THE INTEGRATION OF A COMPUTER-BASED EARLY READING PROGRAM TO INCREASE ENGLISH LANGUAGE LEARNERS' LITERACY SKILLS

by **Laurie James**
Western Washington University
516 High Street
Bellingham, WA 98225, USA
laurie.james @ wwu.edu

Abstract

The intention of this study was to establish if the third grade English Language Learners improved reading fluency when using the computerized Waterford Early Reading Program. This quantitative study determined the effectiveness of the Waterford Early Reading Program at two Title I elementary schools. Students not meeting Grade Level Expectations (GLEs) in reading were enrolled into the computer emphasized reading program. An Analysis of Variance design determined if the students improved reading fluency as measured by the Victory 1000 Oral Reading Fluency test.

The findings revealed a correlation between the students who used the Waterford Early Reading Program and reading achievement scores of the students enrolled in the traditional reading program.

Keywords: achievement gap, computer emphasized reading program, English language learner, grade level expectations, proficient, oral reading fluency, traditional reading program

1. Introduction

Students below grade level in reading by the time they enter the fourth grade are likely to experience academic difficulties and literacy problems in high school (Armbruster, Lehr, & Osborn, 2003). There is a need to close the achievement gap between students who are and are not proficient in reading. Proficiency means a measurement of growth through the student's application of knowledge as well as demonstrating mastery of the Essential Academic Learning Requirements for the subject and grade level (U.S. Department of Education, 2010). Students reaching proficiency demonstrate competency over a challenging subject matter and implement subject-matter knowledge and analytical skills appropriate to the topic.

Adults who struggle with reading may have faced literacy obstacles in the primary grades (Snow, Burns, & Griffin, 1998). The challenge in education is getting kindergarten through third grade students at Title I schools to meet grade level standards for reading on state academic assessments (Office of Superintendent of Public Instruction, 2012). Title I schools have at least 40% of enrolled students who are registered in the free or reduced lunch program and come from low-income households (U.S. Department of Education, 2010). Since educational settings in the United States are continuing to get an increase of students who do not speak English as their first language, teachers must create learning environments in which students are able to perform their best. Therefore, professional educators play a critical role in supporting language development opportunities for the students who do not have a strong grasp of English. Sociolinguistic background of spoken language use between native English speakers and English language students will be provided.

2. Problem background

2.1. Legislative acts regulating reform of education in the United States

In 1965, the United States Congress passed the Elementary and Secondary Education Act (ESEA), which authorized the largest part of the funding for federal K-12 education. The ESEA, known as the *War on Poverty*, supported by President Lyndon B. Johnson was to close the achievement gap between privileged and underprivileged children (U.S. Department of Education, 2010).

Also, the National Commission on Excellence in Education studied the quality of education in the United States. This initiated the development of the Imperative for Educational Reform of 1983. The report, known as *A Nation at Risk*, implied that the quality of learning and teaching in American schools was quickly falling behind other countries (U.S. Department of Education, 2010). The recommendations gave strength to the curriculum with more emphasis on academics and raising expectations for students using measurable standards. This was the beginning of the modern standards movement to determine if students were proficient in reading, math, and science.

The Elementary and Secondary Education Act has developed over time with the reauthorization of the *No Child Left Behind Act* of 2001, which held schools more accountable

for improving students' academic achievements, training teachers, and providing quality instruction for limited English proficient students. In January 2010, reform occurred again with the *Race to the Top* program, which is a competitive grant program to encourage and reward states implementing significant reforms in the following four education areas:

1. enhancing standards and assessments,
2. improving the collection and use of data to increase teacher effectiveness,
3. achieving equity in teacher distribution,
4. turning around struggling schools failing to make adequate yearly progress (U.S. Department of Education, 2010).

Even though the name of the original ESEA has changed and standards have been rewritten, the needs of students from low-income families are still addressed.

If a student fails to learn to read adequately as a child, social and economic advancements in the future will be difficult (Snow, Burns, & Griffin, 1998). Professional educators must provide support that allows students to make progress and develop foundational literacy skills to meet common core standards outlined by the state. The requirements of the *Race to the Top* are beneficial to this study because implementing high-quality instruction allows opportunities for students to close the achievement gap. Therefore, there is a need to ensure that students, including those with limited English, have an opportunity to be proficient in reading English on state academic assessments (U.S. Department of Education, 2010).

By diversifying literacy instruction and using high-levels of academic assessment methods, students will have more than one way to show gains in literacy. Through the integration of computer programs into the reading curriculum, the students are learning at their own rate and reading level receiving one-on-one instruction. The effectiveness of computer-assisted instruction improves reading abilities of English Language Learners (ELLs) and helps attain higher proficiency levels (Sivin-Kachala & Bialo, 2000).

2.2. Oral reading fluency

Prior to the twentieth century, oral reading had been the main form of entertainment and information sharing (Rasinski, 2010). Families shared books by having members read the text aloud. In the classroom, oral reading helped strengthen decoding skills and foster reading fluency. Teachers would assess students' reading on the quality of their oral reading as well as

reading simultaneously to classmates. By the beginning of the twentieth century, the popularity of oral reading had begun to dwindle and a shift to silent reading was the preferred mode of reading instruction (Rasinski, 2010).

Modeling oral reading fluency is a skill used with reading instruction by reading aloud with accuracy, speed, proper expression, and fluency. To reinforce the skills used by proficient readers, the teacher thinks aloud, makes predictions, and ponders upon questions while reading text (Tankersley, 2003). Given that fluency is one of the main components of an effective reader, the classroom teacher will need to also present the text naturally with pauses and appropriate pitch when reading aloud (Putnam, 1996).

Students who struggle with oral reading can have the most difficulty in reading comprehension. To become a fluent reader, students limited in English will need to develop their decoding skills by concentrating on making sense from what they read (Tankersley, 2003). English Language Learners who do not recognize words and phrases instantly use much cognitive energy decoding the words while trying to remember meaningful text.

2.3. Computer-Assisted Instruction

Since the mid-1980s, computer-assisted instruction at schools has increased rapidly and has been identified as an effective teaching approach to improve the achievement of at-risk students (Barley et al., 2002). Technology allows students to revise previous work easily because of the immediate feedback from the computer software (Scoter & Boss, 2004). Computer software and other technologies should not replace the classroom curricula but should blend activities and skills with the teacher's instruction. The teacher is the key to effective computer use in literacy education whereas computers are merely a support to the curriculum implementation (Putnam, 1996).

Sivin-Kachala and Bialo (2000) summarized educational technology research compiling information based on 311 research reviews and reports. Within the reviewed reports, primary students using computer-assisted instruction in reading made more academic improvements than did students who did not use technology to enhance reading. By incorporating technology tools, students receive immediate feedback from computer software programs. Software is effective as it allows students to discover various ways to learn while instructionally matching learning and teaching goals appropriate for multi-age learners.

Scoter and Boss (2004) reported upon a range of areas that determine how computer technology enhances student learning. The two areas include meeting the needs of diverse learners and understanding the role of technology in literacy. Students in technology-rich learning environments perform better on specialized reading tests than do students receiving traditional classroom instruction (Sivin-Kachala & Bialo, 2000).

2.4. Computerized Reading Program

The Waterford Early Reading Program attempts to maximize computer instruction by motivating students to read while providing visual and auditory feedback (Waterford Institute, 2012). The computerized Waterford Early Reading Program is a supplemental program designed as an intervention curriculum to develop literacy, which offers potential for positive change, and constitutes an alternative to worksheets or workbooks (Pearson Digital Learning, 2006). The Waterford Early Reading Program adapts instruction through an easy-to-use computer program that enhances reading skills at each student's pace (Pearson Digital Learning, 2006).

Computer technology promotes verbal communication and the acquisition of English for ELLs (Green, 2005). In the classroom setting, computers can provide a rich contextual environment allowing students to be constantly engaged in literacy activities. Providing additional practice in reading and implementing individual instruction are the ways in which computer-assisted teaching tailors learning to each student's unique needs. When using a computer in a one-on-one setting, the English language student becomes a more active learner building long-term recall of vocabulary. Computer programs give immediate feedback that guide students through problem-solving activities (Scoter & Boss, 2004). Furthermore, students show greater gains in reading comprehension with the integration of technology-based instruction (Sivin-Kachala & Bialo, 2000). However, computer-assisted instruction is only one method to enhance a traditional reading program and is not a substitute for quality teaching (Green, 2005).

Established in 1976 as an educational research organization, the Waterford Institute had a mission to use computer software and new technologies to help educate disadvantaged primary students. For this reason, the computerized Waterford Early Reading Program provided students with a balanced, comprehensive, and research-based curriculum through high-quality models (Pearson Digital Learning, 2006).

The Waterford Early Reading Program provides a process to help students become fluent readers by first assuming each student is a nonreader. The primary goal of the Program is to ensure that students have quality instruction to become strong readers and prevent reading difficulties. Implemented for approximately 20-minutes five days a week, the computerized reading software program is a continuum of lessons customized to each student's reading level (Pearson Digital Learning, 2006). These specific reading levels correspond with the Grade Level Expectations (GLEs) that delineates the essential content learned whereas students demonstrate the ability to use the reading process. The GLEs outline the learning standards in which students must demonstrate word recognition strategies to read fluently and proficiently (Office of Superintendent of Public Instruction, 2012).

After recording the student data, the reading software program is ready to use. The student uses a designated computer and puts on the headphones to hear the directions. Included at each computer station, the student will have access to a keyboard, mouse, microphone, printer, and computer camera mounted on the monitor. These technology components get used throughout various lessons and are vital to the success of this computerized reading program (Waterford Institute, 2012). Academic areas displayed for each student on the summary report include the current lesson, fluency speed score, skill builder activity, and comprehension activities.

The Waterford Early Reading Program is a technology-driven reading curriculum that builds a solid foundation supporting oral reading skills needed to recite poetry, sing songs, and act out plays (Waterford Institute, 2012). The Waterford Early Reading Program is for beginner learners as well as readers needing additional reinforcement with reading strategies. To build reading fluency skills, primary students need to choral read, follow along with modeled reading, read aloud to a partner, listen to recorded text, and practice repeated reading (Rasinski, 2010).

3. The study

3.1. The aim of the study

The purpose of this research was to determine if the third grade English Language Learners improve reading fluency when using a computer emphasized reading program with a traditional reading program. To measure the effectiveness of the Waterford Early Reading Program, the

Victory 1000 Oral Reading Fluency (ORF) pretest/posttest design established if there was a significant difference of growth in oral reading fluency. The ORF test is a grade-appropriate measurement that compares an individual student's fluency scores to other students in the school district and to the national target score. The target score is the national average of correct words read aloud per minute at each grade level.

Academic growth in reading fluency will verify if the implementation of the Waterford Early Reading Program facilitates the development of the English language by improving literacy. In a short amount of time spent assessing oral reading fluency, the teacher assesses a student's word recognition and fluency. Then the teacher can use the computer emphasized reading program to assist in developing literacy skills of primary students (Pearson Digital Learning, 2006).

Administering the ORF test at the beginning of the school year allowed educators to collect information needed to provide appropriate instruction for students to meet Grade Level Expectations in reading. The learning requirements that coincide with fluency enhancing comprehension include: 1) read aloud grade-level expository text and narrative text accurately, using appropriate phrasing, pacing, and expression, and 2) read aloud unrehearsed grade-level text with fluency in a range of words correct per minute.

3.2. Significance of the study

The results of this study can help guide educators in their quest for improving oral reading fluency. Understanding the role of technology in tomorrow's classrooms is an essential component in education (Scoter & Boss, 2004). The Waterford Early Reading Program draws upon the results of research, classroom feedback, and advances in technology (Waterford Institute, 2012). The process of comprehending involves anticipating what will be read next as well as understanding the text that has just been read.

In grades kindergarten through third, oral reading fluency plays a significant role in effective reading instruction. A student's oral reading errors can be analyzed to diagnose reading problems. Inferences about the strategies a student uses to read orally help identify the type and number of errors. Therefore, error analysis enables the teacher to determine if a student lacks skills in areas of identifying syllables, recognizing initial consonant sounds, pronouncing unfamiliar words, or differentiating between similarly spelled words (Tankersley, 2003).

To foster reading skills and attain higher proficiency levels, the teacher uses reading components with direct instructional techniques through whole group reading lessons (Armbruster, Lehr, & Osborn, 2001). Specific reading skills students need to maser are phonemic awareness, phonics, fluency, vocabulary, and comprehension. Direct teaching of reading skills provides a foundation for successful literacy development helping students understand what they are reading (Snow, Burns, & Griffin, 1998). After a student becomes a proficient reader, they can gain meaning and make connections between schema and the new information within the text (Tankersley, 2003).

Professional educators can use technology in the primary grades to promote active learning as a regular part of students' educational experiences (Scoter & Boss, 2004). There is a positive relationship between reading skills and use of computers to improve literacy of students in the first grade through the sixth grade (Barley et al., 2002). Educational organizations are to provide opportunities for students to use whatever instructional technologies are available as a means of improving academic achievement in literacy while enhancing their learning environment.

A sign of a good reader is the constant effort to construct meaning from text. If text is read in an ineffective way, students cannot retain information and relate ideas expressed to their background knowledge (National Reading Panel, 2000). Background knowledge and experiences are essential components to allow reading fluency to result in comprehension. Making technology literacy a goal in schools can be accomplished through the integration into core subjects (Nelson, Palonsky, & McCarthy, 2012).

When students are behind in reading during kindergarten and first grade, they continue to fall further behind in school (Nelson et al., 2012). Students who have problems with word recognition or fluency struggle with comprehension and reading proficiency. Fluent readers can connect ideas within the text, thereby improving comprehension and can easily group text into larger phrases or complete sentences instead of reading word-by-word (Putnam, 1996). Literature supports the conclusion that reading with speed, accuracy, and proper expression are critical components of a fluent reader (National Reading Panel, 2000).

Armbruster, Lehr, and Osborn (2001) reported that third grade students should develop strategies to read fluently by applying word recognition skills and using appropriate pacing when reading grade-level text aloud. Fluent readers can decode written words accurately without

unnecessary hesitation (Putnam, 1996). The stronger the students' fluency in reading, the greater the resulting comprehension with the materials read (Tankersley, 2003). A student who is a fluent reader interacts continually to construct meaning from the written text. By using the computer as a learning tool, the student can make steady gains. Since each student reads at various rates, the independent use of the computer presents skills at their own pace (Armbruster et al., 2003).

Oral reading plays an important role in effective reading instruction and can build confidence in young readers. As a result, educational organizations have an obligation to make certain that reading programs build basic skills necessary for students to become proficient successful readers.

3.3. Research questions

This study aimed at determining if and to what extent the Waterford Early Reading Program increased the third grade English Language Learners' oral reading fluency scores. The results for the data analysis examined the third grade English Language Learners who used the Waterford Early Reading Program in their educational environment. To establish a need for this research, the following questions were asked in this quantitative research:

1. Did the computerized Waterford Early Reading Program improve oral reading fluency of English Language Learners?
2. Did the computerized Waterford Early Reading Program result in oral reading fluency scores for English Language Learners closer to those of native English speakers by closing the achievement gap?

3.4. Participants of the study

In September, professional educators identified third grade ELLs who did not meet the Grade Level Expectations in reading. Based on reading scores of the third graders unable to show proficiency in reading, professional educators prioritized students as possessing the greatest need to improve reading fluency and comprehension. The students selected from two Title I elementary schools would receive additional reading services by having the Waterford Early Reading Program incorporated into their educational day.

There were 36 students enrolled in the treatment group who used the Waterford Early Reading Program. Out of these 36 students, there were 20 Victory 1000 Oral Reading Fluency test scores selected. There were 105 students in the control group who did not use the Waterford Early Reading Program. Out of these 105 students, there were 80 Victory 1000 Oral Reading Fluency test scores selected.

3.5. Design and procedure

The intent of this study was to determine if the third grade English language students improved reading fluency percentages as measured through the Victory 1000 Oral Reading Fluency test. For this research study, the Statistical Package for the Social Sciences software randomly selected scores from the research groups, tested data with Analysis of Variance, and used Pearson chi-square to determine how well a sample distribution fits the hypothesized distribution.

Academic growth in reading fluency identified the group of ELL students who participated in the Waterford Early Reading Program and students in a traditional reading program who did not take part in the computerized curricula. This design identified increases or decreases in the academic reading percentages of the third grade students.

There was a comparison between the mean percentage scores from the randomly selected third grade ELLs in the treatment group and the mean percentage score of the randomly selected native English speakers in the control group. Students experienced similar developmental processes over the passage of time. A second analysis conducted with the treatment group showed the third grade students' average score within the school district and the national target scores for third grade. Comparisons presented the mean percentage growth from within these groups.

The Waterford Early Reading Program was the independent variable and the Victory 1000 Oral Reading Fluency test was the dependent variable. The pretest-posttest scores were independent and designed to measure the effect of the Waterford Early Reading Program.

The Statistical Package for the Social Sciences predictive analytic software program randomly selected students for the research group as well as tested data using Pearson chi-square and within-subjects Analysis of Variance. The Analysis of Variance was the quantitative data analysis used to test differences between means and any standard deviation (*SD*) for the pretest-

posttest. The within-subjects design tested the null hypothesis of the treatment group and control group to establish that the means were equal. A within-subjects test analyzed statistical data by measuring changes in performance over time.

4. Results and findings

The summary showed observable improvements for the English Language Learners in the treatment group and the native English speaker group. The English language students' pretest scores in the treatment group ranged from 9 to 121 words read per minute and their posttest scores ranged from 42 to 166 words read per minute. The treatment group had a mean score of 55 (*SD*=38.12) for the pretest and 89.6 (*SD*=35.06) for the posttest. The treatment group increased their average oral reading fluency scores by 62.9%.

The pretest scores from the native English speaker group ranged from 6 to 200 words read per minute and the posttest scores ranged from 31 to 237 words read per minute. The native English speakers had a mean score of 102.8 (*SD*=40.81) for the pretest and 130.4 (*SD*=41.47) for the posttest. The native English speakers increased their average oral reading fluency scores by 26.8%. As a result, the English language students in the treatment group increased their average oral reading fluency scores more than native English speakers.

Table 1 shows a comparison of the mean number of words read correctly in one-minute for the pretest-posttest and the standard deviation. The scores correspond to the third grade English language students in the treatment group who used the Waterford Early Reading Program and the native English speakers who used a traditional reading program. Based on the probability value less than or equal to .05, results revealed no significant differences.

Table 1. Comparison of the oral reading fluency scores.

Third Grade Students	Pretest		Posttest	
	Mean	*SD*	Mean	*SD*
Treatment (n=20)	55	38.12	89.6	35.06
Control (n=80)	102.8	40.81	130.4	41.47

$F = 2.004$, $p = .160$

Table 2 shows the mean scores for the number of words read correctly in one minute for the treatment group, the third grade district average, and the national target group. Third grade students within the school district had a mean score for the pretest of 109 and 144 for the posttest and their scores increased by 32.1%. The students who formed the national target group had a mean score for the pretest of 99 and 113 for the posttest and their scores increased by 14.1%. Thus, the treatment group increased their mean oral reading fluency scores 30.8% more than the district average and 48.8% more than the national target scores.

Table 2. Mean number of words read correctly for third grade students.

Third Grade Students	Pretest September	Posttest May
Treatment Group	55	89.6
School District Average	109	144
National Target	99	113

By focusing on early intervention to close the achievement gap, the computerized reading program emphasizes individual instruction through the integration of technology. This research study revealed that the Waterford Early Reading Program increased English Language Learners' oral reading fluency scores more than a more traditional treatment proposed to the native English speaker group. Fluent readers can read words effortlessly maximizing the amount of cognitive energy directed to make sense of the text (Rasinski, 2010). Therefore, the results of this study can help guide professional educators and stakeholders in their pursuit to have students meet grade level standards in reading before entering the fourth grade.

5. Implications for the future and limitations of the present study

Computer software programs are not an immediate fix to improve test scores at school. From the information gained throughout this study, the Title I schools could identify other areas students were not meeting Grade Level Expectations. The reading fluency tests can be administered more than twice throughout the school year and used as an assessment tool to make inferences about the strategies students use based on the number and type of errors. By gauging a student's reading proficiency, the teacher has the opportunity to alter or modify instruction to meet learners' needs.

The interpretation of findings suggests that third grade students received similar reading instruction. However, there occurred certain limitations because the study looked only at one testing criteria and did not take into account academic achievements from the previous grades. Another limitation was a small number of the students who formed the treatment group. The study did not take into account such variables as the number of years the students in the treatment group had been speaking English, parental support and the proficiency of English spoken at home, which could have influenced the outcomes of the English Language Learners' oral fluency scores as well.

Reading has always been an important aspect of the curricula in the primary grades. Public schools must follow testing regulations to ensure students demonstrate academic achievements through standardized test results (U.S. Department of Education, 2010). Ongoing research from professional organizations could guide educational settings to determine the best strategy to provide children with ample opportunities to learn how to read.

6. Conclusion

The findings revealed a correlation between the students who used the Waterford Early Reading Program and reading achievement scores of the students enrolled in the traditional reading program. As evidenced by the study, the integration of a computerized reading program in third grade had an effect on English Language Learners' mean oral reading fluency scores on the Victory 1000 Oral Reading Fluency test. In the future, computerized programs may assist elementary schools to meet literacy goals and show greater improvements in English Language Learners' reading fluency and comprehension scores. This study represented a small step in exploring the influence of integrated computer software on an elementary reading program.

References

Armbruster, B., Lehr, F., & Osborn, J. (2001). *Put Reading First: Research Building Blocks of Reading Instruction.* Washington, D.C.: National Institute for Literacy, National Institute of Child Health and Human Development, U.S. Department of Education, U.S. Department of Health and Human Services.

Armbruster, B., Lehr, F., & Osborn, J. (2003). *A Child Becomes a Reader: Kindergarten through Third Grade (2nd Ed.).* Washington, D.C.: National Institute for Literacy, National Institute of Child Health and Human Development, U.S. Department of Education, U.S. Department of Health and Human Services.

Barley, Z., Lauer, P., Arens, S., Apthorp, H., Englert, K., Snow, D., & Akiba, M. (2002). *Helping At-Risk Students Meet Standards: A Synthesis of Evidenced-Based Classroom Practices.* Washington, D.C.: U.S. Department of Education.

Green, T. (2005). Using technology to help English language students develop language skills: A home and school connection [Electronic version]. *Multicultural Education*, 13(2), 56-59.

National Reading Panel. (2000). *Teaching Children to Read: An Evidence-Based Assessment of the Scientific Research Literature on Reading and its Implications for Reading Instruction.* Washington, DC: National Institute of Child Heath and Human Development.

Nelson, J. L., Palonsky, S. B., & McCarthy, M. R. (2012). *Critical Issues in Education: Dialogues and Dialectics.* New York, NY: McGraw-Hill Higher Education.

Office of Superintendent of Public Instruction. (2012). *Title I.* Retrieved January 6, 2014, from http://www.k12.wa.us/TitleI.

Pearson Digital Learning. (2006). *Waterford Early Reading Program: Research Summary.* Scottsdale, AZ: Pearson.

Putnam, L. (1996). *How to Become a Better Reading Teacher: Strategies for Assessment and Intervention*. Englewood Cliffs, NJ: Prentice Hall.

Rasinski, T. (2010) *Fluent Reader: Oral Reading Strategies for Building Word Recognition, Fluency, and Comprehension* (2nd ed.). Jefferson City, MO: Scholastic Professional Books.

Scoter, J. V., & Boss, S. (2004). *Learners, Language, and Technology: Making Connections that Support Literacy.* Portland, OR: Northwest Regional Educational Laboratory.

Sivin-Kachala, J., & Bialo, E. (2000). *2000 Research Report on the Effectiveness of Technology in Schools*. Washington, DC: Software & Information Industry Association.

Snow, C., Burns, M. S., & Griffin, P. (1998). *Preventing Reading Difficulties in Young Children*. Washington, DC: National Academy Press.

Tankersley, K. (2003). *Threads of Reading: Strategies for Literacy Development.* Alexandra, VA: Association for Supervision and Curriculum Development.

U.S. Department of Education. (2010). Elementary & secondary education. Retrieved January 6, 2014, from http://www.ed.gov/policy/elsec/leg/esea02/index.html,

Waterford Institute. (2012). Waterford Early Reading Program. Retrieved January 6, 2014, from http://www.waterford.org/products/early-learning.