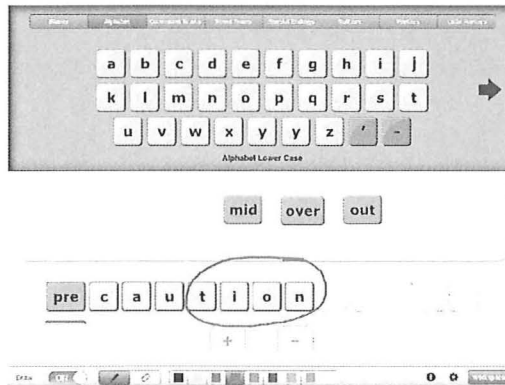
As the students studied through the list of spelling words, they would break apart the words, emphasizing the lesson of the week. During week one, the focus was irregular plurals. Students used the alphabet screen to break apart and study the irregular plurals.



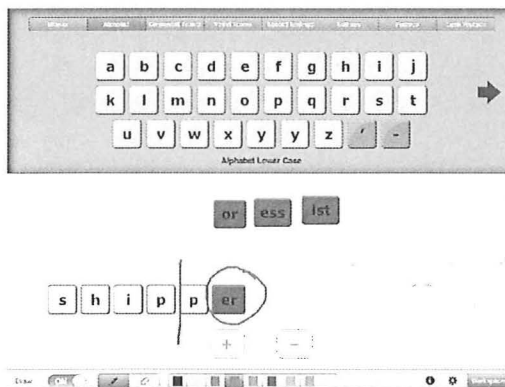
The session of week two saw an emphasis on vowel sounds, focusing on -er, -ir and -or.



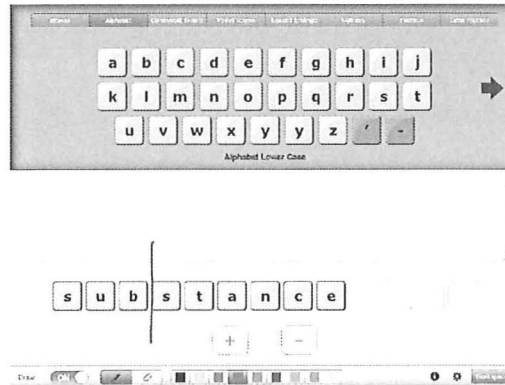
During week three, the students studied prefixes pre-, mid-, over- and out-. Selections from the prefix section allowed extra emphasis.



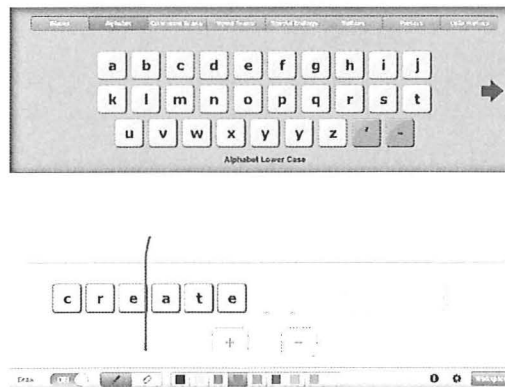
Week four's lesson emphasized suffixes -er, -or, -ess, and -ist.



The study session of week five focused on studying words that followed a VC-CCV syllable pattern. This study allowed us to use the alphabet and focus on breaking down words into syllables.



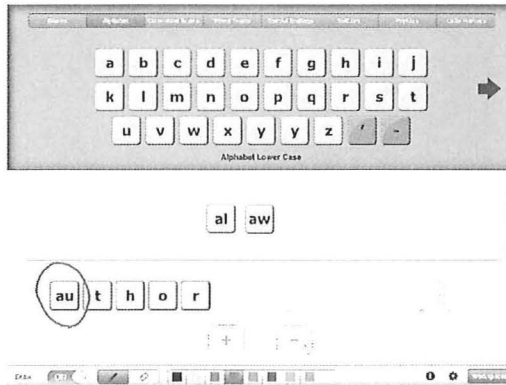
Week six continued the study of syllable patterns, allowing students to discern between CV-VC and CV-V words for break down.



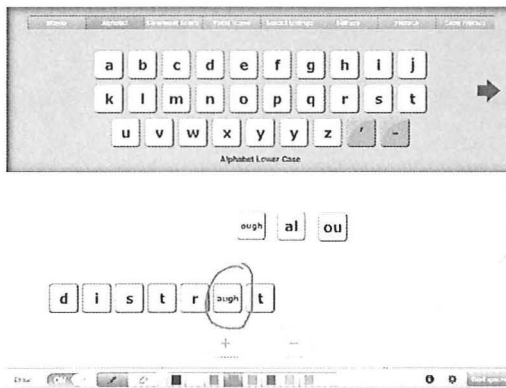
As we studied in week seven, we used to the alphabet to break apart homophones, placing specific attention to the sentence usage.



The spelling list of week eight provided a distinction between the vowel sounds a, au, and aw. Listening for vowel distinctions proved to be a bit more difficult than the weeks prior.



In the last study session, week nine, we continued to study vowel sounds as we picked apart words using -augh, -ough, -al and -ou.





The iPad application utilized variety and color coding to make the distinctions pop out to the student speller.

After 9 weeks of traditional study, and experimental study with the iPad application, both the control group of students and the experimental group of students receiving the additional instruction then took a post-test for comparison. The spelling words on the post-test were identical to the spelling words given in the pre-test. The students were allowed to have as much time as reasonably needed to complete both tests.

## CHAPTER IV: RESULTS

### The Experiment

All students were given a spelling pre-test. After the pre-test, students were divided into control and experimental groups. The control students only received traditional forms of language arts instruction, including spelling. The experimental group received the traditional forms of language arts instruction, plus an additional amount of time using technological means. The technological means used by the experimental group for further study was an iPad application called Sound Literacy. After the 9 week study, all students took a spelling-post test. Both groups were tested on the same list of words. The words in the pre-test were the same words used in the post-test.

### Analysis

The data from the research project was analyzed with the use of the SPSS program to run a one-way ANOVA. Included in the data, were the pre-test, post-test scores and the percentage of growth increase for both the control group and the experimental group. The scores were then analyzed in comparison.

On the PRE-test, the control group scored an average of 43.7% with an average score 17.5/40. On the POST-test, the control group scored an average of 79.2% with an average score of 31.7/40. The control group increased an average of 14.2 points, or 35.5%.

On the PRE-test, the experimental group scored an average of 35% with an average score of 14/40. On the POST test, the experimental group scored an average of 74% with an average score of 29.6/40. The control group increased an average of 15.6 points, or 39%.

The experimental group consisted of eight students of varying skills and abilities. Student 4, John, initially scored a 12/40 on his spelling pre-test. John would typically score low or a C, or lower on Spelling tests. John did not have a learning disability, and came from a traditional 2 parent household. He had exposure to technology outside of school. His post test score rose 30% to a 24/40.

Student 7, Josh<sup>1</sup>, initially scored a 22/40 on his spelling pre-test. Josh would typically score a medium score, or an average of a B on spelling tests. Josh did not have a learning disability, and came from a traditional 2 parent household. He had exposure to technology outside of school. His post test score rose 40% to a 38/40.

Student 8, Ella, initially scored a 12/40 on her spelling pre-test. Ella would typically score a medium score, or an average of a B on spelling tests. Ella did not have a learning disability, but came from a non-traditional household. She had exposure to technology outside of school. Her post test score rose 47.5 % to a 31/40.

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<sup>1</sup> Names and identities of the experimental group have been changed to afford confidentiality and privacy.

Student 13, David, initially scored an 11/40 on his spelling pre-test. David would typically score low or a C or lower on spelling tests. David had a learning disability in the form of dyslexia. He came from a non-traditional household. His exposure to technology outside of school was limited. His post test score rose 20% to a 19/40.

Student 15, Lucy, initially scored an 11/40 on her spelling pre-test. Ella would typically score low or a C or lower on spelling tests. Ella had a learning processing disorder. She came from a non-traditional household. She had exposure to technology outside of school. Her post test score rose 42.5% to a 28/40.

Student 20, Isla, initially scored a 16/40 on her spelling pre-test. Isla would typically score high, or on average, an A on spelling tests. Isla did not have a learning disability, and came from a traditional 2 parent household. She had exposure to technology outside of school. Her post test score rose 42.5% to a 33/40.

Student 21, Adele, initially scored an 8/40 on her spelling pre-test. Adele would typically score high, or on average, an A on spelling tests. Adele did not have a learning disability, and came from a traditional 2 parent household. Adele had exposure to technology outside of school. Her post test score rose 62.5% to a 33/40.

Student 22, Miles, initially scored a 14/40 on his spelling pre-test. Miles would typically score high, or on average, an A on spelling tests. Miles did not have a learning disability, and came from a traditional 2 parent household. He had exposure to technology outside of school. His post test score rose 27.5% to a 31/40.

Running a One Way ANOVA allowed for analysis of the post-test scores of the control group vs. the experimental group. The independent variable would be the group assigned (control vs. experimental), therefore studying the effectiveness of the extra

technological time. The dependent variable would be the post-test scores. This would show if the assigned group had any effect on the results of the tests. As the descriptive statistics show, the means were similar. The control group had a mean post-test score of 79%. The experimental group had a mean post-test score of 74%. No significant difference between the experimental group and the control group was found ( $F = .649, p > .05$ ). Table A shows the Post Test Descriptive Statistics. Table B shows ANOVA analysis of the results.

**Table A- Descriptives**

Post-Test Scores

	N	Mean	Std. Dev	Std. Error	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
					Control Group- 1	14		
Experimental Group- 2	8	74.0%	14.7%	5.2171%	61.726%	86.399%	47.5%	95.0%
Total	22	77.3%	14.5%	3.0925%	70.955%	83.818%	47.5%	100.0%

**Table B- ANOVA**

Post-Test Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	138.890	1	138.890	.649	.430
Within Groups	4279.576	20	213.979		
Total	4418.466	21			

Every student increased percentage wise between the pre-test and post-test. When comparing the percentage increase between the two groups, it is clear that the mean is higher for students in the experimental group or Group 2. The students in the experimental group saw a higher increase in percentage of test grade. Table C shows the average mean of increase in percentage between the pre-test and the post-test.

**Table C- Report**

Increase Between Pre-Test and Post-Test

Group: Control vs. Experimental	Mean	N	Std. Deviation
Control Group- 1	35.536%	14	12.3716%
Experimental Group- 2	38.750%	8	13.1611%
Total	36.705%	22	12.4496%

## CHAPTER V: SUMMARY

The researcher began this study with the intent of finding the benefits of iPad applications to a typical classroom setting. The hope for the study was to show an increase in test score percentage as students spent more time interacting with the technological tool, in addition to the traditional learning methods. The results of this study do not conclusively prove significance gained with the additional usage of the technological tool, when the two groups are compared. While it did show a higher mean in test score increase percentage for the experimental group, it can not “statistically speaking” be attributed to the study. As a result of this particular study, the results do not show a marked difference in the effectiveness of one method over another.

That being said, this project did reconfirm and provide insight in the following ways. None of the students were negatively impacted by the use of the technological tool. Every student in the experimental group grew by at least 20% from pre-test to post test. One particular student in the experimental group grew 62.5%. Additional study spelling words, no matter the method, will never hamper a child’s growth.

Every child has a different learning style. Technology is like any tool or teaching method. Sometimes the use of a technological tool will be a great addition; or at times a

student could learn best in another way, like with more traditional methods of teaching. Even yet another form of technology tested could be of benefit to the learning pupil. Part of growing in the elementary school years is allowing students to be exposed to various methods and tools for study. The more tools and methods found within a student's repertoire, the greater the chances for success.

As evidence clearly states, society around us is changing. As educators we are always seeking ways to engage our students in academic learning. During this study session with iPads, the students were eagerly and actively engaged. The effectiveness of a tool at engaging the mind and interest of a student can not be measured by statistics alone; this is a knowledge seen through observation and conversation. While interacting with the experimental group of students, the researcher noticed a great excitement for learning. The experimental group really enjoyed getting to "play" with the educational tool, and the control group was a little jealous they could not participate. When asked to review the use of the iPad and the app, all of the students had similar commentaries. David, said, "It was fun!" (Personal communication, July 4, 2012) Miles went on the say, "I liked using the iPad and spelling the words out. It made the practicing more fun." (Personal communication, July 7, 2012) John explained, "I liked it a lot because if I didn't get the word right, she would correct. I could also sound it out and break down the word." (Personal communication, July 8, 2012) Ella stated, "It helped with one on one, even though I didn't like how the letters were mashed together. I had a lot of fun. Thank you for picking me!" (Personal communication, July 5, 2012) No matter the method, this is what every teacher is trying to do - help students fall in love with learning.



As a result of this study, iPads were bought for the researcher's classroom. The initial purchase of iPads, and on-going interest in the application Sound Literacy, prompted a school wide shopping spree. An on-going initiative within the school district is flawlessly integrate various forms of technology into the classrooms- the use of legitimate iPad applications tied nicely into this goal. Because of the desire and drive in regards to technological use, Worthington Christian Elementary became a pilot school with a joint venture initiative with the Polaris Apple Store. Sessions taught by the researcher and various other faculty members, allowed colleagues to learn skills, such as presented above, which could be a benefit to the classroom.

The iPad app Sound Literacy was initially created for and tested on, our Worthington Christian first grade teachers by developer Kathy Penn, a former Worthington Christian teacher (K. Penn, personal communication, October 15, 2011). As a result of years of experience and exposure, it has grown in appeal. As a result of this study and extensive use, the application is used in grades K-3 in Worthington Christian Schools. The application, copyrighted in 2010 is being used beyond our school. The creator, Kathy Penn, noted that the app has been picked up by the Dyslexia Association and school districts in the Washington DC area are using it for a pilot study in literacy (Personal communication, October 15, 2011).

While the researcher tried to best control for accuracy, there was a variance that could have affected the outcome, and in turn resulted in a rejected hypothesis. The very element of human nature came into play this year in my classroom - familial circumstances, as experienced by a few students, impacted not only this study, but the academic progress of the year. During the course of the school year, 3 sets of parents

within in the tested classroom separated or divorced. These students spent a good majority of the year lacking focus and falling behind in studies. A few of these parents even admitted that in the stress, they were no longer studying with their child at home. Out of interest, a One-Way ANOVA was run comparing the post test scores of the class against the factor of a traditional 2 parent home and a non-traditional home. As reflected in the school year, the results ( $F(16, 6) = 4.022, p=.05$ ) proved a significant correlation between the final spelling test grade and the type of student home. Though it might be considered irrelevant to our immediate study, family home life can be a distraction, or an aid, to the learning process. We live in a fallen world tainted by sin. We can not control sin, or the effects of sin. As educators, we hope to be able to meet the students where they are. This study was not an analysis of the student's skill, but of the ability of a tool to meet them and help them grow regardless. Still, educators, and researchers, can only account and control the distractions and variances found within the classroom.

Two other variables were under researcher control. The time allotted for the study and the sample size selected were adequate and appropriate. The time and number of students were controlled in a careful manner. To further validate the researcher's findings, a larger sample and a longer length of time could be used to study, but it is believed the outcome would be similar for a study comparable in regards to time and size of participants. Further research would only prove to validate, as the researcher learned that time, not necessarily teaching method variable, proves most significant in the outcome of a student's success.

Ultimately, the key to success in utilizing technology in the classroom is knowing how to integrate. One who is seeking to integrate, whether the Bible or technology, must

KNOW what they are integrating. For example, a teacher who knows the Bible can then seek to ask stimulating questions- questions which prod students and lead them back to connecting to the truth. Integration should be a part of how we discuss as a class and question the world around us, from the infiniteness and order of our Creator in Math to examining a Social Studies textbook's take on the age of the earth. These questions help students learn to think through a Biblical worldview and start to analyze on their own- plus it aides in comprehension. Like Biblical integration, technological integration should be woven into our classroom and approach to education. It should be natural to utilize the technology in the world around us. In the review of Domine's book Rethinking Technology in Schools, the author explains, "...We should not approach technology in school as a subject area in and of itself but integrate it into the curriculum as a support to observe and make sense of the world around us." (Dettori, 2010, p.30) A shift in focus and approach to technological education will make schools effective conduits for its use. As Steve Jobs pointed out, there is one glaring difference between technological and Biblical integration - technology is NOT the answer. We know this is true. There is only one answer and it is not found in technology, but the Bible.

The purpose of this study was to analyze technology education and try and find a new and engaging way to help struggling students with Spelling. These goals were effectively accomplished. One can find research in abundance on the advantages and disadvantages of the use of technology in education. Definite merit can be gained from the integration of educational technology. It is important, as research and this study present, to remember that technology is not a one-stop fix in education. Any technology is a tool used in the hands of capable professionals. Furthermore, while the results of the

study may not strongly depict a bias in favor of the hypothesis as initially predicted, the researcher was able to accomplish her classroom goal. Students were able to grow in classroom knowledge, gain an appreciation for technology, and develop a greater love for learning.

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## APPENDIX A

### Example of Parental Consent

**iPads and Language Arts**  
**RESEARCH INFORMATION AND CONSENT FORM**

**Introduction:**

You are invited to participate in a research study investigating the use of iPads in the classroom to benefit reading and spelling. This study is being conducted by Rachel Janssen at Westview Elementary. Your student was selected as a possible participant in this research because of the attendance in my class. Please read this form and ask questions before you decide whether to participate in the study.

**Procedures:**

The students will meet with me for 20 minutes, once a week. During this time they will work extensively on iPad using Sound Literacy as a reading/spelling tool.

**Risks and Benefits:**

This study has no foreseen risks.

The benefits to participation are impending growth in reading comprehension and spelling.

**Confidentiality:**

Any information obtained in connection with this research study that could identify you will be kept confidential. In any written reports or publications, no one will be identified or identifiable and only group data will be presented. No one else will know your student's results.

I will keep the research results in a password protected computer and only I will have access to the records while I work on this project. We/I will finish analyzing the data by May 2011. I will then destroy all original reports and identifying information that can be linked back to you.

**Voluntary nature of the study:**

Participation in this research study is voluntary. Your decision whether or not to participate will not affect your future relations with Miss Janssen or Westview.

**Contacts and questions:**

If you have any questions, please feel free to contact me, [rachel.janssen@worthingtonchristian.com](mailto:rachel.janssen@worthingtonchristian.com)

You may keep a copy of this form for your records.

**Statement of Consent:**

You are making a decision whether or not to participate. Your signature indicates that you have read this information and your questions have been answered. Even after signing this form, please know that you may withdraw from the study at any time and no further data will be collected.

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Signature of Participant

Date

---

Signature of Parent, Legal Guardian

Date

---

Signature of Researcher

Date

APPENDIX B

School Principal Consent



**WORTHINGTON  
CHRISTIAN SCHOOLS**

October 26, 2011

Worthington Christian Schools  
Administration  
6870 Worthington-Galena Road  
Worthington, OH 43085  
614-431-8200

High School  
6870 Worthington-Galena Road  
Worthington, OH 43085  
614-431-8200

Middle School  
8225 Worthington-Galena Road  
Westerville, OH 43081  
614-431-8200

Westview Elementary School  
70 Westview Avenue  
Columbus, OH 43224  
614-431-8200

Kindergarten  
8225 Worthington-Galena Road  
Westerville, OH 43081  
614-431-8200

Dear Dr. Henton,

This letter is to confirm that Miss Rachel Janssen does have permission to conduct her project, Language Arts Advantages of iPad Apps, at Worthington Christian Westview Elementary within the parameters outline on the institutional review board proposal form. If you have any questions please feel free to contact me at 614-431-8240 or my e-mail address is [jparrish@worthingtonchristian.com](mailto:jparrish@worthingtonchristian.com). Thank you.

In His grip,

James T. Parrish  
Principal  
Westview Elementary School

## APPENDIX C

### List of Spelling Words Used in Study

## SPELLING WORDS

1. knives
2. heroes
3. loaves
4. potatoes
5. third
6. earth
7. commercial
8. virtual
9. midnight
10. overgrown
11. overdue
12. precaution
13. overweight
14. hostess
15. tourist
16. announcer
17. pharmacist
18. pianist
19. district
20. pilgrim
21. embrace
22. curtsy
23. medium
24. video
25. rodeo
26. audience
27. recreation
28. hour
29. knew
30. their
31. whether
32. because
33. author
34. awesome
35. faucet
36. laundry
37. taught
38. trough
39. overwrought
40. beanstalk

## APPENDIX D

### Example of Parental Home Technology Survey



March 3, 2012

Hello!

As I am working on my thesis, I was wondering if you could possibly answer the following questions in regards to your student's use of technology at home. At home, does your child have regular access to:

- A computer?
- The internet?
- An iPad/iPhone/iPod using applications?

Thanks in advance! :-)

Miss J

## APPENDIX E

Cedarville University Internal Review Board Proposal and Acceptance

# Cedarville University

## Institutional Review Board Proposal Form

**Student Name(s) and email:** Rachel Janssen- rachnicole1110@gmail.com

**Faculty Name(s):** Timothy Heaton

**External Researcher Name(s) and contact information:**

**Kathy Penn (creator of the Sound Literacy app)**

**Date:** 10/18/11

**Project Title:** Language Arts Advantages of iPad Apps

1. Summarize the main steps of your research plan.

- 8 students- 3 low, 2 middle and 2 high
- Pre-test for phonemic awareness (spelling test)
- For an entire quarter (9 weeks) tutor students for 20 minutes, once a week using the ipad app "Sound Literacy."
- Posttest for phonemic awareness

2. Describe any potential harm you foresee occurring to participants in your study.

I do not foresee any potential harm to my participants.

3. If foreseeable potential harm may occur to your research subjects, describe what steps you intend to take to minimize this harm or to keep it within acceptable ethical and moral parameters.

N/A

4. Provide the anticipated benefits of your study. If there are anticipated significant risks to subjects, weigh these two factors from your perspective.

From this study, I hope to exhibit the positive nature and influence of tutoring with technology, more specifically an ipad and in particular, the sound literacy app.

5. Will subjects provide informed consent regarding their participation in the study? Yes/No

The students were informed that they are "hanging out with Miss J and playing on the ipad." They do not specifically that they are being tutored. They are excited. I have principal, parental and student consent.

6. If subjects will be provided with informed consent regarding their participation in the study, identify the means by which that will occur.

I emailed and spoke with the principal, parents and students.

7. If subjects will not be provided with informed consent regarding their participation in the study, explain why this will not be necessary or why the cost/benefit warrants not doing so.

N/A

8. Identify the anticipated beginning and ending dates of your connection with human participants.

I would like to have my interviews finished by May 2011.

9. Describe what you anticipate human subjects in your research study will do (describe the activities they will participate in, what they will be asked to do or be observed doing, types of questions they will be asked, or behaviors you would expect to observe)

Students will be tested initially for phonemic awareness. Every week I will meet with them for 20 minutes. During this time, they will receive specific and individualized tutoring on the iPad using the Sound Literacy app. The app helps break down words phonetically and morphologically, so that students will grasp a better understanding of spelling and meaning. I expect that the post test scores will be higher. I also expect Reading and Spelling grades to jump.

10. Describe how you will ensure that the publication or presentation of your results will ensure the anonymity of those participating in the study.

In my final presentation, I will use Find and Replace and all of the names in my study will be changed.

11. Are you seeking expedited review of this research project? Yes/No \*\*I need to begin research fairly quickly in one week's time, to be exact.

Proposals should be forwarded to: Andy Runyan, Associate Vice President, Academic Administration: [arunyan@cedarville.edu](mailto:arunyan@cedarville.edu), Founders Hall Room 3, Phone (937) 766-3840.

## Grad School IRB

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Andy Runyan <arunyan@cedarville.edu>

Tue, Oct 25, 2011 at 1:52 PM

To: "Janssen, Rachel" <rachnicole1110@gmail.com>

Cc: "Heaton, Timothy Lewis" <HEATONT@cedarville.edu>

Rachel,

I have reviewed the attached study and it is approved to proceed with the following provisions:

- Prior to beginning the study I would ask to receive a letter of support from the Principal of the school. That should be on school letterhead and can be faxed, mailed, or emailed to my attention using the contact information below.
- Parents should be asked to sign your statement of consent. You should retain those consent forms with information on the study for review by the IRB if asked.

Thank you,  
Andy Runyan

