Using Technology to Develop Early Phonological Awareness Skills

Adrienne Ripley

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Using Technology to Develop Early Phonological Awareness Skills

by

Adrienne Ripley

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A thesis submitted to the
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Master of Science in Education
Using Technology to Develop Early Phonological Awareness Skills

by

Adrienne Ripley
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Chapter I

Introduction

Technology in today’s society has exposed both children and adults to a considerable range of opportunities that allow for learning and the production of knowledge to occur in a variety of ways. According to Painter, Whiting, and Wolters (2005), two issues confront teachers with regard to the Information Age. First, technology has brought new demands on how educators facilitate learning opportunities within the classroom setting. Students present an accelerated understanding of technology and have experienced a variety of technology resources at home. According to the U.S. Bureau of the Census (2003), 57% of children ages 7-17 have access to a computer at home to complete school work. The second issue presented by Painter et.al (2005), is that teachers need to adapt traditional instructional methods to incorporate technology in order to prepare students with problem-solving skills for the workplace. Current research and government findings have indicated that today’s students are not adequately prepared to compete in the international job market (North Central Regional Educational Laboratory, 2005).

In recent years it has become a necessity for teachers to adapt instruction and modify planning in their efforts to prepare all students for success in education. Research shows that no single instructional program meets the needs of all learners or the needs of an individual over time. Today’s students enter school presenting diverse needs. Due to the various learning styles present in any given general
education classroom, Hill-Clarke and Robinson (2003) affirm that teachers must be multi-faceted in their teaching style to ensure academic success for all students.

The Individuals with Disabilities Education Act (IDEA) of 1997 states that students with disabilities should be included in general education settings if that setting presents the least restrictive environment for that student. This presents a significant challenge to general education teachers who now face the task of supporting the needs of the general and special education population within the same classroom. Erickson and Koppenhaver (2007) state that students with disabilities differ from their general education peers in six different ways. These six areas include communication, cognition, physical abilities, senses, affect, and attention.

Integrating technology in the classroom provides educators with a means to deliver instruction to meet a variety of learning needs, specifically visual, auditory and tactile needs.

**Problem Statement**

Elementary school teachers begin their school year assessing each student to evaluate individual skill levels and determine a baseline for instruction. Our district began the 2007-2008 school year by assessing the phonological awareness skills of each incoming kindergarten student. The same assessment is given to the entire kindergarten population, including special needs, gifted and talented, and English language learners. Without a variety of assessment tools which yield specific skill-driven goals, Erickson and Koppenhaver (2007) assert that teachers find themselves challenged in identifying a means to focus their lessons.
One goal that our district has identified is the need to focus instruction on early phonological awareness skills in kindergarten and first grade as a means to help prevent reading failure in at-risk students. In 2007, our reading and special services department closely examined the phonological awareness skills of struggling readers entering second grade. The results of that assessment showed that the majority of struggling readers were lacking in sufficient emergent phonological awareness skills. Hill-Clarke and Robinson (2003) believe that phonological awareness skills serve as a predictor of reading and writing success. Students with weak phonological awareness skills tend to have difficulty with reading and spelling. Therefore the task of pinpointing exactly where each child is lacking in phonological skill development also becomes the daily goal of the classroom teacher, as well as meeting the needs of those students who are achieving and exceeding benchmarks.

Presently, one third of my current kindergarten students have an Individualized Education Plan (IEP), receive speech, occupational therapy and/or physical therapy services, or were declassified of those services upon entering kindergarten. I receive 30 minutes of push-in support daily from a special education teacher for guided reading instruction and my occupational and physical therapies are mostly in pull-out situations. The manner in which teachers must create, modify, implement and support students throughout the day is no longer one that requires traditional methods; flexibility and creativity are a must. Integrating technology into daily lessons allows teachers to differentiate instruction in all subject areas to meet a
range of student needs. Technology provides students with opportunities for hands-on learning that is student-centered, engaging, and motivating.

**Significance of Problem**

Inclusive education requires teachers to be prepared to meet the needs of all learners through differentiated instruction. Technology allows teachers to present content that is interactive and focused to meet specific student needs. It has been my experience that most students today have the ability to adapt quickly to technology and related tasks and that it has been both engaging and motivating for all students. As an elementary teacher, I am responsible for teaching all core subject areas to my students. Technology has allowed for differentiation of instruction within literacy, mathematics, science and social studies lessons.

Having piloted a Promethean ACTIVboard, a specific brand of interactive whiteboard, with first graders in the spring of 2007, I was amazed with how the board engaged and motivated all learners across curriculum. I was particularly impressed with the motivation and success of my special needs students when learning a skill using the board. Not only were they completely immersed in the learning process, but they were eager to repeat previously learned tasks and continue their involvement in the lesson. I immediately found myself creating numerous lessons that were completely focused around the ACTIVboard to facilitate learning for all of my students.
Rationale

Preparation for long-term success in education begins formally in kindergarten. The need to prepare our students to grow and become productive members of the global community is strongly reflected in schools across the United States. Our district has set its vision to meet these expectations through a commitment to improve the teaching and learning process by providing instructional tools for staff and students. These instructional tools include computers and emerging technologies needed to enhance the classroom experience and prepare students for the workforce they will enter. This goal is unattainable without the implementation of technology in every classroom.

My goal as an educator is to create a student-centered learning environment where all students are involved in the learning process and motivated to learn new skills and concepts. For the 2007-2008 school year, I am one of four classrooms in my district that piloted the Promethean ACTIVboard with kindergarten students. This action research project utilized the ACTIVboard and classroom desktop computers to engage and motivate students in a variety of activities targeting phonological awareness skills, specifically syllabication and rhyming.

I began my research by administering a pre and post phonological awareness assessment to my class. The students were involved in three weeks of learning syllabication and rhyming skills using flipcharts created on the ACTIVboard and using the desktop computers. My control group was another kindergarten classroom that does not have a Promethean ACTIVboard but were learning the same content.
My goal was to increase phonological awareness skills for all students using technology to foster emergent reading characteristics as well as create enjoyment, engagement and motivation to learn.

The following chapter analyzes the current research on educational technology. In the literature review I discuss the history of technology in schools, analyze the benefits of using technology in the classroom, note the relationship between phonological awareness and reading readiness, and discuss the relationship between technology and student achievement.

**Definition of Terms**

**Interactive whiteboard:** “A large touch-sensitive display panel that can function as an ordinary whiteboard, a projector screen, an electronic copy board or as a computer projector screen on which the computer image can be controlled by touching the surface of the panel instead of using a mouse or keyboard.” (Kennewell and Morgan, 2003, p.2)

**Phonological Awareness:** The ability to recognize, discriminate, and manipulate speech sounds. It is also the ability to attend to sounds in a spoken word rather than their meaning. Phonological awareness is a broader term that includes phonemic awareness and also encompasses the understanding of syllables, rhymes, and words.
Chapter II

Literature Review

Development of technology in the classroom

The definition of technology has evolved over time as technology itself has developed and changed. The meaning of the term technology is appropriate to the context in which it is used and to the time period in which it was defined (Spencer and Rogers, 2006). That which was once considered sufficient use of technology in the classroom no longer applies as the demands of society have dictated the necessity for improvement. The development of technology has had both positive and negative impacts on society and continues to broaden its reach. Today, with the integration of technology into the educational system, it poses both great possibilities and vast challenges for students, educators and administrators alike (ibid).

Technology in education was present in a variety of forms in the early 20th century. Electronic mediums of technology entered the classroom in the 1920's with the invention of radio (Quinn, 2003). The presence of radio allowed for the possibility of news broadcasts to become part of instruction. Educational television presented similar excitement and was introduced in the early 1950's (ibid). It was believed that incorporating news media into the classroom environment could be beneficial to student learning.

In 1963, the Vocational Education Act was passed giving new monies to support the use of technology in schools. However, the mainframe and minicomputers used at the time did not support teacher instruction (California State
University, Long Beach, 2003). Rather, the computer processing methods were used solely for the purposes of programming. The introduction of computers in schools continued throughout the latter half of the 1970's, as database computers began to be used for administration and school counseling purposes. In 1983, IBM and Apple II computers found widespread acceptance in education as microcomputers (PC) supported teacher-managed instruction (ibid).

In 1993, the internet and the World Wide Web were introduced and computers quickly became an important educational tool, creating new possibilities for research and instructional standards. Quinn (2003) summarized the popularity of the internet in the 1990's when he noted, "The last decade began with minimal integration of technology in classrooms and ended with entire curricular units taking place online" (p.1).

Educational technology quickly became integrated in schools. Ten years ago, one of the nation's highest educational priorities was wiring schools for internet access because access to technology was limited at best (North Central Regional Educational Laboratory, 2005). According to the National Center for Education Statistics (NCES), only 35 percent of schools in 1994 had access to the Internet compared with 99 percent in 2003 (Parsad & Jones, 2005). Schools have also demonstrated progress with using computers and the Internet in the classroom. Three percent of instructional rooms had Internet access in 1994 compared with 93 percent in 2003 (ibid).
Over the past decade there has been a tremendous growth of online instruction and multimedia instruction (e-learning). At least 15 states currently provide students with some form of virtual schooling for general and special education classes. Within the next decade every state and most schools will be offering virtual schools (National Education Technology Plan, 2004). Implementing technology in the classroom environment has allowed students and adults to experience various learning opportunities through a new medium of instruction.

Access to the Internet for students has expanded in society as well as in the classroom. A survey conducted by the Pew Internet & American Life Project found that approximately 21 million youth between the ages of 12 and 17 use the Internet and 78 percent of that population report using the Internet at school (Hitlin & Rainie, 2005). The survey also noted that most teens felt that the Internet helped them do better in school (ibid). Today's students understand the benefits presented by utilizing technology, both in and out of the classroom setting.

An examination of governmental priorities for implementing technology in schools can track the changes that have taken place in education over the past few decades. Almost 25 years ago, the National Commission on Excellence in Education, under the direction of the U.S. Department of Education, published a report that warned of the challenges our educational system would face if changes in the quality of our curricula were not made (National Education Technology Plan, 2004).

This report, A Nation at Risk, indicated that students were not being adequately challenged in the areas of math and science and that, "the people of the
United States need to know that individuals in our society who do not possess the levels of skill, literacy and training essential to this new era will be effectively disenfranchised” (ibid, p.9). The National Commission on Excellence in Education further stated that innovation in the educational landscape was needed for future success in the global economy with regards to the digital age (National Education Technology Plan, 2004). The United States government warned of the possibility of students being part of a workforce that is less than capable of performing adequately, thus finding it difficult to support themselves and their families financially in the future (A Nation at Risk, 2003). The nation’s leaders clearly saw the need for changes in education with regards to technology as a means to strengthen US competition in the global market.

In part, the US Government was in turn relying on schools to establish precedence for preparing our youth for the future. It had become apparent that there was a widening gap between knowledge and skill acquired in schools and knowledge and skills needed in the increasingly technology-infused workplace. Through technology, classrooms could now bring all students to the educational forefront within the mainstream. Ensuring that all students had access to a better future was the key to this success.

Over the last few decades, the American educational system has treated the area of special education as being separate from its regular education counterpart (NCREL, 2005). Special Education teachers and students were kept segregated from the general education classroom (ibid). The US government took the necessary steps
to make certain that the special education population were also considered in its reform efforts. In 1997, the Individuals with Disabilities Education Act (IDEA) was passed to protect the rights of students with disabilities in the regular education environment. It further explained that school districts were required under law to consider and provide assistive technology support to students when appropriate. The Assistive Technology Training Online Project (ATTO, 2005), through the University of Buffalo, states that, “In order to support the inclusion and participation of students with disabilities in regular education classrooms, all IEPs developed for children identified as needing special education services, must indicate that assistive technology has been considered to ‘provide meaningful access to the general curriculum’” (ATTO, p.1).

ATTO further references IDEA and defines assistive technology, as both an instrument and a service to maintain, increase, or improves the functional capabilities of a student with a disability (ibid). Educators must now consider the purpose and impact of assistive technologies on student performance for all students in the general education classroom.

In 2001, the United States government created the No Child Left Behind Act (NCLB) in an effort to prevent academic failure and close the achievement gap for all students regardless of race or socioeconomic status. NCLB has been a catalyst of much needed reform in the American education system. NCLB legislation “…requires that every student should be technology literate by the time they finish
eighth grade, regardless of the student’s race, ethnicity, gender, family income, geographic location, or disability” (Department of Education, 2005, p.2).

NCLB also required that a National Education Technology Plan be published (ibid). The National Education Technology Plan was designed as a long term plan to address the present and future necessity of effectively implementing technology in schools to meet challenging district, state and national academic standards and improve student achievement (Department of Education, 2005).

NCLB legislation mandated technology literacy in public education. As stated by the National Education Technology Plan of 2004, NCLB has created, “lively debate over how to re-think and redesign educational models to raise standards, retrain educators, reapportion budgets, exploit new technologies and provide students with the technological and individual support they need” (p.38).

Benefits of using technology in the classroom

Technology provides students with opportunities for hands-on, student-centered learning that is both engaging and motivating when it is introduced in the classroom. Teachers must create, implement, and modify lessons to support a range of student needs throughout the day. The manner of instruction is no longer one that requires traditional methods; flexibility and creativity are a must. Integrating technology into daily lessons allows teachers to differentiate instruction in all subject areas to meet student needs and increase time on task. When technology is used in the classroom, students are likely to have more positive attitudes towards learning in
school, are more actively engaged in lessons, and have a higher level of academic achievement (Fouts, 2000; Foltos, 2002).

Greater awareness of and accountability for student needs and the importance of differentiation became the standard in the inclusive classroom. Thus, teachers were faced with the challenge of creating multi-dimensional activities with consideration of the various learning styles present in the general education classroom. Rose and Meyer (2002) found that the Universal Design for Learning (UDL) considers the importance of communication technologies in education. Practical application of UDL allows educators to use flexible teaching methods and create appropriate materials that can reach diverse learners and improve student access to the general education curriculum.

Rose and Meyer further assert that, “UDL assumes that students bring different needs and skills to the task of learning, and the learning environment should be designed to both accommodate, and make use of, these differences” (NCREL, p. 9). Accessing the general education curriculum is attained through three key principles for UDL: Information needs to be presented in multiple formats, offer students the opportunity to use what they have learned, and provide multiple tasks which students can complete to engage them in the learning process. These are the keys to meeting the needs of all students (ibid).

Hill-Clarke and Robinson (2003) affirm that teachers must be multi-faceted in their teaching style to ensure academic success for all students. Educators today have come to realize that students learn best when more traditional pencil and paper drill
tasks of the past are abandoned for lessons that attend to a variety of learning styles in the classroom.

Any one classroom in our nation's schools presents diverse learning needs due to several federal mandates for inclusive education and success for all students. Erickson and Koppenhaver (2007) identify six different ways in which students with disabilities differ from their general education peers: variation in communication, cognition, physical abilities, senses, affect, and attention. Technology in the classroom provides educators with a means to deliver instruction to meet these needs (ibid).

Considerations of visual, auditory and tactile needs of the learner are also addressed through the use of technology for instruction. Educational computer programs are created to allow each child to work at his or her personal academic level. According to a 2002 summary of research findings, Apple Computer, Incorporated found, “Technology offers educators a way to individualize curriculum and customize it to the needs of individual students so all children can achieve their potential” (p. 4). Accessing student knowledge yields greater success, ownership and motivation (ibid). When students are successful in the classroom and are working to develop their own knowledge, they are more motivated to learn.

The interactive whiteboard has proven to have significant potential for meeting the needs of students with diverse learning styles and for engaging students in the learning process. According to Beeland (2002), the interactive whiteboard can be used to deliver instruction with consideration of the visual, auditory and tactile
modalities for learning. The extent to which these modalities are included in the lesson determine and enhance student engagement and motivation. Beeland further asserts that the level of student engagement will be determined by the presence of multiple modalities in instruction (ibid).

Likewise, Kennewell and Morgan (2003) suggest that, “from a pedagogical perspective, there are a number of key features of interactive whiteboards which take their role beyond mere display: interactivity, size, and accessibility for all learners, especially young children and those with a visual or physical impairment” (p.1). Interactive whiteboards can be considered an assistive technology device for all learners.

Levy (2002) emphasized that interactive whiteboards enhance the presentation of content which leads to student ownership of information and participation in class discussion and activities as it reduces the need for excessive note taking. Levy’s claims are further supported by the British Educational Communications and Technology Agency (BECTA) in that utilizing technology for whole-group instruction maintains the role of teacher in guiding and monitoring student learning (ibid).

The Information Age also places new demands on educators. Students begin their education having been exposed to a variety of technology since birth. From 2000-2002, the largest group of new users of the Internet were 2-5 years of age (Corporation for Public Broadcasting, 2003, as cited by Department of Education, 2005). Today’s students exist inherently in the age of the Internet (Department of
Education, 2005). Educators need to make better use of technology in the classroom to help students develop the necessary skills to be successful, independent learners. Hill-Clarke and Robinson (2003) believe that this can be achieved by creating a student-centered, teacher-facilitated learning environment.

One way the students can learn using computers is what Murphy, Penuel, Means, Korbak, Whaley and Allen (2002) describe as discrete educational software (DES) programs. These types of software programs are among the most widely available applications of educational technology in schools (ibid). While DES programs are a common use for students to learn from computers, students also need to utilize technology to enhance reasoning and problem-solving skills. Ringstaff and Kelley (2002) affirm that students can learn with computers when “technology is used as a tool that can be applied to a variety of goals in the learning process and can serve as a resource to help develop higher order thinking, creativity and research skills” (p.8).

Current research findings have also shown that students must engage in higher-order thinking tasks in order to use technology effectively. Wenglinsky (2005) acknowledged that using computers for skill and drill of taught concepts does not allow students to use higher-order thinking skills necessary to solve multi-step and more complex problems.

Contrary to Wenglinsky, Atherton (2005) suggests that it is essential for educators to build a solid foundation of basic knowledge and comprehension skills and strategies in order for students to be successful in the synthesis and evaluation of
newly taught concepts. Furthermore, one cannot effectively attempt higher levels of thinking until the basic concepts and thought processes are sufficiently utilized and retained (ibid). As stated by Carlson, Fletcher, Foorman, Francis and Schatscheider (2004), the basic rudimentary focus of instruction in elementary schooling is phonological awareness and reading readiness skills, the skills on which all future learning is built.

*Phonological awareness and reading readiness*

Our nation is currently engaged in a vast effort to ensure reading success for all students prior to exiting elementary school. According to Carlson et al (2004), there is a renewed interest in predicting reading readiness skills in young children, focusing on early intervention strategies. The NCLB Act states that current students who do not meet proficient literacy standards by 2013-2014 will face unprecedented consequences. Most children who receive focused early intervention support become functional readers (Foorman, Francis, Schatschneider, & Mehta, 1998; O’Connor, 2000; Torgesen, Wagner, & Rashotte, 1997, as cited by Bishop & League, 2006). With most educators facing limited resources, it is important to accurately determine which students are at risk and tailor instruction to meet specific student deficits.

Kindergarten has repeatedly been identified by researchers as a crucial time frame for assessing reading readiness and phonological awareness skills. Lonigan, Burgess, and Anthony (2000) and Bishop and League (2006) suggest that screening measures that incorporate letter identification, phonological awareness, and rapid automatized naming correlate with reading achievement throughout the primary and
intermediate grades. Carlson et al. (2004) further affirm that measures of letter name and letter sound knowledge, naming speed, and phonological awareness skills are good predictors of multiple reading outcomes by second grade.

Faced with the challenge of producing skilled readers, teachers need to be equipped with appropriate means to prevent reading failure. The need to focus instruction on early phonological awareness skills in kindergarten and first grade has proven successful as a means to help prevent reading failure in at-risk students. Hill-Clarke and Robinson (2003) believe that phonological awareness skills serve as a predictor of reading and writing success. Students with weak phonological awareness skills tend to have difficulty with reading and spelling (ibid). Therefore, the task of pinpointing exactly where each child is lacking in phonological skill development also becomes the daily goal of the classroom teacher, as well as meeting the needs of those students who are achieving and exceeding benchmarks (ibid).

Integrating technology into the classroom environment to support a variety of learning needs has proven successful. A study in 2005 by Segers and Verhoeven, exam the long term effects of computer training of phonological awareness in kindergarten students. Results showed that while technology does not take the place of human intervention, the computer presented obvious advantages for instruction, such as repetition, direct feedback, and lack of judgment (ibid). Technology proved to be a useful tool for enhancing phonological skill development.
Technology and student achievement

Technology must be integrated effectively in the classroom in order to realize its benefits and for students to be successful. Integration begins with the alignment of activities to district, state, and national standards. The goal of educators is to synthesize standards-based curriculum with technology in order to create student activities that meet educational objectives. As stated in the CEO Forum in 2001, "technology can have the greatest impact when integrated into the curriculum to achieve clear, measurable educational objectives" (p.2). Educators must focus on the needs of the learner and the curriculum and not simply on the use of technology itself. According to Martha Stone Wiske, co-director of the Educational Technology Center at the Harvard Graduate School of Education, "One of the enduring difficulties about technology and education is that a lot of people think about technology first and the education later" (as cited in Schacter, 1999, p.10). Technology must be thoughtfully used to support objectives and student achievement.

Research on educational technology conducted over the past 15 years has found a positive association between computer-based instruction and student achievement in reading and mathematics. Sivin-Kachala and Bialo (2000) examined 311 research studies on the effectiveness of technology on student achievement based on a 2000 study commissioned by the Software and Information Industry Association. Their findings revealed that when preschool thru high school students were immersed in technology-rich lessons, they were more likely to demonstrate significant gains across curriculum, improved motivation and increased self-esteem (ibid).
Roschelle, Pea, Hoadley, Gordin and Means (2000) identified four fundamental characteristics of how technology benefits student learning in the classroom: active engagement, participation, frequent interaction and feedback and connections to real-world contexts. Roschelle et al. further indicated that technology is more effective when embedded in broader educational reform in that it includes improvements in curriculum, teacher training, student assessment, and it considers a school’s capacity for change (ibid).

An examination of the use of technology in schools across New York State clearly demonstrates a shortage of teachers proficient in advanced technology skills. A new report was recently released from the University of the State of New York Technology Policy and Practices Council which outlines current difficulties with the use of technology K-12 and what measures are needed to ensure greater technology implementation and student success (McGrath, 2007). The report found that students use computers on average two hours or less a week and unlike many other states, New York does not have a state-sponsored broadband network to serve classrooms K-12 (ibid).

The development of a statewide technology network, by the Council, has been recommended to provide low-cost, uniform Internet services for schools, setting statewide standards for the acquisition and use of technology to support teaching and learning (ibid). This fulfills requirements for professional development in the use of technologies for both teachers and administrators while creating an Office of Instructional Technologies that reports to the State Education Department (ibid). This
report emphasizes that a decade of students have come and gone through New York State schools while technology integration remained stagnant (ibid). The 21st century demands change in order for our students to be competitive in the global job market beyond formal education.

Technology education must be seen as fundamental to achieving workforce competencies, especially when the competencies include critical thinking, solving semi-structured problems, and reasoning (Bybee and Starkweather, 2006). The next decade will present the United States with increased competition in the global economy with regards to new technologies. The Department of Education states in their 2004 National Education Technology Plan that, “the technology that has so dramatically changed the world outside our schools is now changing the learning and teaching environment within them” (p. 6). Every field will require mastery and application of new technologies, as well as, heightened skills in mathematics and science. It is the responsibility of the nation’s educational system to help secure economic success by ensuring that our students are prepared to meet these challenges (ibid).

Current research and government findings have indicated that today’s students are not adequately equipped to compete in the international job market (NCREL, 2005). Kay and Honey (2005) affirm that there are six areas critical to student success in the workplace. Students need to be able to communicate effectively, analyze and interpret data, understand computational modeling, manage and prioritize tasks, engage in problem solving and ensure security and safety (ibid). Technology
plays an important role in developing these skills in today’s learner. Bybee and Starkweather (2006) acknowledged that, “The emergence of economic issues and the essential role of technology in the global economy have highlighted the often too glaring omission of technology in K-12 school programs” (p. 31). Technology education has emerged as an important role in the American educational system, more so than at any other time in recent history (ibid). Students in the 21st century need to develop competencies that will promote future success, starting with the first days of schooling.
Introduction

The project has two major objectives. The primary objective of my research is to determine if technology has a positive impact on student motivation and achievement. Specifically, I want to find out if using technology to teach early phonological awareness skills meets the needs of all learners and increases mastery of skills taught. A second objective of the research study is to assess student attitude toward using technology in the classroom in preparing students for the future. The study is designed to examine the effectiveness of using technology to teach early phonological awareness skills for three weeks in an inclusion kindergarten classroom.

Participants

The members of the target group of this action research project are kindergarten students in a suburban school district located approximately 15 minutes south of Rochester, New York. This study included 37 kindergarten students from two classrooms. There are approximately 300 students in the entire school, which houses all students in kindergarten and first grade in the school district. The poverty rate in the school, demonstrated by the number of free and reduced lunches, is about 3%. The special education percentage for the district is 5%. I am the general education teacher in charge of the classroom using technology in this study. In my classroom, there are nine boys and ten girls. One student is a racial minority. This classroom is an inclusion classroom and four students have an individualized
education plan (IEP). Several other students also receive speech, occupational and/or physical therapy services. The second classroom used in this study is another general education classroom that received only the pre and post phonological awareness assessment. This classroom served as the control group and did not use technology. The classroom has nine girls and nine boys. There are no racial minorities and no students in this classroom with an IEP.

**Procedures**

Research on several phonological awareness continuums demonstrates that hearing and identifying rhyming word pairs and counting syllables in words serve as two initial concepts to be taught to students who are characterized as emergent readers and writers. These skills are identified on a newly created phonological awareness grid to be used for instruction in kindergarten classrooms in our district. These concepts are also identified as skills to be taught during the first ten weeks of instruction on our English Language Arts curriculum map and are identified as kindergarten level skills by the New York State Department of Education.

As part of the three week period of study, students were exposed to the concepts of rhyming and syllabication in text. Students listened to and discussed literature related to each concept during whole group instruction and small group guided reading instruction. Students further engaged in technology-based activities in a whole group setting on the Promethean ACTIVboard to learn and apply rhyming and syllabication skills. They also participated in small group and individual lessons during center time to practice learned skills on both the Promethean ACTIVboard and
student desktop computers. Examination of each skill took place five days a week during Literacy Centers and Shared Reading time. I spent one week focusing on each skill. The entire study took a total of three weeks to complete, allowing extra time for scheduling changes as needed.

*Instruments of study*

All students participated in a pre and post phonological awareness assessment to gather information regarding knowledge of rhyming and syllabication skills (see Appendix C). The pre-assessment was given individually to each student prior to instruction to gather a baseline. The content was taught for a three week period. The post-assessment was given to students immediately proceeding the instructional period. Results of each assessment were analyzed quantitatively to determine student achievement. I analyzed the results of both the pre and post assessment and used Microsoft Word to create tables to display data.

Students were assessed through the use of one-on-one interviews with the teacher. I met with each student to administer the student survey. The survey consists of four questions asked to gather information regarding student attitudes towards using technology (see Appendix D). Students were asked if they liked using the Promethean ACTIVboard and computers in school to learn and if they use technology at home. I also asked students to describe how technology helps them learn. The student survey was given following the instructional period. I further conducted informal anecdotal observations of students using technology during each instructional period. I noted positive and/or negative demonstrations of using
technology to learn reading readiness skills, as well as student engagement and attention while using technology versus other traditional methods of instruction (see Appendix E). The results of these informal observations were qualitatively analyzed to support student learning and attitude towards using technology.

Throughout the study, I used a variety of anecdotal notes and observations to determine how I could best help each student through the process of learning the concepts of rhyming and syllabication. Students were grouped based on the results of the pre-assessment data. The groupings remained flexible as student needs changed with each concept taught. Along with general notes, I created promethean flipchart pages to teach rhyming and syllabication skills (see Appendices A and B). Data from these various instruments and observations can be found in the next chapter.
Chapter IV

Results

Student achievement

At the conclusion of the research study, students in the targeted kindergarten classroom were evaluated through a triangulation of assessments. The improvement of student achievement in rhyming and syllabication skills was assessed by the use of the post phonological awareness skills assessment (see Appendix C). The post assessment scores were compared to the pre assessment scores recorded at the beginning of the study. A student attitude survey was given at the conclusion to gather information regarding use of technology. Anecdotal notes were also analyzed qualitatively to determine changes in student achievement, engagement, and motivation while using technology. Students in the control group were administered the pre and post phonological awareness skills assessment only.

The first progress reporting period for kindergarten and first grade reflected student growth from September 5, 2007 to November 14, 2007. By the end of the ten week marking period, kindergarten students were expected to be able to recognize rhyming word pairs and identify the number of syllables in spoken words containing one, two, or three syllables with mastery. Mastery of a skill is demonstrated by achieving a score of 10 out of 10 on the assessment. Students were given a pre and post phonological awareness skills assessment of 10 words to determine understanding and application of concepts taught.
The results of the pre and post assessment scores for rhyming from the targeted classroom are reported in Table 1.
Table 1: Comparison of Phonological Awareness Scores of Targeted Classroom-rhyming

<table>
<thead>
<tr>
<th>Student</th>
<th>Pre-assessment rhyming _/10</th>
<th>Post-assessment rhyming _/10</th>
<th>Difference</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>7</td>
<td>+6</td>
<td>600</td>
</tr>
<tr>
<td>C</td>
<td>0</td>
<td>8</td>
<td>+8</td>
<td>800</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>6</td>
<td>+6</td>
<td>600</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>10</td>
<td>+6</td>
<td>150</td>
</tr>
<tr>
<td>F</td>
<td>4</td>
<td>10</td>
<td>+6</td>
<td>150</td>
</tr>
<tr>
<td>G</td>
<td>6</td>
<td>10</td>
<td>+4</td>
<td>67</td>
</tr>
<tr>
<td>H</td>
<td>8</td>
<td>10</td>
<td>+2</td>
<td>25</td>
</tr>
<tr>
<td>I</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>J</td>
<td>4</td>
<td>10</td>
<td>+6</td>
<td>150</td>
</tr>
<tr>
<td>K</td>
<td>8</td>
<td>10</td>
<td>+2</td>
<td>25</td>
</tr>
<tr>
<td>L</td>
<td>2</td>
<td>8</td>
<td>+6</td>
<td>300</td>
</tr>
<tr>
<td>M</td>
<td>6</td>
<td>10</td>
<td>+4</td>
<td>67</td>
</tr>
<tr>
<td>N</td>
<td>4</td>
<td>10</td>
<td>+6</td>
<td>150</td>
</tr>
<tr>
<td>O</td>
<td>0</td>
<td>7</td>
<td>+7</td>
<td>700</td>
</tr>
<tr>
<td>P</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Q</td>
<td>8</td>
<td>10</td>
<td>+2</td>
<td>25</td>
</tr>
<tr>
<td>R</td>
<td>4</td>
<td>10</td>
<td>+6</td>
<td>150</td>
</tr>
<tr>
<td>S</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

According to Table 1, 15 out of 19 students in the targeted group improved in their ability to hear rhyming word pairs. Four students demonstrated mastery on the pre-assessment. Fourteen students achieved mastery of rhyming skills. Of the fourteen students that demonstrated mastery, only four students entered kindergarten with this skill, based on the pre-assessment data. The mean score of the pre-assessment was 5.2 out of 10. The mean score of post-assessment was 9.3 out of 10. Most students who entered kindergarten with some knowledge of hearing rhyming words demonstrated mastery. Students who entered kindergarten with limited or no knowledge of rhyme improved, but did not achieve mastery.
The results of the pre and post assessment scores for syllables from the targeted classroom are reported in Table 2.
According to Table 2, all students in the targeted group improved in their syllabication skills. Twelve students achieved mastery of counting one, two, and three syllable words. The mean score of the pre-assessment was 3.6 out of 10. The mean score of the post-assessment was 8.6 out of 10. Most students who entered kindergarten with some knowledge of syllables demonstrated mastery. Students who entered kindergarten with limited or no knowledge of syllables improved, but did not achieve mastery.

The results of the pre and post assessment scores for rhyming from the control group are reported in Table 3.
Table 3: Comparison of Phonological Awareness Scores of Control Group-Crhyming

<table>
<thead>
<tr>
<th>Student</th>
<th>Pre-assessment rhyming __/10</th>
<th>Post-assessment rhyming __/10</th>
<th>Difference</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>5</td>
<td>+5</td>
<td>500</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>10</td>
<td>+4</td>
<td>67</td>
</tr>
<tr>
<td>C</td>
<td>7</td>
<td>10</td>
<td>+3</td>
<td>43</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
<td>9</td>
<td>+3</td>
<td>50</td>
</tr>
<tr>
<td>E</td>
<td>8</td>
<td>10</td>
<td>+2</td>
<td>25</td>
</tr>
<tr>
<td>F</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>G</td>
<td>5</td>
<td>8</td>
<td>+3</td>
<td>60</td>
</tr>
<tr>
<td>H</td>
<td>9</td>
<td>10</td>
<td>+1</td>
<td>11</td>
</tr>
<tr>
<td>I</td>
<td>2</td>
<td>5</td>
<td>+3</td>
<td>150</td>
</tr>
<tr>
<td>J</td>
<td>0</td>
<td>6</td>
<td>+6</td>
<td>600</td>
</tr>
<tr>
<td>K</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>L</td>
<td>6</td>
<td>10</td>
<td>+4</td>
<td>67</td>
</tr>
<tr>
<td>M</td>
<td>4</td>
<td>9</td>
<td>+5</td>
<td>125</td>
</tr>
<tr>
<td>N</td>
<td>2</td>
<td>4</td>
<td>+2</td>
<td>100</td>
</tr>
<tr>
<td>O</td>
<td>4</td>
<td>8</td>
<td>+4</td>
<td>100</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>6</td>
<td>+6</td>
<td>600</td>
</tr>
<tr>
<td>Q</td>
<td>8</td>
<td>10</td>
<td>+2</td>
<td>25</td>
</tr>
<tr>
<td>R</td>
<td>3</td>
<td>7</td>
<td>+4</td>
<td>133</td>
</tr>
</tbody>
</table>

According to Table 3, 16 out of 18 students in the control group improved in their knowledge of hearing rhyming words. Two students demonstrated mastery on the pre-assessment. Eight students achieved mastery of hearing rhyming word pairs. The mean score of the pre-assessment was 4.7 out of 10. The mean score for the post-assessment was 8.2 out of 10. Students who entered kindergarten with some knowledge of rhyme achieved greater gains than those students who entered kindergarten with little or no knowledge of those skills.

The results of the pre and post-assessment scores for syllabication from the control group are reported in Table 4.
Table 4: Comparison of Phonological Awareness Scores of Control Group-syllables

<table>
<thead>
<tr>
<th>Student</th>
<th>Pre-assessment syllables /10</th>
<th>Post-assessment syllables /10</th>
<th>Difference</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0</td>
<td>3</td>
<td>+3</td>
<td>300</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>9</td>
<td>+5</td>
<td>125</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>10</td>
<td>+5</td>
<td>100</td>
</tr>
<tr>
<td>D</td>
<td>3</td>
<td>8</td>
<td>+5</td>
<td>167</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>8</td>
<td>+3</td>
<td>60</td>
</tr>
<tr>
<td>F</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>G</td>
<td>2</td>
<td>6</td>
<td>+4</td>
<td>200</td>
</tr>
<tr>
<td>H</td>
<td>6</td>
<td>8</td>
<td>+2</td>
<td>33</td>
</tr>
<tr>
<td>I</td>
<td>0</td>
<td>2</td>
<td>+2</td>
<td>200</td>
</tr>
<tr>
<td>J</td>
<td>0</td>
<td>3</td>
<td>+3</td>
<td>300</td>
</tr>
<tr>
<td>K</td>
<td>7</td>
<td>10</td>
<td>+3</td>
<td>43</td>
</tr>
<tr>
<td>L</td>
<td>3</td>
<td>6</td>
<td>+3</td>
<td>100</td>
</tr>
<tr>
<td>M</td>
<td>2</td>
<td>6</td>
<td>+4</td>
<td>200</td>
</tr>
<tr>
<td>N</td>
<td>0</td>
<td>1</td>
<td>+1</td>
<td>100</td>
</tr>
<tr>
<td>O</td>
<td>5</td>
<td>10</td>
<td>+5</td>
<td>100</td>
</tr>
<tr>
<td>P</td>
<td>0</td>
<td>4</td>
<td>+4</td>
<td>400</td>
</tr>
<tr>
<td>Q</td>
<td>3</td>
<td>9</td>
<td>+6</td>
<td>200</td>
</tr>
<tr>
<td>R</td>
<td>2</td>
<td>6</td>
<td>+4</td>
<td>200</td>
</tr>
</tbody>
</table>

According to Table 4, 17 out of 18 students in the control group improved in their knowledge of syllabication skills. One student demonstrated mastery on the pre-assessment. Four students achieved mastery of syllables. The mean score of the pre-assessment was 3.0 out of 10. The mean score for the post-assessment was 6.6 out of 10. Students who entered kindergarten with some knowledge of syllables achieved greater gains than those students who entered kindergarten with little or no knowledge of those skills.

A comparison of the targeted group with the control group indicates that the students who received instruction using technology demonstrated a stronger
understanding of emergent phonological awareness skills. The mean post-assessment scores for rhyming and syllabication in the targeted group were 9.3 and 8.6 out of 10, respectively. The mean post-assessment scores for rhyming and syllabication in the control group were 8.2 and 6.6 out of 10, respectively. The targeted group demonstrated a +1.1 greater difference than the control group in the post-assessment scores for rhyming and a +2.0 greater difference than the control group in the post-assessment scores for syllables. The students in the control group who learned rhyming and syllabication skills without an interactive whiteboard or classroom computers had fewer students demonstrate mastery. In the targeted group, fourteen students achieved mastery of rhyming skills compared to eight students in the control group. In the targeted group, twelve students achieved mastery of syllables compared to four students in the control group.

**Student attitude toward using technology**

At the completion of the study on using technology to support the development of early phonological awareness skills, students were given a survey of four questions to determine their attitudes toward the use of technology in the classroom. One question was used to show students' perception of using the Promethean interactive whiteboard. A second question was used to show students' perception of using the classroom computers. A third question was used to determine if students used a computer at home. The last question was used to gather information on how each student perceives technology as being helpful to their learning. The survey used "Yes" and "No" responses for three of the four questions
to determine student opinion and use of technology. One question presented a sentence prompt for students to finish a thought about how technology benefited their individual learning needs. The results of questions one and two regarding student perception of using technology at school are reported in Table 5.
Table 5: Student Attitude Survey Results – Using Technology at School

<table>
<thead>
<tr>
<th>Question</th>
<th>“Yes”</th>
<th>“No”</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you like using the Promethean board at school to learn?</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>2. Do you like using the computers at school to learn?</td>
<td>95%</td>
<td>5%</td>
</tr>
</tbody>
</table>

According to Table 5, survey results for using technology at school showed that 100% of students liked using the Promethean interactive whiteboard for learning opportunities. Ninety-five percent of students like using technology in the classroom to learn. One student responded that they did not like using the computers at school to learn.

The survey results for using computers at home are reported in Table 6.
Table 6: Student Attitude Survey Results - Using Computers at Home

<table>
<thead>
<tr>
<th>Question</th>
<th>&quot;Yes&quot;</th>
<th>&quot;No&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you use a computer at home?</td>
<td>84%</td>
<td>16%</td>
</tr>
</tbody>
</table>

According to Table 6, survey results for using computers at home showed that most students have and use a computer at home. Eighty-four percent or 16 students have a computer at home and use that computer for educational games. Two students do not have a computer at home and one student is not allowed to use the home computer.

The remaining question was written for students to express their general views toward using technology for learning opportunities and how they feel technology benefits their individual learning. A total of nineteen students responded to the question. Twelve students stated that they liked using technology to learn and that technology was fun. Seven students referenced the Promethean ACTIVboard as helping their learning. One student stated, “I like to see things on the Promethean board.” Another student responded, “We do calendar and weather on the Promethean board.”

Through classroom observation and facilitation of small group learning, I was able to observe that students quickly learned and enjoyed all rhyming and syllabication games taught using the interactive whiteboard and student desktop computers. Many students chose to use their recess time to continue the activities on the Promethean ACTIVboard and repeatedly requested to revisit the activities whole group and during centers. Overall, students were engaged and motivated by tasks
completed using technology and demonstrated positive attitudes towards using technology for learning opportunities.
Chapter V

Conclusions and Recommendations

The purpose of this thesis was to examine how utilizing technology for instruction of emergent phonological awareness skills in a kindergarten classroom impacted student achievement. My goal was to increase those skills for all students using an interactive whiteboard to foster characteristics which support early reading as well as create enjoyment, engagement and motivation to learn using technology. The data collected was compared to another kindergarten classroom that did not use technology to teach the same content. My focus was to determine if technology-based instruction would result in higher assessment scores when compared to traditional instructional methods. The assessment of student attitudes regarding the use of technology for learning was yet another important factor to consider.

Evaluation of the results of the assessment data, surveys, and interviews, allowed me to make some conclusions about the effectiveness of integrating technology into teaching and learning.

When observing the data, it was clear that students in both classrooms demonstrated an increased understanding of skills taught; however, the average scores for both the rhyming and syllabication assessments were higher in the targeted group. This suggests that the technology-based instruction was more effective in supporting student learning rather than the traditional activities done with the control group. The findings align themselves with the current research on technology-integration in the classroom. Numerous studies have shown that students achieve
greater success when technology is integrated into instruction compared with classrooms where technology is not used or integrated effectively. By completing several hands-on activities using both the Promethean ACTIVboard and the computers, students were able to demonstrate a better understanding of early phonological awareness skills and perform well on the assessment.

On the contrary, when examining the assessment results for syllabication, an interesting correlation was made with regards to syllabication and mathematics. Students who demonstrated mastery of syllabication skills were also able to demonstrate one-to-one correspondence with counting. Several students who did not demonstrate mastery of syllables were also not able to accurately count the number of times they clapped syllables in words. These students were not able to hear, clap, and count words with more than two syllables with consistency, while other students who did not achieve mastery of syllabication skills were not able to grasp the concept of counting one syllable words. Instead, they counted onset and rime rather than syllables when given a word like *man*: The response consisted of two syllables as they would say "m – an" and count the total.

Another conclusion regarding a possible discrepancy in syllabication data resulted from conversations with the teacher in the control group classroom. Upon examining data and discussing the methods of instruction, she admitted she had devoted more time to teaching rhyming skills and less time teaching syllabication. This information can be taken into account when looking at the mean scores for syllabication for both classrooms.
The survey results yielded some interesting thoughts as well. If we examine the positive statements, it is evident that all students in the targeted group enjoy learning using the Promethean ACTIVboard in the classroom. Interestingly, the statements, “It is fun to use,” and “I like to do things on the Promethean board,” show that students are engaged and motivated to learn using technology.

By analyzing the negative survey statement regarding technology at school, it is obvious that most students enjoy using technology both at school and at home. One student did not like using the computers at school because there are certain days when he has to share a computer with another student due to the student-to-computer ratio of 5:4. Most students prefer to use the computers independently. This further supports findings that in classrooms where technology is integrated, students are more engaged and demonstrate a more positive attitude toward learning.

Students engage in technology-related tasks throughout the day. We use technology during literacy centers, shared writing, math time, and science time. The Promethean ACTIVboard is also used to display center rotations, the calendar, and the weather graph. A daily schedule is posted on the ACTIVboard and many students begin their day by reading the schedule. This helps many of my students prepare themselves for the days events and any possible changes to our daily routine and increases the overall organization and time line for the school day. Students rely on this information to guide them throughout the day.

The Promethean board is also a highly requested activity for students to use during choice and indoor recess time. This correlates well with the current research
findings that in classrooms where technology is used students demonstrate a more positive attitude towards learning and demonstrate an increase in self-esteem. Parents also commented that their child had an increased interest with using technology at home. One parent commented that their child asked to purchase a Promethean ACTIVboard for their home. Other parents mentioned how much their child enjoyed learning using technology at school.

Many students who use a computer at home are confident with using the computers at school. Three students are responsible for starting and shutting down the computers in our classroom at the beginning and end of the day. Those students were chosen based on demonstration of above-average computer skill and knowledge upon entering kindergarten. Parent-comments, along with teacher observation, support current data regarding the positive effects and increased use of technology in society.

Present findings have shown that educators need to be provided with ample opportunities for professional development to support successful integration of technology. Further research should focus on other specific factors that contribute to technology and positive student achievement. Several studies have been completed on this topic with smaller groups of students rather than larger groups. It is my opinion that more in-depth research should be conducted to determine the impact of technology integration and student achievement in the classroom. More needs to be studied on this topic as the demand for incorporating technology into classroom instruction increases.
Throughout my teaching career, I have wondered if integrating technology in the classroom would be beneficial to the present and future learning of my students. We have been inundated by technological advances in many aspects of our daily lives. The expectation of our students to utilize these resources has become the norm. The current focus of our district mission is preparing our students for the year 2020. Society will be vastly different in ten years with regards to technology and the workforce. It was important to discover if technology would help students achieve greater success in the classroom in preparing for competition in the global economy.

By reviewing the literature on integrating technology in the classroom, I found that there are many benefits for student achievement through successful integration of technology. In classrooms where technology was incorporated effectively, I found that students demonstrated a positive attitude towards technology and a higher level of achievement with newly taught skills. Most students I observed were more engaged and tasks became more student-centered when technology was used for instruction. As a result, technology-based activities were created to teach students rhyming and syllabication skills. After teaching these skills to my kindergarten students, students were administered a phonological awareness assessment and a student attitude survey. Comparisons were made between my findings and another kindergarten classroom that did not incorporate technology into instruction.

I found that students in the targeted classroom, overall, achieved greater success than the students in the control group who were instructed using traditional methods. Students in the targeted classroom were engaged, motivated to learn, and
demonstrated positive attitudes toward technology and instruction. These conclusions reinforce what current educational research suggests about integrating technology into classroom instruction. Technology must be effectively integrated into the classroom environment in order to adequately prepare today's students for competition and success in tomorrow's workforce.
References


Appendices
Appendix A
Rhyme Time

Sort the rhyming words into the boxes.

cat

bee

clock

can
Appendix B
Syllable Suitcases

Count the syllables for each picture. Move to the correct suitcase.
Name _______________________________ Number ______

Phonological Assessment

**Part I: Rhyming words**
Listen to each rhyming word pair. Say yes if the words you hear rhyme. Say no if the words do not rhyme.

<table>
<thead>
<tr>
<th></th>
<th>yes</th>
<th>no</th>
<th></th>
<th>yes</th>
<th>no</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>man/fan</td>
<td>___</td>
<td>___</td>
<td>6.</td>
<td>boy/girl</td>
</tr>
<tr>
<td>2.</td>
<td>dog/cat</td>
<td>___</td>
<td>___</td>
<td>7.</td>
<td>sun/fun</td>
</tr>
<tr>
<td>3.</td>
<td>pet/jet</td>
<td>___</td>
<td>___</td>
<td>8.</td>
<td>in/out</td>
</tr>
<tr>
<td>4.</td>
<td>fish/wish</td>
<td>___</td>
<td>___</td>
<td>9.</td>
<td>pot/hot</td>
</tr>
<tr>
<td>5.</td>
<td>up/top</td>
<td>___</td>
<td>___</td>
<td>10.</td>
<td>look/long</td>
</tr>
</tbody>
</table>

**Part II: Syllabication**
Listen to each word. Clap and count the number of syllables you hear in each word.

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>box</td>
<td>___</td>
<td>6.</td>
<td>umbrella</td>
<td>___</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>feather</td>
<td>___</td>
<td>7.</td>
<td>button</td>
<td>___</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>computer</td>
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<td>8.</td>
<td>man</td>
<td>___</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>window</td>
<td>___</td>
<td>9.</td>
<td>dragon</td>
<td>___</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>cup</td>
<td>___</td>
<td>10.</td>
<td>bat</td>
<td>___</td>
<td></td>
</tr>
</tbody>
</table>
Appendix D
Technology Survey

1. Do you like using the Promethean board at school to learn?
   - Yes
   - No

2. Do you like using the computers at school to learn?
   - Yes
   - No

3. Do you use a computer at home?
   - Yes
   - No

4. Technology helps me learn because ____________________________
   ____________________________
Appendix E
## Anecdotal Observation Recording Sheet

<table>
<thead>
<tr>
<th>Date:</th>
<th>Time:</th>
<th>Student(s):</th>
<th>Notes:</th>
</tr>
</thead>
<tbody>
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